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The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) Implementation Guidance

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This document provides guidance to states, tribes, and U.S. Environmental Protection Agency (EPA) Regions exercising primary enforcement responsibility under the Safe Drinking Water Act (SDWA) and contains EPA's current policy recommendations for complying with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). Throughout this document, the terms "state" or "states" are used to refer to all types of primacy agencies including U.S. territories, Indian tribes, and EPA Regions.

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List of Acronyms and Abbreviations

CAFO	Concentrated Animal Feeding Operation
CCR	Consumer Confidence Report
CDC	Centers for Disease Control
CFD	Computational Fluid Dynamics
CFE	Combined Filter Effluent
CFR	Code of Federal Regulations
CT	The Residual Concentration of Disinfectant (mg/L) Multiplied by the Contact Time (in minutes)
CWS	Community Water System
DBPs	Disinfection Byproducts
DCTS	Data Collection and Tracking System
EPA	U.S. Environmental Protection Agency
FBRR	Filter Backwash Recycling Rule
FEMA	Federal Emergency Management Agency
FRDS	Federal Reporting Data System
GAC	Granular Activated Carbon
GWUDI	Ground Water Under the Direct Influence of Surface Water
HAA5	Haloacetic Acids (Monochloroacetic, Dichloroacetic, Trichloroacetic, Monobromoacetic and Dibromoacetic Acids)
HQ	Headquarters
ICR	Information Collection Rule
ICRSS	Information Collection Rule Supplemental Survey
ICRSSL	Information Collection Rule Supplemental Surveys of Large Systems
ICRSSM	Information Collection Rule Supplemental Surveys of Medium Systems
IDSE	Initial Distribution System Evaluation
IESWTR	Interim Enhanced Surface Water Treatment Rule
IFE	Individual Filter Effluent
IPMC	Information Processing and Management Center
Log	Logarithm (common, base 10)
LRAA	Locational Running Annual Average
LRV	Log Removal Value
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCF	Membrane Cartridge Filter
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
M-DBP Cluster	Microbial-Disinfectants/Disinfection Byproducts Cluster
MRDL	Maximum Residual Disinfection Level

M/R	Monitoring and Reporting
NCWS	Noncommunity Water System
NIPDWR	National Interim Primary Drinking Water Regulations
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulation
NTNCWS	Nontransient Noncommunity Water System
NTU	Nephelometric Turbidity Unit
OECA	Office of Enforcement and Compliance Assurance
OGC	Office of General Counsel
OGWDW	Office of Ground Water and Drinking Water
ORC	Office of Regional Counsel
POTW	Publicly Owned Treatment Works
PWS	Public Water System
PWSS	Public Water System Supervision
Q&A	Questions and Answers
QA	Quality Assurance
QCRV	Quality Control Release Value
RAA	Running Annual Average
SDWA	Safe Drinking Water Act
SDWIS/FED	Safe Drinking Water Information System/Federal
SNC	Significant Non-complier
Stage 1 DBPR	Stage 1 Disinfectants and Disinfection Byproducts Rule
Stage 2 DBPR	Stage 2 Disinfectants and Disinfection Byproducts Rule
Subpart H	PWS using surface water or ground water under the direct influence of surface water
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TMDL	Total Maximum Daily Loads
TOC	Total Organic Carbon
TT	Treatment Technique
TTHM	Total Trihalomethanes (Chloroform, Bromodichloromethane, Dibromochloromethane, and Bromoform)
UCMR	Unregulated Contaminant Monitoring Rule
UV	Ultraviolet Light

Introduction

This document provides guidance to EPA Regions and states exercising primary enforcement responsibility under the Safe Drinking Water Act (SDWA) regarding implementation of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) under the SDWA. It also provides guidance to the public and the regulated community regarding the U.S. Environmental Protection Agency's (EPA's) interpretation of the statute and regulations. This guidance is designed to implement national policy on these issues.

The SDWA provisions and EPA regulations described in this document contain legally binding requirements. This document does not substitute for those requirements, nor is it a regulation itself. It does not impose legally-binding requirements on EPA, states, or the regulated community and may not apply to a particular situation based upon the circumstances. EPA and state decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance, where appropriate. Any decisions regarding a particular facility will be made based on the applicable statutes and regulations. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation. EPA will then consider whether or not the recommendations or interpretations in the guidance are appropriate in that situation based on the law and regulations. EPA may change this guidance in the future.

This manual contains the following sections:

- **Section 1** summarizes the rule requirements of the LT2ESWTR and presents a timetable of important dates.
- **Section 2** lists the "stand-alone" guidance materials that will help states and public water systems (PWSs) adopt each new requirement.
- **Section 3** discusses state implementation activities.
- **Section 4** covers state primacy revision requirements, including a detailed time frame for application review and approval. This section also contains guidance and references to help states adopt each new special primacy requirement included in these rules.
- **Section 5** addresses violation determinations and associated reporting requirements to assist states in their compliance activities.
- **Section 6** provides examples of violations requiring public notification and sample language to include in Consumer Confidence Reports (CCRs).

The appendices of this document also provide information that will be useful to states and EPA Regions throughout the primacy revision application process.

- **Appendix A** contains the primacy revision application crosswalk for the Rule.
- **Appendix B** contains the rule language of the LT2ESWTR.
- **Appendix C** contains fact sheets and quick reference guides for the Rule.
- **Appendix D** presents flowcharts to help states and systems implement the Rule.

- **Appendix E** contains various templates for letters that states can tailor to meet their needs.

- **Appendix F** contains information about the Data Collection and Tracking System.

- **Appendix G** contains checklists for reviewing documentation submitted by systems.

- **Appendix H** contains guidance for reviewing extension requests under Section 1412(b)(10) of the Safe Drinking Water Act.

Please note that, in several sections, the guidance makes suggestions and offers alternatives that go beyond the minimum requirements indicated. EPA does this to provide information and/or suggestions that may be helpful to implementation efforts. Such suggestions are prefaced by "may" or "should" and are to be considered advisory. They are not required elements of the LT2ESWTR.

EPA expects to undertake necessary rule implementation activities during the period of early implementation. During this period, a state may elect to undertake some or all of the implementation activities in cooperation with EPA. This will facilitate continuity of implementation and ensure that system-specific advice and decisions are made with the best available information and are consistent with existing state program requirements.

Section 1
Rule Requirements

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1.1 Introduction

EPA finalized the LT2ESWTR in the *Federal Register* on January 5, 2006 (71 *FR* 653; see www.epa.gov/safewater/disinfection/lt2). This Rule is part of a series of rules, the "Microbial-Disinfectants/Disinfection Byproducts Cluster" (M-DBP Cluster), which is intended to improve control of microbial pathogens while minimizing public health risks of disinfectants and disinfection byproducts (DBPs). The LT2ESWTR builds upon the requirements established by the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), and the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). Key provisions of the LT2ESWTR include:

- Source water monitoring for *Cryptosporidium*, with reduced monitoring requirements for small systems.
- Additional *Cryptosporidium* treatment technique (TT) provisions for certain filtered systems based on source water *Cryptosporidium* concentrations.
- Inactivation of *Cryptosporidium* for all unfiltered systems.
- Disinfection profiling and benchmarking to ensure continued levels of microbial protection while PWSs take the necessary steps to comply with new DBP standards.
- Covering uncovered finished water reservoirs or treating the discharge from the storage facility.

EPA believes that implementation of the LT2ESWTR will significantly reduce levels of *Cryptosporidium* in finished drinking water. This will substantially lower rates of endemic cryptosporidiosis, the illness caused by *Cryptosporidium*, which can be severe and sometimes fatal in sensitive sub-populations (e.g., infants, immune suppressed patients, and the elderly). In addition, the TT requirements of this rule are expected to increase the level of protection from exposure to other microbial pathogens (e.g., *Giardia*).

The LT2ESWTR has been finalized concurrently with the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR), which addresses reducing peak and average levels of DBPs in drinking water supplies. The Stage 2 DBPR was finalized as a separate rule on January 4, 2006.

1.1.1 History

The 1974 SDWA called for EPA to regulate drinking water by creating the national interim primary drinking water regulations (NIPDWR). In 1979, the first interim standard addressing DBPs was set for total trihalomethanes (TTHM), a group of four volatile organic chemicals that form when disinfectants react with natural organic matter in the water.

1986 SDWA Amendments

Although the SDWA was amended slightly in 1977, 1979, and 1980, the most significant changes to the 1974 law occurred when the SDWA was reauthorized in 1986. To safeguard public health, the 1986 Amendments required EPA to set health goals, or maximum contaminant level goals (MCLGs), and maximum contaminant levels (MCLs) for 83 named contaminants. Waterborne disease outbreaks of giardiasis demonstrated that disease-causing microbial contamination had not been sufficiently controlled under the original Act. In addition, several hundred chemical contaminants were known to occur in the environment, but few were regulated in PWSs. EPA was also required to establish additional regulations within certain timeframes, require disinfection of source water supplies, specify filtration requirements for

nearly all water systems that draw their water from surface sources, and develop additional programs to protect ground water supplies.

In 1989, EPA issued two important National Primary Drinking Water Regulations (NPDWRs): the Total Coliform Rule (TCR) and the SWTR. The TCR and SWTR provide the foundation for the M-DBP Cluster and are summarized below.

Total Coliform Rule

The TCR applies to all PWSs. Coliforms are easily detected in water and are used to assess a water system's vulnerability to pathogens. In the TCR, EPA set an MCLG of zero for total coliforms. EPA also set an MCL for total coliforms and required testing of total coliform positive cultures for the presence of *E. coli* or fecal coliforms, which indicate more immediate health risks from sewage or fecal contamination. If more than 5.0 percent of the samples contain coliforms within a month, water system operators must report this violation to the state and the public. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Finally, the TCR required sanitary surveys every 5 years (or 10 years for noncommunity water systems (NCWSs) using disinfected and protected ground water) for every system that collects fewer than five routine total coliform samples per month. These are typically systems that serve 4,100 or fewer people.

Surface Water Treatment Rule

PWSs using surface water or ground water under the direct influence of surface water (GWUDI) (i.e., Subpart H systems) as a supply are prone to microbial contamination of their source water. Pathogenic microorganisms that can contaminate source water can be removed or inactivated during the water treatment sedimentation, filtration, and disinfection processes. EPA issued the SWTR in response to a Congressional mandate requiring disinfection, and filtration where necessary, of systems that use surface water or GWUDI sources. The Rule sets MCLGs for *Legionella, Giardia lamblia*, and viruses at zero because any exposure to these contaminants presents some level of health risk. The SWTR includes a TT requirement for inactivation (or removal and inactivation) of these organisms.

Specifically, the SWTR requires that a surface water system have sufficient treatment to reduce source water concentrations of *Giardia lamblia* and viruses by at least 99.9 percent (3.0-log) and 99.99 percent (4.0-log), respectively. In addition, disinfection residuals must be maintained throughout the distribution system. For systems that filter, the adequacy of the filtration process is determined by measuring the turbidity of the treated water since poor turbidity removal often indicates that the filtration process is not working properly. The goal of the SWTR is to reduce the public health risk for infection by *Giardia lamblia*, *Legionella*, or viruses to less than one infection per year per 10,000 people.

The SWTR, however, does not account for systems with high pathogen concentrations in source water that, when treated at the levels required under the Rule, still may not meet this health goal. The SWTR also does not specifically control for the protozoan *Cryptosporidium*, as sufficient information about its removal or disinfection was not available at the time the SWTR was finalized. Since the SWTR was promulgated, much has been learned about this organism. Most notably, *Cryptosporidium* is resistant to disinfection practices commonly employed by PWSs. Therefore, physical removal or alternative disinfectants are the most effective treatment methods.

1996 SDWA Amendments

In 1990, EPA's Science Advisory Board, an independent panel of experts established by Congress, cited drinking water contamination as one of the most important environmental risks and indicated that disease-causing microbial contaminants (e.g., bacteria, protozoa, and viruses) are probably the greatest remaining health-risk management challenge for drinking water suppliers. Data from the Centers for Disease Control (CDC) confirm this concern and indicate that between 1980 and 1998, 419 waterborne disease outbreaks were reported, with over 511,000 estimated cases of disease. During this period, a number of agents were implicated as causes of the outbreaks, including various protozoa, viruses, and bacteria, as well as several chemicals (Craun and Calderon 1996, Levy et al. 1998, Barwick et al. 2000). Most of the cases (but not the outbreaks) of illnesses were associated with surface water, including a single outbreak of approximately 403,000 cases of cryptosporidiosis in Milwaukee, WI (Mac Kenzie et al. 1994).

The SDWA was further amended in 1996 to improve public health protection by incorporating new data on the adverse health effects of contaminants, the occurrence of contaminants in PWSs, and the estimated reduction in health risks that would result from further regulation. The Amendments provided for use of best-available, peer-reviewed science in decision-making and for risk reduction and cost analyses in the regulatory decision process.

TTHMs/Stage 1 DBPR/Stage 2 DBPR

Many water systems treat their water with a chemical disinfectant in order to inactivate pathogens that cause disease. The public health benefits of common disinfection practices are significant and well-recognized; however, disinfection poses risks of its own. While disinfectants are effective at controlling many harmful microorganisms, they react with organic and inorganic matter (DBP precursors) in the water and form DBPs, some of which pose health risks when present above certain levels. Since the discovery of chlorination byproducts in drinking water in 1974, numerous toxicological studies have been conducted that show some DBPs to be carcinogenic and/or cause reproductive or developmental effects in laboratory animals. Additionally, exposure to high levels of disinfectants over long periods of time may cause health problems, including damage to blood and kidneys. While many of these studies have been conducted with disinfectants at high doses, the weight of evidence indicates that DBPs present a potential public health problem that must be addressed to minimize risks from long-term exposure. One of the most complex questions facing water supply professionals is how to reduce risks from disinfectants and DBPs while providing adequate protection against microbial contaminants.

The TTHM Rule of 1979 set a TTHM MCL for community water systems (CWS) serving 10,000 or more people. The Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) built on the TTHM Rule by lowering existing MCLs and widening the range of affected systems to include all PWSs (except most transient systems) that add a disinfectant. The Stage 1 DBPR established new MCLs for additional DBPs (e.g., chlorite, bromate, and haloacetic acids (HAA5)) as well as established maximum residual disinfection levels (MRDLs) for the disinfectants chlorine, chloramines, and chlorine dioxide. In addition, the Stage 1 DBPR required conventional filtration systems to remove specified percentages of organic materials, measured as total organic carbon (TOC), which may react with disinfectants to form DBPs.

The Stage 2 DBPR builds upon the Stage 1 DBPR by providing more consistent protection from DBPs across the entire distribution system and by focusing on the reduction of DBP peaks. The Stage 2 DBPR changes the way sampling results are averaged to determine compliance. The determination for the Stage 2 DBPR is based on a locational running annual average (LRAA) (i.e., compliance must be met at *each* monitoring location) instead of the system-wide running annual average (RAA) used under the Stage 1 DBPR. In addition to changes in MCL compliance calculation, systems must also conduct an initial distribution system evaluation (IDSE) to identify compliance monitoring locations that represent high TTHM and HAA5 levels. Systems are also required to conduct an operational evaluation if they have DBP levels that could result in an MCL exceedance if not reduced.

Filter Backwash Recycling Rule

The Filter Backwash Recycling Rule (FBRR) complements the surface water treatment rules by reducing the potential for microbial pathogens, particularly *Cryptosporidium* oocysts, to pass through the filters into the finished water of conventional and direct filtration systems that recycle backwash water. The FBRR requires affected systems to return regulated recycle streams (e.g., spent filter backwash, thickener supernatant, or liquids from dewatering processes) through all processes of a system's conventional or direct filtration system, unless the state approves an alternate location. In addition, the FBRR requires systems to notify the state in writing about recycle practices and to maintain specific records.

IESWTR/LT1ESWTR/LT2ESWTR

The IESWTR builds on the SWTR by adding protection from *Cryptosporidium* by requiring filtered systems to meet new turbidity standards for combined filter effluent (CFE) and individual filter effluent (IFE). Additionally, the IESWTR requires unfiltered systems to include control of *Cryptosporidium* in their watershed control plans. These requirements of the IESWTR apply to systems that serve 10,000 people or more. The IESWTR builds on the TCR by requiring sanitary surveys for all PWSs using surface water or GWUDI regardless of size. The IESWTR also requires covers for all new finished water storage facilities and includes disinfection profiling and benchmarking provisions to ensure systems provide continued levels of microbial protection while taking the necessary steps to comply with the DBP standards.

The provisions in the LT1ESWTR address the concerns covered by the IESWTR as they apply to small systems (i.e., systems serving fewer than 10,000 people) using surface water or GWUDI. The LT2ESWTR builds upon the SWTR, IESWTR, and LT1ESWTR by supplementing existing microbial treatment requirements for systems where additional public health protection is needed.

Collectively, the SWTR, IESWTR, LT1ESWTR, and LT2ESWTR place stringent treatment requirements on systems using surface water or GWUDI as a source.

The Multiple Barrier Approach

By building on the foundation of the original SDWA, subsequent amendments to the Act have improved the quality of drinking water and increased public health protection. The 1996 SDWA Amendments, for example, require EPA to develop rules to balance the risks presented by microbial pathogens and DBPs. The LT2ESWTR is one of the most recent rules in the M-DBP Rule Cluster that expands on the foundation of prior rulemaking efforts.

Since multiple threats require multiple barriers, the LT2ESWTR and Stage 2 DBPR expand on the foundation of the TCR, SWTR, TTHM Rule, Stage 1 DBPR, IESWTR, LT1ESWTR, and FBRR standards to target health risks not addressed by prior regulations. By encompassing these previously

unaddressed health risks from microbials and DBPs, the M-DBP Rule Cluster continues to maximize drinking water quality and public health protection.

1.1.2 Development of the LT2ESWTR

In March 1999, EPA reconvened the M-DBP Advisory Committee to develop recommendations for the LT2ESWTR and Stage 2 DBPR. This committee also participated in the development of the IESWTR, LT1ESWTR, and Stage 1 DBPR. The Committee's members represented EPA, state, and local public health and regulatory agencies, local elected officials, Native American tribes, drinking water suppliers, chemical and equipment manufacturers, and public interest groups. Technical support for the Committee's discussions was provided by a technical workgroup established by the Committee at its first meeting. The Committee's activities resulted in the collection and evaluation of substantial new information related to key elements for both rules. This included new data on pathogenicity, occurrence, and treatment of microbial contaminants, specifically *Cryptosporidium*, as well as new data on DBP health risks, exposure, and control. The Committee held ten meetings (from September 1999 to July 2000) to discuss issues pertaining to the LT2ESWTR and Stage 2 DBPR. There was also an opportunity for public comment at each meeting.

In September 2000, the Committee signed the Agreement in Principle, a full statement of the consensus recommendations of the group. The agreement was published in a December 29, 2000 *Federal Register* notice (65 *FR* 83015) and includes the list of committee members and their organizations. The Committee's recommendations were incorporated into the LT2ESWTR and the Stage 2 DBPR.

The M-DBP Committee reached agreement on the following major issues regarding the LT2ESWTR:

- Additional *Cryptosporidium* treatment should be provided for certain systems based on source water monitoring results.
- Filtered systems that must comply with additional *Cryptosporidium* treatment requirements may choose from a "toolbox" of treatment and control options.
- A reduced monitoring burden should be provided for small systems.
- Future monitoring should be conducted to confirm initial assessments of source water quality.
- *Cryptosporidium* inactivation should be provided by all unfiltered systems.
- Unfiltered systems should meet overall inactivation requirements using a minimum of 2 disinfectants.
- Criteria and guidance for ultraviolet light (UV) disinfection and other toolbox options should be developed.
- Existing uncovered finished water reservoirs should be covered or the discharge treated unless the state approves an alternative method to comply.

1.1.3 Benefits of the LT2ESWTR

1.1.3.1 Quantifiable Benefits

The LT2ESWTR is expected to reduce drinking water related exposure to *Cryptosporidium* substantially, thereby reducing both illness and death associated with cryptosporidiosis through source water monitoring, additional TTs, and higher standards for drinking water quality. Cryptosporidiosis is an infection caused by *Cryptosporidium* and is an acute, typically self-limiting illness with symptoms that include diarrhea, abdominal cramping, nausea, vomiting, and fever (Juranek, 1995). Cryptosporidiosis patients in sensitive subpopulations, such as infants, the elderly, and AIDS patients, are at risk for severe illness, including risk of death. The LT2ESWTR is expected to reduce 230,730 to 964,360 illnesses and 52 to 207 deaths annually after full implementation (range based on the Information Collection Rule Supplemental Surveys of large systems (ICRSSL) and Information Collection Rule (ICR) data sets). Based on these values, the mean present value of benefits (annualized at a 3 percent discount rate) ranges from $458 million to $1.9 billion. These values do not take into account confidence limits for non-quantified benefits.

For filtered systems, benefits to the approximately 195 million people served by filtered surface water and GWUDI systems range from a mean reduction in annual cases of endemic illness ranging from 84,609 to 464,069 (based on ICRSSL, Information Collection Rule Supplemental Surveys of medium systems (ICRSSM), and ICR data sets). In addition, deaths are expected to be reduced by an average of 14 to 77 people annually. The 10 million people served by unfiltered surface water or GWUDI systems will also see a significant reduction in cryptosporidiosis as a result of the Rule. The LT2ESWTR is expected to reduce approximately 146,121 to 500,291 cases of illnesses and 38 to 130 premature deaths annually in unfiltered systems (based on the ICR data set). Only the ICR data set is used to directly calculate reduced illness because it is the only data set that includes sufficient information on unfiltered systems.

1.1.3.2 Non-quantifiable health and non-health related benefits

Although significant benefits will result from the LT2ESWTR in terms of the reduction in illnesses and death associated with cryptosporidiosis, other health and non-health related benefits associated with this rule remain unquantified due to lack of data. Non-quantifiable health and non-health related benefits of the LT2ESWTR include:

- Reducing outbreak risks and response costs associated with human or equipment failure.
- Reducing averting behavior (e.g., boiling tap water or purchasing bottled water).
- Improving aesthetic water quality (e.g., taste and odor).
- Reducing exposure to other parasitic protozoans and contaminants that EPA regulates or is considering for future regulation (e.g., pathogenic bacteria, viruses, *Giardia lamblia*, *Cyclospora sp.*, members of the Microsporidia class, arsenic, DBPs, and atrazine).
- Increasing source water monitoring that leads to a better understanding of source water quality and helps systems choose more effective treatment technologies.
- Reducing contamination of storage facilities by covering or treating the finished water.
- Installing UV or microfiltration may allow PWSs to better regulate the amount of chlorine added to water; thereby reducing the level of DBPs in water. However, systems

adding ozone treatment to comply with rule requirements will have to be aware of the potential increase in the level of certain DBPs associated with ozone.

1.2 Requirements of the Rule: PWSs

The following section provides a summary of the rule requirements. The rule requirements are from the Final LT2ESWTR published in the *Federal Register* on January 5, 2006 (71 *FR* 653). For a copy of the actual rule language, see Appendix B or visit EPA's Web site at www.epa.gov/safewater/disinfection/lt2.

1.2.1 General Requirements

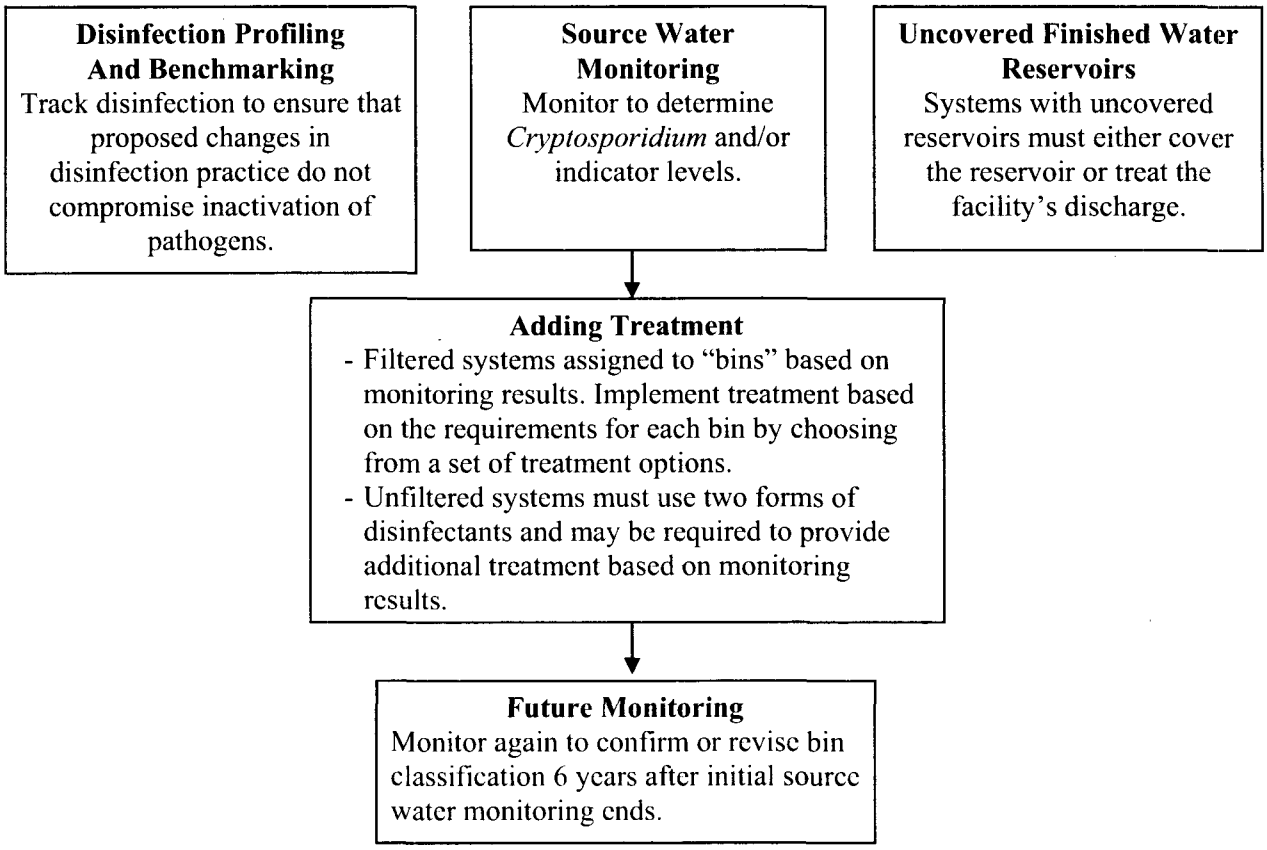
The flowchart in Figure 1-1 shows the general requirements of the LT2ESWTR. All surface water and GWUDI PWSs, including wholesale systems, must characterize their source water to determine what, if any, additional treatment is necessary to reduce *Cryptosporidium*. Systems conduct source water monitoring to determine an average *Cryptosporidium* concentration. Based on that average, filtered systems will be classified into one of four possible risk categories (bins). Unfiltered systems will be classified into one of two categories: one that does not require additional treatment beyond the two disinfectant requirements; and one that requires additional treatment (beyond the requirement for all unfiltered systems to provide two forms of disinfection). The LT2ESWTR also includes requirements for uncovered finished water reservoirs and disinfection profiling and benchmarking.

EPA developed the LT2ESWTR compliance schedule for monitoring, reporting, and treatment requirements to provide maximum compatibility with the Stage 2 DBPR compliance schedule. The compliance schedule is divided into the following four schedules based on population served by the systems treating the water:

- **Schedule 1:** Systems serving 100,000 people or more
- **Schedule 2:** Systems serving 50,000 – 99,999 people
- **Schedule 3:** Systems serving 10,000 – 49,999 people
- **Schedule 4:** Systems serving fewer than 10,000 people

Wholesale water systems' compliance schedule is based on the population of the largest system in the combined distribution system.

Figure 1-1. General Requirements of the LT2ESWTR



1.2.2 Source Water Monitoring [40 CFR 141.701]

Large systems (serving 10,000 people or more) that currently provide filtration or that are unfiltered and required to install filtration must conduct source water monitoring for *Cryptosporidium*, *E. coli*, and turbidity.

Small systems (serving fewer than 10,000 people) that currently provide filtration or that are unfiltered and required to install filtration must first monitor for *E. coli* or an alternative indicator approved by the state as a screening analysis. Small systems are subsequently required to monitor for *Cryptosporidium* if the following trigger events occur:

- The annual mean concentration of *E. coli* exceeds 10 *E. coli*/100 mL for systems using lake or reservoir sources;
- The annual mean concentration of *E. coli* exceeds 50 *E. coli*/100 mL for systems using flowing stream sources;
- The level of a state-approved alternate indicator exceeds the state-approved alternative indicator trigger level; or
- The system does not monitor for *E. coli* at least once every 2 weeks for 12 months as required.

Small filtered systems can forgo *E. coli* monitoring and monitor for *Cryptosporidium* instead.

Large and small unfiltered systems that meet all the filtration avoidance criteria of 40 Code of Federal Regulations (CFR) 141.71 must monitor for *Cryptosporidium* unless they provide 3.0-log *Cryptosporidium* inactivation by the time treatment is required.

Large and small filtered systems do not have to conduct source water monitoring if they provide 5.5-log *Cryptosporidium* inactivation by the time treatment is required.

Systems that operate for only part of the year must sample their source water during months that the plant is in operation, unless the state specifies another monitoring period. Systems that must monitor for *Cryptosporidium* and operate plants for less than 6 months per year must collect at least six samples per year for a 24 month period. The samples must be collected at even intervals throughout the period of operation.

New systems and systems that begin using a new surface water or GWUDI source must contact the state regarding their requirements and schedule for conducting source water monitoring.

1.2.2.1 When are systems required to begin source water monitoring? [40 CFR 141.701(c)]

Systems serving 100,000 people or more must begin source water monitoring no later than October 1, 2006. System serving from 50,000 to 99,999 people must begin source water monitoring no later than April 1, 2007. Systems serving from 10,000 to 49,999 people must begin source water monitoring no later than April 1, 2008. These three system sizes must monitor source water for *Cryptosporidium, E. coli*, and turbidity at least monthly for 24 months. Unfiltered systems must monitor for *Cryptosporidium* at least monthly for 24 months. Small filtered systems (systems serving fewer than 10,000 people) must begin *E. coli* monitoring no later than October 1, 2008 and monitor at least once every 2 weeks for 12 months. Small unfiltered systems and those small filtered systems that exceeded the *E. coli* trigger levels must begin *Cryptosporidium* monitoring no later than April 1, 2010 and monitor at least twice each month for 12 months or at least monthly for 24 months. Wholesale water systems will begin monitoring according to the population of the largest system in the combined distribution system.

Systems are required to conduct a second round of source water monitoring approximately 6 years after the first round of monitoring ends. This will help determine if there has been a significant change in source water quality that would affect treatment requirements.

1.2.2.2 Where are systems required to sample source water? [40 CFR 141.703]

Systems must collect source water samples for each plant that treats a surface water or GWUDI source at a location prior to any treatment. The state may allow systems to collect samples after chemical treatment if the state determines that collecting a sample before treatment is not feasible and if the treatment is unlikely to have an adverse effect on sample analysis. If more than one plant draws water from the same influent, the state may allow one set of results to be used for multiple plants. Samples must be collected prior to the addition of filter backwash for systems that recycle their filter backwash.

Systems using a presedimentation basin or an off-stream raw water storage reservoir should take source water samples after the presedimentation basin or the off-stream storage reservoir but before any other treatment. Systems collecting samples after a presedimentation basin may not receive credit for the presedimentation basin as a toolbox option. Use of bank filtration during monitoring must be consistent

with routine operational practice, and the state may identify additional reporting requirements to verify operational practices.

Systems using more than one water source must either collect samples at a sampling tap where the sources are combined prior to treatment or must collect samples at each source near the intake on the same day. Samples may be composited from each source based on proportionate flows into one sample prior to sample analysis, or systems may analyze samples separately and calculate a weighted average of results.

1.2.3 Disinfection Profiling and Benchmarking Requirements [40 CFR 141.708, 40 CFR 141.709]

1.2.3.1 Which systems need to develop profiles? [40 CFR 141.708]

Systems that plan to make a significant change to their disinfection practices based on the results of their first round of source water monitoring must develop disinfection profiles and calculate disinfection benchmarks. Systems must notify the state before making significant changes in their disinfection practices.

1.2.3.2 What if systems previously collected data? [40 CFR 141.709]

Systems can meet profiling requirements under the LT2ESWTR using previously collected data (i.e., grandfathered data). This data must be equivalent in sample number, frequency, and data quality to data that will be collected under the LT2ESWTR. Use of grandfathered data is allowed if the system has not made a significant change in disinfection practice or changed sources since the data were collected. This will permit most systems that prepared a disinfection profile under the IESWTR or the LT1ESWTR to avoid collecting any new operational data to develop profiles under the LT2ESWTR.

1.2.3.3 If a system developed a profile for *Giardia*, does it have to develop one for viruses? [40 CFR 141.709]

Systems that produced a disinfection profile for *Giardia* but not viruses under the IESWTR or LT1ESWTR must develop a disinfection profile for viruses under the LT2ESWTR. Systems must use the same monitoring data on which the *Giardia* profile is based. EPA believes that virus profiling is necessary because some of the disinfection processes that systems will select to comply with the LT2ESWTR and Stage 2 DBPR (e.g., chloramines, UV) are relatively less effective against viruses than free chlorine. Systems should refer to EPA's *Disinfection Profiling and Benchmarking Guidance Manual* for details on how to develop a disinfection profile.

1.2.4 Treatment Requirements

1.2.4.1 When do systems have to install additional treatment? [40 CFR 141.713]

Systems serving 100,000 people or more have to meet any additional *Cryptosporidium* treatment requirements by April 1, 2012 as shown in Table 1-18 and Figure 1-2. Systems serving from 50,000 to 99,999 people have until October 1, 2012; systems serving 10,000 to 49,999 people have until October 1, 2013; and systems serving fewer than 10,000 people have until October 1, 2014 to meet additional treatment requirements. The SDWA section 1412(b)(10) allows states to grant systems an additional 2 years to comply when capital investments are necessary (refer to Appendix H for guidance).

Systems must comply with additional *Cryptosporidium* treatment requirements, determined from source water monitoring, by implementing one or more treatment processes or control strategies from the

microbial toolbox. Most of the toolbox components require submission of documentation to the state demonstrating compliance with design and/or required implementation criteria to receive credit.

1.2.4.2 What are the requirements for *Cryptosporidium* treatment for filtered systems? [40 CFR 141.711]

Filtered systems or systems that are unfiltered and required to install filtration must provide the level of treatment for *Cryptosporidium* specified in Table 1-1 based on their bin classification.

Table 1-1. Level of Treatment Required for Filtered Systems

If the source water *Cryptosporidium* concentration in oocyst/L is...	**And the system uses the following filtration treatment in full compliance with SWTR, IESWTR, and LT1ESWTR (as applicable), then the additional treatment requirements are...**			
	Conventional filtration treatment (including softening)	**Direct filtration**	**Slow sand or diatomaceous earth filtration**	**Alternative filtration technologies**
<0.075 (Bin 1)	No additional treatment	No additional treatment	No additional treatment	No additional treatment
≥0.075 and <1.0 (Bin 2)	1.0-log treatment	1.5-log treatment	1.0-log treatment	(1)
≥1.0 and <3.0 (Bin 3)	2.0-log treatment	2.5-log treatment	2.0-log treatment	(2)
≥3.0 (Bin 4)	2.5-log treatment	3.0-log treatment	2.5-log treatment	(3)

(1) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
(2) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
(3) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

Filtered systems must use at least one of the management and treatment options listed in the microbial toolbox (see Table 1-2) to meet the additional *Cryptosporidium* treatment requirements identified for each bin. Systems classified in Bins 3 and 4 (the highest *Cryptosporidium* levels) must achieve at least 1.0-log of additional treatment using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV as specified in the microbial toolbox.

1.2.4.3 What are the requirements for *Cryptosporidium* treatment for unfiltered systems? [40 CFR 141.712]

Unfiltered systems with a mean *Cryptosporidium* concentration of 0.01 oocysts/L or less must provide at least 2.0-log *Cryptosporidium* inactivation. Unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L must provide at least 3.0-log *Cryptosporidium* inactivation.

Unfiltered systems must meet the combined *Cryptosporidium*, *Giardia lamblia*, and virus inactivation requirements using a minimum of two disinfectants. Each disinfectant must be able to achieve the total inactivation required for *Cryptosporidium*, *Giardia lamblia*, or viruses. For example, a system may use UV to meet *Cryptosporidium* and *Giardia* inactivation requirements and chlorine to meet virus

inactivation requirements. To meet the *Cryptosporidium* inactivation requirements, systems must use chlorine dioxide, ozone, or UV.

Disinfection requirements under the LT2ESWTR are more stringent for unfiltered systems than filtered systems. The following unfiltered systems will incur a TT violation:

- Systems using chlorine dioxide or ozone that fail to achieve the *Cryptosporidium* log inactivation on more than 1 day in the calendar month.
- Systems using UV light that fail to achieve the *Cryptosporidium* log inactivation required in at least 95 percent of the water that is delivered to the public during each calendar month.

1.2.5 Microbial Toolbox Options Available to Systems

Systems can implement a variety of source, pre-filtration, treatment, additional filtration, and inactivation toolbox components to receive *Cryptosporidium* credit, as summarized in Table 1-2.

Table 1-2. Microbial Toolbox: Options and Credits

Toolbox option	***Cryptosporidium* credits**
Source Toolbox Components	
Watershed control program	0.5-log credit. (Section 1.2.5.1)
Alternative source/intake management	No prescribed credit. (Section 1.2.5.2)
Pre-filtration Toolbox Components	
Presedimentation basin with coagulation	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or state-approved performance criteria. Basins must operate continually with coagulant addition and all plant flow must pass through the basins. (Section 1.2.5.3)
Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. (Section 1.2.5.4)
Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback. Aquifer must contain granular material and in at least 90 percent of the length of a core, grains less than 1.0 mm in diameter constitute 10 percent of the material. Average turbidity must be less than 1 Nephelometric Turbidity Unit (NTU). No presumptive credit for bank filtration that serves as pretreatment when source water monitoring is performed from the well (after bank filtration). (Section 1.2.5.5)

Toolbox option	*Cryptosporidium* credits
Treatment Performance Toolbox Components	
Combined filter performance	0.5-log credit for CFE turbidity ≤ 0.15 NTU in at least 95 percent of samples each month. (Section 1.2.5.6)
Individual filter performance	0.5-log credit (in addition to the combined filter performance credit) for IFE ≤ 0.15 NTU in 95% of samples each month and no filter > 0.3 NTU in two consecutive measurements. (Section 1.2.5.7)
Demonstration of performance	Credit based on demonstration to the state. (Section 1.2.5.8)
Additional Filtration Toolbox Components	
Bag or cartridge filters (individual filters)	Up to 2.0-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. (Section 1.2.5.9)
Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. (Section 1.2.5.9)
Membrane filtration	Log removal credit up to the removal efficiency demonstrated during challenge test if supported by direct integrity testing. (Section 1.2.5.10)
Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. (Section 1.2.5.11)
Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. (Section 1.2.5.12)
Inactivation Toolbox Components	
Chlorine dioxide	Log credit based on measured contact time (CT) in relation to CT table. (Section 1.2.5.13)
Ozone	Log credit based on measured CT in relation to CT table. (Section 1.2.5.14)
UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. (Section 1.2.5.15)

1.2.5.1 Watershed Control Program [40 CFR 141.716(a)]

Filtered systems must submit their watershed control programs to the state for approval to qualify for 0.5-log credit of *Cryptosporidium* removal. Unfiltered systems may not claim credit for *Cryptosporidium* removal under this option. Systems must notify the state of their intention to apply the watershed control program no later than 2 years prior to their specific treatment compliance date. The proposed watershed control program must be submitted to the state at least 1 year prior to their treatment compliance date.

Systems with existing watershed control programs in place prior to January 5, 2006, may also seek the watershed control credit, as long as the watershed control plan contains the information outlined below.

Initial Watershed Control Plan

A system's watershed control plan must be approved by the state for the system to receive the watershed control program treatment credit. If the plan is approved or if the system agrees to implement the state's conditions for approval, the system is awarded a 0.5-log credit for *Cryptosporidium* removal.

The watershed control plan must include the following elements:

- Identification of an "area of influence" (the area to be considered in future watershed surveys) outside of which there is little chance for *Cryptosporidium* or fecal contamination to affect the drinking water intake.

- Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources of contamination on the system's source water quality.

- An analysis of control measures that could mitigate the sources of *Cryptosporidium* contamination identified during the vulnerability analysis. The analysis must address the measure's relative effectiveness in reducing *Cryptosporidium* loading to the source water and its feasibility and sustainability.

- A plan that establishes goals and defines and prioritizes specific actions to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their role(s), identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

Maintaining State Approval for Treatment Credit

Initial state approval of a watershed control plan and its associated treatment credit is valid unless withdrawn by the state. Systems must complete the following actions to maintain state approval and the 0.5-log credit:

- Submit an annual watershed control program status report to the state by a date determined by the state. The annual watershed control program status report must describe the following items:

  - The system's implementation of the approved plan and an assessment of the adequacy of the plan to meet its goals.

  - How the system is addressing any shortcomings in plan implementation, including those previously identified by the state or as the result of the watershed survey.

  - A description of any significant changes that have occurred in the watershed since the last watershed survey. A PWS must notify the state before making any significant changes, and must list actions that the system will take to mitigate any changes that are likely to reduce the level of source water protection.

- Conduct watershed sanitary survey every 3 years for CWSs and every 5 years for NCWSs and submit the survey report to the state. The survey must be conducted

according to state guidelines and by qualified persons approved by the state. The survey needs to cover the area of the watershed identified as the area of influence, assess the implementation of actions to reduce source water *Cryptosporidium* levels, and identify any significant new sources of *Cryptosporidium*. If the state determines that significant changes have occurred since the previous watershed sanitary survey, the system must have another watershed sanitary survey on a state-approved schedule, which may be earlier than every 3 or 5 years.

- The PWS must make the watershed control plan, annual reports, and watershed sanitary survey reports available to the public upon request. The state may allow certain information to be withheld from the above reports based on water supply security considerations.

If the state determines that the system is not carrying out the approved watershed control plan, the state may revoke the watershed control program treatment credit.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-3. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-3. Reporting Deadlines for Systems Choosing the Watershed Control Program Toolbox Option

Systems must submit the following information	On the following schedule
Notice of intention to develop or continue an existing watershed control program.	No later than 2 years before the applicable treatment compliance date specified in Table 1-18.
Submit watershed control program plan to state.	No later than 1 year before the applicable treatment compliance date specified in Table 1-18.
Annual watershed control program status report.	Every 12 months, beginning 1 year after the applicable treatment compliance date specified in Table 1-18.

1.2.5.2 Alternative Source [40 CFR 141.716(b)]

If approved by the state, a system can be classified into a bin based on additional monitoring that is conducted concurrently with existing source water monitoring and reflects either a different intake location (either in the same source or for an alternate source) or a different procedure for managing the timing or level of withdrawal from the source.

Sampling and analysis of *Cryptosporidium* in the concurrent round of monitoring must conform to the monitoring requirements used to determine bin classification. Systems must submit the results of all their monitoring to the state along with supporting information that documents the operating conditions under which the samples were collected.

If the state classifies the system in a bin based on monitoring that reflects a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or use the intake management strategy. The deadline for relocation of the new intake is specified in Table 1-4. The state may specify additional reporting requirements to verify operational practices.

Table 1-4. Reporting Deadlines for Alternative Source/Intake Management

Systems must submit the following information	On the following schedule
Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date specified in Table 1-18.

1.2.5.3 Pre-sedimentation with Coagulant [40 CFR 141.717(a)]

Presedimentation basins with coagulant addition may receive 0.5-log *Cryptosporidium* removal credit during any month that the system meets the following criteria:

- The presedimentation basin must be in continuous operation and must treat all of the plant flow taken from a surface water or GWUDI source.
- A coagulant must be continuously added to the presedimentation basin while the plant is in operation.
- The presedimentation basin must achieve 0.5-log (68 percent) reduction of influent turbidity. The reduction must be calculated as follows: $\log_{10}$ (monthly mean of daily influent turbidity) - $\log_{10}$ (monthly mean of daily effluent turbidity). The system may also comply with state-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material.

Systems must measure presedimentation basin influent and effluent turbidity at least once per day or more frequently as determined by the state.

Table 1-5. Reporting Deadlines for Systems Choosing the Presedimentation Toolbox Option

Systems must submit the following information	On the following schedule
Monthly verification of the following: - Continuous basin operation. - Treatment of 100% of the flow. - Continuous addition of a coagulant. - At least 0.5-log mean removal of influent turbidity or compliance with alternative state-approved performance criteria.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.4 Two-stage Lime Softening [40 CFR 141.717(b)]

The LT2ESWTR requires plants to meet the following criteria in order to receive 0.5-log credit towards additional *Cryptosporidium* during any month chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration: both softening stages must treat all plant flow from the surface or GWUDI source, and no water flow may bypass either of the treatment stages.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-6. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-6. Reporting Deadlines for Systems Choosing the Two-stage Lime Softening Toolbox Option

Systems must submit the following information	On the following schedule
Monthly verification of the following: - Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration. - Both stages treated 100% of the plant flow.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment date specified in Table 1-18.

1.2.5.5 Bank Filtration [40 CFR 141.717(c)]

The LT2ESWTR specifies the following design requirements for systems to receive removal credit for bank filtration:

- Wells must draw from granular aquifers that are comprised of clay, silt, sand, or pebbles or larger particles. Minor cement may be present. Systems must characterize the aquifer at the well site by extracting a core from the aquifer to demonstrate that grains less than 1.0 mm in diameter are present in at least 1- percent of the material in at least 90 percent of the core length.

- Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. Only horizontal and vertical wells are eligible for treatment credit.

  - The ground water flow path for vertical wells is the distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary as defined in Federal Emergency Management Agency (FEMA) flood hazard maps) to the well screen.

  - The ground water flow path for horizontal wells is the distance from the river bed under normal flow conditions to the closest horizontal well lateral screen.

- Turbidity must be monitored at least once every 4 hours when the bank filtration process is in operation. If at any time the monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report the results to the state and conduct an assessment to determine the cause of the high turbidity levels. This assessment must be completed within 30 days. If the state determines that microbial removal has been compromised, treatment credit may be revoked until the system implements corrective actions approved by the state to correct the problem.

- Springs and infiltration galleries are not eligible to receive bank filtration treatment credit, but are eligible for credit under Demonstration of Performance (see section 1.2.5.8).

- The state may also offer treatment credit based on a demonstration of performance study. The credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the requirements specified above if:

  – The study follows a state-approved protocol and involves *Cryptosporidium* or a surrogate for *Cryptosporidium* and hydrogeologic and water quality parameters during the full range of operating conditions; and

  – The study includes sampling from both the production well(s) and monitoring well(s) that are screened and located on the shortest flow path between the surface water source and the production wells.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-7. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-7. Reporting Deadline for Systems Choosing the Bank Filtration Toolbox Option

Systems must submit the following information	On the following schedule
Initial demonstration of the following: - Unconsolidated, predominantly sandy aquifer. - Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log-credit).	No later than the applicable treatment compliance date specified in Table 1-18.
If monthly average of daily max turbidity is greater than 1 NTU, then system must report result and submit an assessment of the cause.	Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.6 Combined Filter Performance [40 CFR 141.718(a)]

Systems using conventional or direct filtration treatment may obtain an additional 0.5-log *Cryptosporidium* removal credit if the CFE turbidity measurements taken for any month are less than or equal to 0.15 NTU in at least 95 percent of the measurements. Note that systems may receive both the CFE and IFE performance credit during any month the system meets the criteria in this section and in section 1.2.5.7, below.

Compliance with the LT2ESWTR is determined in the same manner as measurements taken for the IESWTR and LT1ESWTR. In other words, the LT2ESWTR does not require any additional monitoring from the IESWTR and LT1ESWTR.

The monitoring frequency and compliance calculation requirements consist of measuring turbidity at 4-hour intervals (or more frequently) with 95 percent of the measurements from each month being less than or equal to 0.15 NTU.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-8. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-8. Reporting Deadlines for Systems Choosing the Combined Filter Performance Toolbox Option

Systems must submit the following information	On the following schedule
Monthly verification of CFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date as specified in Table 1-18.

1.2.5.7 Individual Filter Performance [40 CFR 141.718(b)]

The LT2ESWTR allows systems using conventional or direct filtration treatment to claim an additional 0.5-log *Cryptosporidium* removal credit for any month in which the plant meets both of the following IFE turbidity requirements:

- IFE turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the values recorded at each filter in each month; and
- No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

The monitoring frequency and compliance calculation requirements consist of measuring turbidity every 15 minutes with 95 percent of the measurements from each month being less than or equal to 0.15 NTU.

As previously mentioned, the LT2ESWTR specifies that no individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart. However, if the individual filter is not providing water which contributes to the CFE (i.e., it is not operating, is filtering to waste, or its filtrate is being recycled), the system does not need to report the turbidity for that specific filter.

If a system received treatment credit for individual filter performance and fails to meet the requirements above during any month, the system will not receive a TT violation if:

- The state determined that the failure was due to unusual and short-term circumstances that could not be prevented through optimizing treatment plant design, operation, and maintenance, and
- The system has not had more than two such failures in any calendar year.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-9. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-9. Reporting Deadlines for Systems Choosing the Individual Filter Performance Toolbox Options

Systems must submit the following information	On the following schedule
Monthly verification of the following: - IFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter. - No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.8 Demonstration of Performance: What if a system can perform better than the presumptive credit specified in the toolbox? [40 CFR 141.718(c)]

Systems may also receive treatment credit for drinking water treatment processes based on a demonstration of performance study. The credit awarded by the state through this process may be greater than or less than the treatment credits prescribed by the LT2ESWTR. In addition, credits may be awarded to treatment processes that do not meet the criteria for prescribed credits. The study must follow a state-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will meet under the full range of operating conditions.

State approval must be in writing and may include monitoring and treatment performance criteria for the system to demonstrate and report routinely to maintain the treatment credit. The state may also designate criteria to verify that the system is meeting the demonstration of performance conditions.

The demonstration of performance applies to the physical removal processes at a treatment plant. The LT2ESWTR does not allow systems to claim presumptive credit for the toolbox options listed below if that component is included in the demonstration of performance credit.

- Presedimentation
- Two-stage lime softening
- Bank filtration
- Combined or individual filter performance
- Membrane filters
- Bag and cartridge filters
- Second stage filtration

For example, if a plant receives a demonstration of performance credit for a treatment train (which may include presedimentation, flocculation, sedimentation, filtration, disinfection, etc.), the system may not also receive credit for a presedimentation basin or for achieving the lower finished water turbidity of the combined filter performance option. Note that demonstrating performance for a disinfection process (chlorine dioxide, ozone, or UV) is addressed under the disinfectant toolbox option and not this option.

States may award a lower level of *Cryptosporidium* treatment credit towards compliance for the LT2ESWTR to a system where, based on site-specific information, a plant or a unit process achieves *Cryptosporidium* treatment efficiency less than a presumptive credit specified in the LT2ESWTR.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-10. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-10. Reporting Deadlines for Systems Choosing the Demonstration of Performance Toolbox Option

Systems must submit the following information	On the following schedule
Results from testing following a state-approved protocol.	No later than the applicable treatment compliance date specified in Table 1-18.
As required by the state, monthly verification of operation within conditions of state approval for demonstration of performance credit.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.9 Bag and Cartridge Filtration [40 CFR 141.719(a)]

Bag and cartridge filtration processes that meet the EPA definition and demonstrate *Cryptosporidium* removal through challenge testing may receive *Cryptosporidium* removal credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operating in series by meeting the following conditions:

- The treatment credit awarded must be based on the removal efficiency demonstrated during challenge testing.
- A 1.0-log factor of safety for individual bag or cartridge filter and a 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine the removal credit. The safety factor is applied because bag and cartridge filters cannot have their integrity directly tested; hence, there are no means of verifying their removal efficiency during routine use. Results from challenge testing conducted prior to January 5, 2006, may be used if the testing meets all of the criteria described in this section.
  - Challenge testing must be performed under the same conditions and configurations that the system will use for *Cryptosporidium* removal. For instance, the challenge test must be conducted on full-scale bag or cartridge filters and filter housing and pressure vessels must be identical in material and construction to those used by the system.
  - Systems may conduct challenge testing using *Cryptosporidium* or a surrogate that is not removed more efficiently than *Cryptosporidium*. This challenge particulate must be measured using an analytical method capable of quantifying the specific microorganism or surrogate used in the test (i.e., turbidity may not be used to determine the concentration of the challenge particulate).
  - The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation

$$\text{Maximum Feed Concentration} = 1 \times 10^4 \times (\text{Filtrate Detection Limit})$$

- The maximum design flow rate for the filter as specified by the manufacturer must be used during testing.

- Each filter must be tested for a duration that is sufficient to reach 100 percent of the terminal pressure drop, which will establish the maximum pressure drop for the filter.

- The removal efficiency of a filter is calculated from the challenge test results using the following equation:

$$LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$$

where LRV = log removal value; C_f = feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. Where the challenge particulate is not detected in the filtrate, C_p will be the detection limit. The same units must be used for the feed and filtrate concentrations.

- Challenge testing on each filter must be conducted during three periods over the filtration cycle: within 2 hours of new filter start-up; when the pressure drop is between 45 and 55 percent of terminal pressure drop; and at the end of the cycle when the pressure drop has reached 100 percent of the terminal pressure drop. The LRV must be calculated for each of these three periods. The lowest observed LRV for the filter (LRV_{filter}) must be used.

- The overall removal efficiency for the filter product line must be set equal to the lowest LRV_{filter} if less than 20 filters are tested. The removal efficiency is set to the 10^{th} percentile of the set of LRV_{filter} values for various filters tested when 20 or more filters are tested. The percentile is calculated as follows:

$$i/(n+1)$$

where i is the rank of n individual data points ordered lowest to highest. The 10^{th} percentile may also be calculated using linear interpolation.

- If a filter is modified in a way that could change the removal efficiency of the filter, challenge testing must be conducted to demonstrate the removal efficiency of the modified filter.

All reporting requirements for the SWTR, IESWTR, and LT1ESWTR are still applicable; the LT2ESWTR does not modify or replace any previous rule requirements. The location of filter effluent turbidity monitoring for compliance with the IESWTR and LT1ESWTR does not change with the installation of a bag or cartridge filter as a secondary filtration process. Therefore, a system would still monitor filter effluent turbidity after the primary filters for compliance with the IESWTR and LT1ESWTR.

For routine compliance reporting, the Rule requires verification that all flow was treated by the bag or cartridge filter. One possible approach states may elect to use for flow verification is to have operators certify each month that all flow was treated by the filter. States may require additional reporting at their discretion.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-11. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-11. Reporting Deadlines for Systems Choosing the Bag Filters and Cartridge Filters Toolbox Option

Systems must submit the following information	On the following schedule
Demonstration that the following criteria are met: - Process meets the definition of bag or cartridge filtration. - Removal efficiency established through challenge testing that meets criteria in this section.	No later than the applicable treatment compliance date specified in Table 1-18.
Monthly verification that 100% of plant flow was filtered.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.10 Membrane Filtration [40 CFR 141.719(b)]

Systems receive treatment credit for membrane filtration. Membrane cartridge filters (MCF) that meet the definition of membrane filtration are also eligible for this credit. The treatment credit awarded is equal to the lower of the values determined as follows:

- The removal efficiency demonstrated during challenge testing, described below.
- The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process.

Membrane filters used by systems must undergo challenge testing to evaluate removal efficiency. Challenge testing conducted prior to January 5, 2006 may be used if it meets the criteria outlined below. Challenge testing results must be reported to the state and must be conducted according to the following criteria:

- Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or on a smaller-scale membrane module, identical in material and similar in construction to the modules used in the system's treatment facility.
- Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is not removed more efficiently than *Cryptosporidium*. This challenge particulate must be measured using an analytical method capable of quantifying the specific microorganism or surrogate used in the test (i.e., turbidity may not be used to determine the concentration of the challenge particulate).
- The maximum feed water concentration used is based on the detection limit of the challenge particulate in the filtrate and is determined using the following equation:

$$\text{Maximum Feed Concentration} = 3.16 \times 10^{6} \times (\text{Filtrate Detection Limit})$$

- Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the membrane module manufacturer.

- Removal efficiency must be calculated from the challenge test results using this equation:

$$LRV = Log_{10}(C_f) - Log_{10}(C_p)$$

where LRV = the log removal value demonstrated during the challenge test; C_f = the feed concentration; and C_p = the filtrate concentration. The units for feed and filtrate concentration must be the same. If the C_p is less than the detection limit, the value of the detection limit must be used for C_p. The LRV must be calculated for each membrane module evaluated by challenge testing.

- The overall removal efficiency for the membrane filtration process must be set equal to the lowest removal efficiency ($LRV_{C\text{-}test}$) if less than 20 modules are tested. The removal efficiency is set to the 10^{th} percentile of the set of $LRV_{C\text{-}test}$ values when 20 or more modules are tested. The percentile is calculated as follows:

$$i/(n+1)$$

where i is the rank of n individual data points ordered lowest to highest. The 10^{th} percentile may also be calculated using linear interpolation.

- A quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability must be established by challenge testing (e.g., bubble point test, diffusive airflow test, pressure/vacuum decay test). The test must be applied to all production membrane modules that were not directly challenge tested to verify *Cryptosporidium* removal. If the QCRV is not met by a production module, the production module is not eligible for the treatment credit.

- If a membrane module is modified in a way that could change the removal efficiency of the module, challenge testing must be conducted to demonstrate the removal efficiency of the modified module, and a new QCRV value must be established. All results must be submitted to the state.

Direct integrity testing must demonstrate removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and must meet the requirements outlined below:

- The test must be independently applied to each membrane unit in service, where a unit is a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system.

- The test method must have a resolution of 3 micrometers or less.

- The test must be sensitive enough to verify the log treatment credit awarded to the membrane filtration process by the state using one of the two approaches described below:

- If the direct integrity test uses an applied pressure or vacuum, the test sensitivity must be determined using this equation:

$$LRV_{DIT} = Log_{10}(Q_p/(VCF \times Q_{breach}))$$

where LRV_{DIT} = the sensitivity of the direct integrity test; Q_p = total design filtrate flow from the membrane unit; Q_{breach} = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The VCF is the ratio of suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

- If the direct integrity test uses a particulate or molecular marker, the test sensitivity must be determined using this equation:

$$LRV_{DIT} = Log_{10}(C_f) - Log_{10}(C_p)$$

where LRV_{DIT} = the sensitivity of the direct integrity test; C_f = the typical feed concentration of the marker used in the test; and C_p = the filtrate concentration of the marker from an original membrane unit.

- A control limit must be established within the sensitivity limits of the test that is indicative of a membrane unit that was used in the integrity test and can meet the removal credit awarded by the state.

- If the test results exceed the control limit established, the membrane unit must be removed from service. A new test must be conducted, and the unit may be returned to service when the test results are within the established control limit.

- Direct integrity testing must be conducted on each membrane unit at least once each day the unit is in operation. Less frequent testing may be approved by the state.

Systems must conduct continuous indirect integrity monitoring on each membrane unit. All results of indirect integrity monitoring that triggered direct integrity testing and the corrective action taken in each case must be submitted monthly to the state.

- Unless the state approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

- Monitoring must be conducted at least once every 15 minutes on each membrane unit.

- If filtrate turbidity is above 0.15 NTU in two consecutive 15-minute readings, direct integrity testing must be performed immediately.

- If the state-approved parameter exceeds the state-approved control limit for a period greater than 15 minutes, direct integrity testing must be performed immediately.

Additional requirements and guidance for conducting the tests to comply with the LT2ESWTR are provided in EPA's *Membrane Filtration Guidance Manual.*

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-12. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-12. Reporting Deadlines for Systems Choosing the Membrane Filtration Toolbox Option

Systems must submit the following information	On the following schedule
Results of verification testing demonstrating the following: - Removal efficiency established through challenge testing that meets criteria in this section. - Integrity test method and parameters including resolution, sensitivity, test frequency, control limits, and associated baseline.	No later than the applicable treatment compliance date specified in Table 1-18.
Monthly report summarizing the following: - All direct integrity tests above the control limit. - If applicable, any turbidity or state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.11 Second Stage Filtration [40 CFR 141.719(c)]

Under the LT2ESWTR, a system that employs a second, separate filtration stage meeting the following criteria may receive 0.5-log credit for *Cryptosporidium* removal:

- The first stage of filtration is preceded by a coagulation step.
- The second stage of filtration is comprised of sand, dual media, granular activated carbon (GAC), or other fine grain media.
- Both filtration stages treat 100 percent of plant flow.

A cap, such as a GAC, on a single stage of filtration is not eligible for this removal credit. The treatment credit must be based on the state's assessment of the design characteristics of the filtration process.

Reporting requirements for the LT2ESWTR do not take the place of the IESWTR and LT1ESWTR reporting requirements. Specifically, the turbidity of the combined and IFE from the first filtration stage must be reported as required by the IESWTR and LT1ESWTR.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-13. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-13. Reporting Deadlines for Systems Choosing the Second Stage Filtration Toolbox Option

Systems must submit the following information	On the following schedule
Monthly verification that 100% of flow was filtered through both stages and that the first stage was preceded by a coagulation step.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.12 Slow Sand Filters [40 CFR 141.719(d)]

A system integrating a slow sand filtration process for the second stage of filtration meeting the following criteria can receive 2.5-log credit for *Cryptosporidium* removal:

- No disinfectant residual is present in the influent to the slow sand filtration process.
- Both filtration stages treat 100 percent of plant flow.

The treatment credit must be based on the state's assessment of the design characteristics of the filtration process. However, this does not apply to treatment credit awarded to slow sand filtration as a primary filtration process.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-14. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-14. Reporting Deadlines for Systems Choosing the Slow Sand Filtration Option

Systems must submit the following information	On the following schedule
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 monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.13 Chlorine Dioxide [40 CFR 141.720(a) through (c)]

Systems using chlorine dioxide must calculate CT to determine their inactivation credit for *Cryptosporidium*. CT is the product of the disinfectant concentration (C, in mg/L) and disinfectant contact time (T, in minutes). Systems must calculate CT values for each day based on measurements of C and T during peak hourly flow and use the table in §141.720(b)(1) to determine their inactivation credit or use alternative CT values approved by the state for a system. Systems with several disinfection segments (i.e., a treatment unit process with a measurable disinfectant residual level and a liquid volume) may calculate CT values for each segment and sum those values to obtain a total CT value, then use the table in §141.720(b)(1) to determine their inactivation credit.

Systems may also conduct a site-specific inactivation study to determine the CT values necessary to meet a specified *Cryptosporidium* log inactivation level using a state-approved protocol. The alternative CT values determined from the site-specific study and the method of calculation must be approved by the state to ensure that the CT values are adequate to achieve the inactivation required under the LT2ESWTR. EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for conducting a site-specific inactivation study.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-15. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-15. Reporting Deadlines for Systems Choosing the Chlorine Dioxide Toolbox Option

Systems must submit the following information	On the following schedule
Summary of CT values for each day as described in §141.720(b)(1).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.14 Ozone [40 CFR 141.720(a) through (c)]

Systems using ozone must calculate CT values using methods similar to those for chlorine dioxide. Unless the state approves alternative CT values for a system, systems must use the table in §141.720(b)(2) to determine *Cryptosporidium* log inactivation credit. Systems should refer to EPA's *LT2ESWTR Toolbox Guidance Manual* for guidance on calculating CT values for different disinfection reactor designs and operations.

As with chlorine dioxide, systems may also conduct a site-specific inactivation study to determine the CT values necessary to meet a specified *Cryptosporidium* log inactivation level using a state-approved protocol. The alternative CT values determined from the site-specific study and the method of calculation must be approved by the state to ensure that the CT values are adequate to achieve the inactivation required under the LT2ESWTR.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-16. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-16. Reporting Deadlines for Systems Choosing the Ozone Toolbox Option

Systems must submit the following information	On the following schedule
Summary of CT values for each day based on the table in §141.720(b)(2).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.5.15 Ultraviolet Light [40 CFR 141.720(d)]

Systems may claim credit for UV processes for inactivation of *Cryptosporidium*, *Giardia lamblia*, and viruses. The allowable inactivation credit for each pathogen must be based on the UV dose delivered by the system's UV reactors in relation to the UV dose table in §141.720(d). The UV dose values in the dose table are only applicable to post-filter application of UV in systems that filter and to unfiltered systems that meet all the filtration avoidance criteria of §141.71. Systems may be able to receive credit for up to 4.0-log inactivation of *Cryptosporidium*, *Giardia lamblia*, and viruses. The log credits included in the UV dose table are for UV light at a wavelength of 254 nm, as produced by a low pressure mercury vapor lamp.

Systems can apply the dose table to UV reactors with other lamp types through reactor validation testing (e.g., performance demonstration). The validation testing must demonstrate the operating conditions under which the reactor can deliver the necessary UV dose, including flow rate, UV intensity, and UV lamp status. Systems must account for the following:

- The UV absorbance of the water
- Lamp fouling and aging
- Measurement uncertainty of on-line sensors
- UV dose distributions from the velocity profiles through the reactor
- Failure of UV lamps or other system components
- Inlet and outlet piping or channel configurations of the UV reactor.

Validation testing must include full scale testing for a reactor that conforms to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp. The state may also approve an alternative approach to validation testing.

Systems must monitor their UV reactors to demonstrate that they maintain validated operating conditions during routine use. Systems must monitor for UV intensity as measured by a UV sensor, flow rate, and lamp status and for any other parameters required by the state. In addition, systems need to check the calibration of UV sensors and recalibrate them in accordance with a protocol approved by the state. EPA's *UV Disinfection Guidance Manual* provides a protocol for validating reactors and guidance on the design and implementation of UV systems. Systems must treat at least 95 percent of water delivered to the public each month to receive treatment credit.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-17. The state may include additional reporting requirements, if it determines they are necessary.

Table 1-17. Reporting Deadlines for Systems Choosing the UV Toolbox Option

Systems must submit the following information	On the following schedule
Validation test results demonstrating operating conditions that achieve required UV dose.	No later than the applicable treatment compliance date specified in Table 1-18.
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 as specified in §141.720(d).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

1.2.6 Uncovered Finished Reservoir Requirements [40 CFR 141.714]

Systems using uncovered finished water storage facilities must notify the state of any uncovered finished water storage facilities no later than April 1, 2008.

By April 1, 2009, systems must either:

- Cover any uncovered finished water storage facility; or
- Treat the discharge from the uncovered finished water storage facility to the distribution system to achieve at least 4.0-log virus, 3.0-log *Giardia lamblia*, and 2.0-log *Cryptosporidium* inactivation and/or removal using a state-approved protocol.

1.2.7 PWS Recordkeeping Requirements [40 CFR 141.722]

Systems must keep results from the initial round and the second round of source water monitoring until 3 years after either bin classification (filtered systems) or determination of the mean *Cryptosporidium* level (unfiltered systems). Systems must keep a record of any notification to the state that they will not conduct source water monitoring because they are a filtering system that will provide at least 5.5-log treatment or a ground water system that will provide 3.0-log inactivation for 3 years. Systems must keep the results of treatment monitoring associated with microbial toolbox options and with uncovered finished water reservoirs for 3 years.

1.2.8 Public Notification of Drinking Water Violations [40 CFR 141.211, Subpart Q, 40 CFR 141 Appendix A]

Under LT2ESWTR there are two types of violations that require Tier 2 or Tier 3 notification. Tier 2 notifications are for TT violations, and failure to take at least three *Cryptosporidium* samples. Tier 3 notifications are for monitoring, analytical methods, and reporting violations.

1.2.8.1 What are examples of a violation requiring Tier 2 notification?

A Tier 2 public notification is required for failure to:

- Collect 3 or more *Cryptosporidium* samples.
- Determine and report the bin classification or the mean *Cryptosporidium* level after initial or second round of source water monitoring. However, public notice is not required if the system is complying with a state-approved schedule to address the violation.
- Notify the state of an uncovered finished water reservoir and install treatment or cover the reservoir by the appropriate treatment compliance date.
- Report source water monitoring results and meet TT requirements for unfiltered systems.
- Install the level and type of treatment appropriate for the system's bin classification by the appropriate treatment compliance date.

1.2.8.2 What are examples of a violation requiring Tier 3 notification?

A Tier 3 public notification of monitoring and testing procedure violations is required for failure to:

- Conduct source water monitoring (except when a Tier 2 notice is required due to failure to collect 3 or more *Cryptosporidium* samples).
- Submit a sampling schedule to the state.

- Collect samples in accordance with the sampling schedule (e.g., sampling location, sampling within 2 days before or after the scheduled date).
- Use an approved laboratory and an approved analytical method.
- Notify the state before making a significant change in disinfection.
- Develop disinfection profiles and benchmarks.
- Report source water monitoring results (initial or second round).

More information on public notification requirements can be found at www.epa.gov/safewater/pn.html.

1.2.9 Consumer Confidence Reports Requirements

The LT2ESWTR does not specifically modify the CCR Rule requirements. However, CCRs must contain any violations of TT requirements or other violations of NPDWR requirements. This includes any such violations of the LT2ESWTR.

More information can be obtained from:

- The Long Term 2 Enhanced Surface Water Treatment Rule 71 *FR* 653 (January 5, 2006); and www.epa.gov/safewater/disinfection/lt2
- The EPA Safe Drinking Water Hotline, Telephone: 1.800.426.4791
- EPA's CCR Web site: www.epa.gov/safewater/ccr1.html

1.3 Requirements of the Rule: States or Other Primacy Agencies

The following rule requirements are from the LT2ESWTR published in the *Federal Register* on January 5, 2006 (71 *FR* 653). For a copy of the actual rule language, see Appendix B, or visit EPA's Web site at www.epa.gov/safewater/disinfection/lt2 for a copy of the *Federal Register* notice.

1.3.1 Special Primacy Requirements [40 CFR 142.16]

In order to receive primacy for the LT2ESWTR, states must adopt regulations no less stringent than this rule. States must submit a primacy application consisting of revisions to their programs, regulations, or authorities no later than January 5, 2008, although states may request an extension of up to 2 additional years.

In addition, states that choose to incorporate the following provisions must describe how they will implement them in their primacy applications (see Chapter 4, section 4.4):

- Approve an alternative to the *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people.
- Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.

- Approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.

- Approve protocols for treatment credits under the demonstration of performance toolbox option and for alternative ozone and chlorine dioxide CT values.

- Approve an alternative approach to UV reactor validation testing in the microbial toolbox.

1.3.2 State Recordkeeping Requirements [40 CFR 142.14]

The current regulations in §142.14 require states with primacy to keep various records including analytical results to determine compliance with MCLs, MRDLs, and TT requirements; system inventories; state approvals; enforcement actions; and variance and exemption status. The LT2ESWTR requires that the state keep records related to any decisions made pursuant to the requirements in §141.700–§141.724. In addition, states must keep records of:

- Results of source water *E. coli* and *Cryptosporidium* monitoring.

- The bin classification after the initial and after the second round of source water monitoring.

- Any changes in treatment requirements for filtered systems due to watershed assessment during sanitary surveys.

- Determination of whether each unfiltered system has a mean source water *Cryptosporidium* level above 0.01 oocysts/L after the initial and the second round of source water monitoring.

- The treatment processes or control measures that each system employs to meet *Cryptosporidium* treatment requirements under the LT2ESWTR.

- A list of systems required to cover or treat the effluent of an uncovered finished water storage facility.

1.3.3 State Reporting Requirements [40 CFR 142.15]

The current regulations in §142.15 require states to report certain information to EPA, including:

- Bin classification after the initial and second round of source water monitoring.

- Changes in treatment requirements as a result of a watershed assessment during sanitary surveys.

- Determination of whether the mean *Cryptosporidium* level is greater than 0.01 oocysts/L after initial and second round of source water monitoring for unfiltered systems.

1.4 Summary of Action Dates

1.4.1 Applicability and Compliance Dates

The LT2ESWTR applies to systems using surface or GWUDI as a source and focuses on source water conditions and the appropriate level of treatment [§141.700]. Table 1-18 summarizes key compliance dates required (in **bold**) by the LT2ESWTR, as well as suggested action dates. Systems must comply with treatment requirements based on their specific risk characterizations, as determined through source water monitoring. The compliance dates are designed to allow systems to comply simultaneously with the Stage 2 DBPR and the LT2ESWTR in order to balance risks associated with DBPs with risks associated with microbial pathogens.

Note the term "state" or "states" is used in the following and is used to refer to all types of primacy agencies including U.S. territories, Indian tribes, and EPA Regions.

Table 1-18. Summary of Action Dates for the LT2ESWTR

Date	LT2ESWTR Action
January 5, 2006	Final rule is published in *Federal Register*.
	STATES
January 5, 2006	States should begin determining how they will assess significant changes in the watershed and source water as part of the sanitary survey process and appropriate follow-up actions.
January 5, 2006	States should begin determining how they will approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.
January 5, 2006	States should begin specifying any alternative *E. coli* indicator values for small systems.
January 5, 2006	States should begin determining how they will approve protocols for treatment credits under the demonstration of performance toolbox option, for alternative ozone and chlorine dioxide CT values, and for UV reactor validation testing.
January 5, 2006	States should begin awarding *Cryptosporidium* treatment credit for primary treatments in place.
January 5, 2006	States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.
December 1, 2006	States are encouraged to review grandfathered data for Schedule 1 systems as soon as possible.
April 1, 2007	States are encouraged to update their data management systems.
June 1, 2007	States are encouraged to review grandfathered data for Schedule 2 systems as soon as possible.
June 1, 2008	States are encouraged to review grandfathered data for Schedule 3 systems as soon as possible.
April 1, 2009	States should oversee large system bin assignments.
December 1, 2008	States are encouraged to review grandfathered data for Schedule 4 filtered systems as soon as possible.
June 1, 2010	States are encouraged to review grandfathered data for Schedule 4 unfiltered systems as soon as possible.

Date	LT2ESWTR Action
October 1, 2012	States should oversee small system bin assignments.
April 1, 2013	States should award *Cryptosporidium* treatment credit to large systems for toolbox option implementation.
October 1, 2015	States should award *Cryptosporidium* treatment credit to small systems for toolbox option implementation.
	SCHEDULE 1 SYSTEMS
July 1, 2006	**Systems on Schedule 1 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]**
July 1, 2006	**Systems on Schedule 1 must notify EPA (or the state if the state wishes to have systems report to them) of their intent to submit results for grandfathering data. [§141.707]**
October 1, 2006	**Systems on Schedule 1 must begin initial source water monitoring. [§141.701(b)]**
December 1, 2006	**Systems on Schedule 1 must submit monitoring results for grandfathering. [§141.707]** (States are encouraged to review grandfathered data as soon as possible.)
April 1, 2009	**Filtered systems on Schedule 1 must report their initial bin classification to the state for approval. [§141.710(e)(1)]**
April 1, 2009	**Unfiltered systems on Schedule 1 must report the mean of all initial round *Cryptosporidium* sample results to the state. [§141.712(a)(1)]**
April 1, 2012	**Based on first round of source water monitoring, Systems on Schedule 1 must meet any additional *Cryptosporidium* treatment requirements.[1] [§141.713(c)]**
January 1, 2015	**Systems on Schedule 1 must submit to the state their sampling locations and sampling schedule for the second round of source water monitoring. [§141.702(a)]**
April 1, 2015	**Systems on Schedule 1 must begin second round of source water monitoring. [§141.701(b)]**
October 1, 2017	**Filtered systems on Schedule 1 must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(2)]**
October 1, 2017	**Unfiltered systems on Schedule 1 must report the mean of all second round *Cryptosporidium* sample results to the state. [§141.712(a)(2)]**
	SCHEDULE 2 SYSTEMS
January 1, 2007	**Systems on Schedule 2 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]**
January 1, 2007	**Systems on Schedule 2 must notify EPA (or the state if the state wishes to have systems report to them) of their intent to submit results for grandfathering data. [§141.707]**
April 1, 2007	**Systems on Schedule 2 must begin initial source water monitoring. [§141.701(b)]**
June 1, 2007	**Systems on Schedule 2 must submit monitoring results for grandfathering. [§141.707]** (States are encouraged to review grandfathered data as soon as possible.)
October 1, 2009	**Filtered systems on Schedule 2 must report their initial bin classification to the state for approval. [§141.710(e)(1)]**

Date	LT2ESWTR Action
October 1, 2009	**Unfiltered systems on Schedule 2 must report the mean of all initial round *Cryptosporidium* sample results to the state. [§141.712(a)(1)]**
October 1, 2012	**Based on first round of source water monitoring, Systems on Schedule 2 must meet any additional *Cryptosporidium* treatment requirements.[1] [§141.713(c)]**
July 1, 2015	**Systems on Schedule 2 must submit to the state their sampling locations and sampling schedule for the second round of source water monitoring to the state. [§141.702(a)]**
October 1, 2015	**Systems on Schedule 2 must begin second round of source water monitoring. [§141.701(b)]**
April 1, 2018	**Filtered systems on Schedule 2 must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(2)]**
April 1, 2018	**Unfiltered systems on Schedule 2 must report the mean of all second round *Cryptosporidium* sample results to the state. [§141.712(a)(2)]**
	SCHEDULE 3 SYSTEMS
January 1, 2008	**Systems on Schedule 3 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]**
January 1, 2008	**Systems on Schedule 3 must notify EPA (or the state if the state wishes to have systems report to them) of their intent to submit results for grandfathering data. [§141.707]**
April 1, 2008	**Systems on Schedule 3 must begin initial source water monitoring. [§141.701(b)]**
June 1, 2008	**Systems on Schedule 3 must submit monitoring results for grandfathering. [§141.707]** (States are encouraged to review grandfathered data as soon as possible.)
October 1, 2010	**Filtered systems on Schedule 3 must report their initial bin classification to the state for approval. [§141.710(e)(1)]**
October 1, 2010	**Unfiltered systems on Schedule 3 must report the mean of all initial round *Cryptosporidium* sample results to the state. [§141.712(a)(1)]**
October 1, 2013	**Based on first round of source water monitoring, Systems on Schedule 3 must meet any additional *Cryptosporidium* treatment requirements.[1] [§141.713(c)]**
July 1, 2016	**Systems on Schedule 3 must submit to the state their sampling locations and sampling schedule for the second round of source water monitoring to the state. [§141.702(a)]**
October 1, 2016	**Systems on Schedule 3 must begin second round of source water monitoring. [§141.701(b)]**
April 1, 2019	**Filtered systems on Schedule 3 must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(2)]**
April 1, 2019	**Unfiltered systems on Schedule 3 must report the mean of all second round *Cryptosporidium* sample results to the state. [§141.712(a)(2)]**

Date	LT2ESWTR Action
	SCHEDULE 4 SYSTEMS (*E. coli* monitoring only)
July 1, 2008	**Filtered systems on Schedule 4 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]**
July 1, 2008	**Filtered systems on Schedule 4 must notify the state of their intent to submit results for grandfathering data. [§141.707]**
October 1, 2008	**Filtered systems on Schedule 4 that monitor for *E. coli* must begin source water monitoring. [§141.701(b)]**
December 1, 2008	**Filtered systems on Schedule 4 must submit monitoring results for grandfathering. [§141.707]** (States are encouraged to review grandfathered data as soon as possible.)
July 1, 2017	**Filtered systems on Schedule 4 must submit to the state their sampling locations and sampling schedule for the second round of *E. coli* monitoring to the state. [§141.702(a)]**
October 1, 2017	**Filtered systems on Schedule 4 that monitor for *E. coli* must begin second round of source water monitoring. [§141.701(b)]**
	SCHEDULE 4 SYSTEMS (*Cryptosporidium* monitoring and Unfiltered Systems)
January 1, 2010	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* and unfiltered systems must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]**
January 1, 2010	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* and unfiltered systems must notify the state of their intent to submit results for grandfathering data. [§141.707]**
April 1, 2010	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* and unfiltered systems must begin initial source water monitoring. [§141.701(b)]**
June 1, 2010	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* and unfiltered systems must submit monitoring results for grandfathering. [§141.707]** (States are encouraged to review grandfathered data as soon as possible.)
October 1, 2011 or October 1, 2012	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* must report their initial bin classification to the state for approval. [§141.710(e)(1)]**
October 1, 2011 or October 1, 2012	**Unfiltered systems on Schedule 4 must report the mean of all initial round *Cryptosporidium* sample results to the state. [§141.712(a)(1)]**
October 1, 2014	**Based on first round of source water monitoring, systems on Schedule 4 must meet any additional *Cryptosporidium* treatment requirements.[1] [§141.713(c)]**
January 1, 2019	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* and unfiltered systems must submit to the state their sampling locations and sampling schedule for the second round of *Cryptosporidium* monitoring to the state. [§141.702(a)]**
April 1, 2019	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* and unfiltered systems must begin second round of source water monitoring. [§141.701(b)]**
October 1, 2021 or October 1, 2020	**Filtered systems on Schedule 4 that monitor for *Cryptosporidium* must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(1)]**

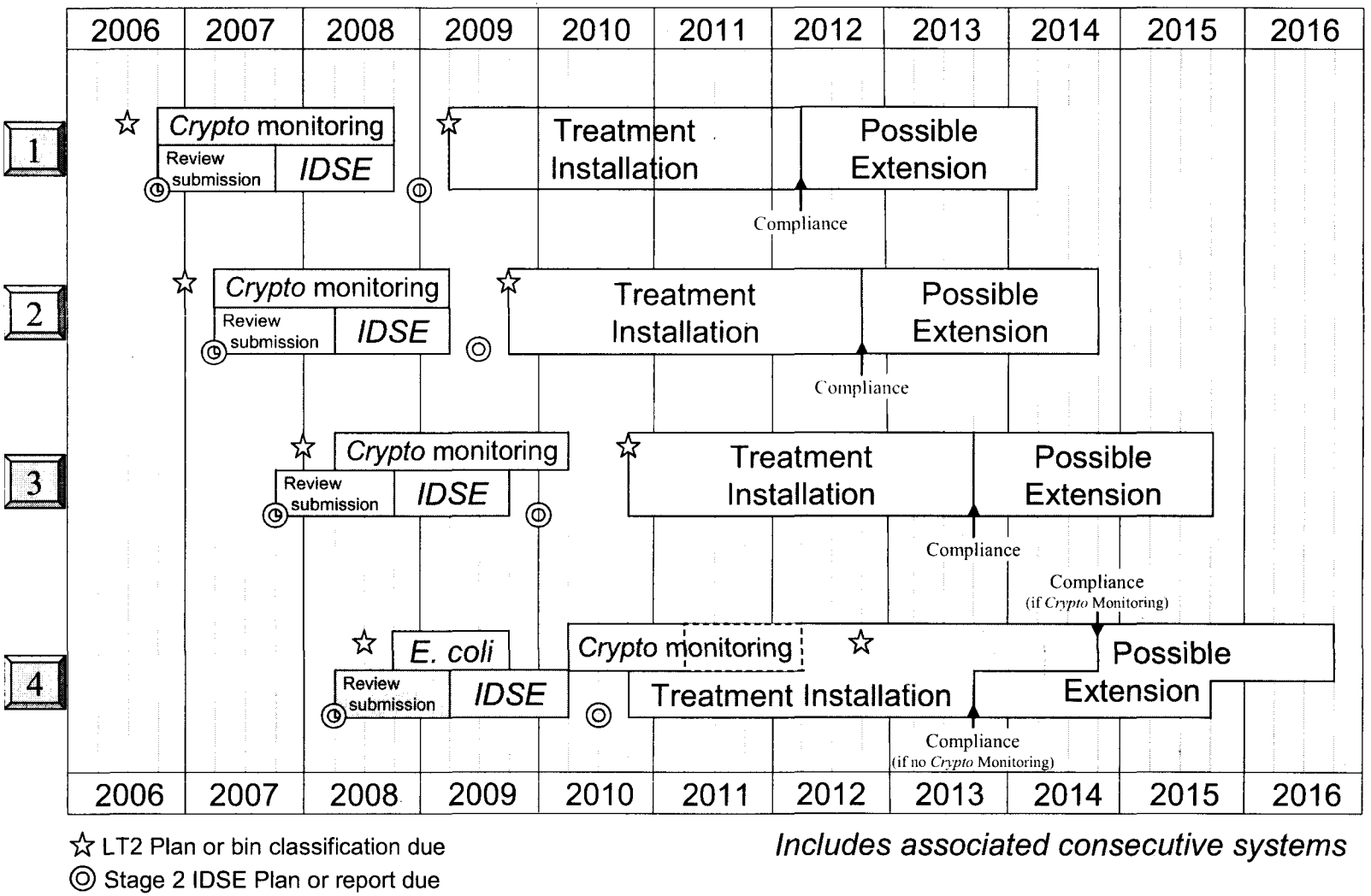
Date	LT2ESWTR Action
October 1, 2021 or October 1, 2020	**Unfiltered systems on Schedule 4 must report the mean of all second round *Cryptosporidium* sample results to the state. [§141.712(a)(1)]**
	UNCOVERED RESERVOIRS
April 1, 2008	**Systems must notify the state of all uncovered treated water storage facilities. [§141.714(b)]**
April 1, 2009	**Uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system. [§141.714(c)]**

1. The state may grant 2-year extensions for capital improvements. See Appendix H for guidance on reviewing extension requests under Section 1412(b)(10) of the SDWA.
Note: Wholesale systems must follow the schedule based on the population of the largest system in their combined distribution system.

1.4.2 Timeline for the LT2ESWTR

Figure 1-2 depicts the LT2ESWTR requirements and implementation timeline for states and systems for the four schedules (based on population served by systems).

Figure 1-2. Implementation Timeline for the LT2ESWTR



Notes:

1. For small systems, the second round requirements are the same as the first with respect to monitoring for *E. coli* (or an indicator) and monitoring for *Cryptosporidium* is only required if *E. coli* or indicator triggers are exceeded.
2. Unfiltered systems must monitor for *Cryptosporidium*, regardless of size.

References

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USEPA. 1999. *Disinfection Profiling and Benchmarking Guidance Manual.* EPA 815-R-99-013.

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Section 2
Resources and Guidance

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In addition to this Implementation Guidance, a variety of resource materials and technical guidance documents have been prepared by EPA to facilitate understanding and implementing the LT2ESWTR. This section is an overview of each of these resources and includes instructions on how to obtain the documents.

2.1 Technical Guidance Manuals

EPA is developing technical guidance manuals to support the LT2ESWTR. These manuals will aid EPA, state agencies, and affected PWSs in implementing this rule and will help ensure that implementation among these groups is consistent.

- The *Source Water Monitoring Guidance for Public Water Systems* (EPA 815-R-06-005, February 2006) provides guidance on activities related to *Cryptosporidium* and *E. coli* monitoring under the LT2ESWTR, such as laboratory contracting, sample collection procedures, and data evaluation and interpretation.

- The *Microbial Laboratory Manual for the LT2ESWTR* (EPA 815-R-06-006, February 2006) provides guidance to laboratories on procedures for analyzing *Cryptosporidium* and *E. coli* samples under the LT2ESWTR to ensure compliance and maximize data quality and consistency.

- The *Ultraviolet Disinfection Guidance Manual* (EPA 815-R-06-007, November 2006) provides guidance on the validation, selection, design, and operation of UV disinfection systems to comply with treatment requirements under the Rule.

- The *Membrane Filtration Guidance Manual* (EPA 815-R-06-009, November 2005) provides guidance on the selection, design, and operation of membrane filtration to comply with treatment requirements under the Rule.

- The *LT2ESWTR Toolbox Guidance Manual* (publication to be announced later) provides guidance on the selection, design, and operation of treatment and management strategies in the LT2ESWTR "microbial toolbox" to comply with treatment requirements under the Rule.

- The Guidance on Generation and Submission of Grandfathered *Cryptosporidium* Data for Bin Classification Under the LT2ESWTR (publication to be announced later) provides guidance to PWSs that elect to monitor for *Cryptosporidium* prior to their compliance dates required by LT2ESWTR. The guidance describes how PWSs can perform grandfathered *Cryptosporidium* monitoring such that the results should be equivalent to data generated under the LT2ESWTR and, therefore, acceptable for use in bin classification.

- The *Simultaneous Compliance Manual for Long Term 2 and Stage 2 DBP Rules* (EPA 817-D-06-003) describes the various potential treatment and operational conflicts that may arise as systems comply with these two rules in addition to other existing rules.

- The *Small Entity Compliance Guidance Manual* (publication to be announced later) is intended for small PWSs, as required by the Small Business Regulatory Enforcement Fairness Act of 1996. This guide contains a general introduction and background for the LT2ESWTR, describes the specific requirements of the LT2ESWTR, and provides information on how to comply with those requirements.

For more information, contact EPA's Safe Drinking Water Hotline, (800) 426-4791 or see the Office of Ground Water and Drinking Water (OGWDW) Web page. The Rule and guidance documents are located at (www.epa.gov/safewater/disinfection/lt2).

2.2 Rule Presentation

Presentations that may be useful for workshops on the LT2ESWTR will be available in PowerPoint format on EPA's Web site: www.epa.gov/safewater/disinfection/lt2.

2.3 Fact Sheet/Quick Reference Guide

A Fact Sheet/Quick Reference Guide for the LT2ESWTR may be useful in conveying basic information to water systems, new personnel, and for educating stakeholders about the Rule. The following are stand-alone documents and are included in Appendix C of this guidance:

- ✓ Fact Sheet: Long Term 2 Enhanced Surface Water Treatment Rule.
- ✓ LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People.
- ✓ LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People.
- ✓ LT2ESWTR Data Collection and Tracking System.
- ✓ LT2ESWTR Laboratory Fact Sheet.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 1 Systems.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 2 Systems.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 3 Systems.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 4 Systems.

- ✓ List of Laboratories Approved for the Analysis of *Cryptosporidium* under the SDWA.
- ✓ LT2 Rule: *Cryptosporidium* & *E. coli* Sample Collection Recommendations Pocket Guide.

2.4 Frequently Asked Questions

Questions and Answers (Q&As) on the LT2ESWTR are provided in this section. These questions have been asked of EPA through the Safe Drinking Water Hotline, implementation training, and/or other means.

Schedule

Q1: What are the population ranges of the four schedules?

A1: The population ranges of the four schedules are:

If you have a Subpart H source and are this kind of system:	*You are on schedule number:*
System serving 100,000 or more people OR a wholesale system in a combined distribution system that contains a system serving 100,000 or more people	1
System serving 50,000 to 99,999 people OR a wholesale system in a combined distribution system with the largest system serving 50,000 to 99,999	2
System serving 10,000 to 49,999 people OR a wholesale system in a combined distribution system with the largest system serving 10,000 to 49,999	3
System serving fewer than 10,000 people	4

Q2: Should a system adjust its source water monitoring schedule if its population increases or decreases during initial monitoring so much that the system is moved into a different schedule?

A2: It is important for systems to conduct at least 24 consecutive months of monitoring. If a system's population changes so much that the system is shifted into a different schedule, the system should remain on its original schedule for the duration of initial monitoring.

Q3: How will the LT2ESWTR affect new water systems? What should a new system do if it does not have 2 years of source water data prior to installing treatment?

A3: New systems should work with the primacy agency to determine applicable compliance dates. The LT2ESWTR does not require systems to have 2 years of data if they have sufficient treatment in place to achieve 5.5-log of treatment (if a filtered system) or 3.0-log inactivation (if an unfiltered system).

Combined Distribution Systems

Q4: How does a wholesale system differ from a purchased system?

A4: A wholesale system is a PWS that treats source water to produce finished water and sells that water to another PWS. A purchased system buys finished water from a wholesale system.

Q5: What is a combined distribution system?

A5: A combined distribution system is the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

Q6: How should a system in a combined distribution system determine its schedule?

A6:

If your system:	*You must comply with the schedule and monitoring requirements of:*
Sells finished water and has its own Subpart H source	The largest system in your combined distribution system
Sells finished water but does not have its own Subpart H source	The largest system in your combined distribution system*
Does not sell finished water but has its own Subpart H source	The population of your own system
Does not sell finished water and does not have its own Subpart H source	The population of your own system*

**It is important to note that systems with no Subpart H source in a combined distribution system are not required to conduct source water monitoring; however, they must comply with other requirements of the LT2ESWTR (i.e., covering finished water reservoirs or treating the discharge and complying with disinfection profiling and benchmarking requirements).*

The summed population of all the systems in the combined distribution system is not used to determine compliance schedule.

Q7: If a wholesale system serving fewer than 10,000 people has its own Subpart H source and purchases finished water from a Schedule 1 system, can the small system still conduct *E. coli* trigger level monitoring, or is the small system required to conduct *Cryptosporidium*, *E. coli*, and turbidity monitoring?

A7: Systems in a combined distribution system that have their own Subpart H source and sell finished water are required to monitor for the same contaminants as required of the largest system in the combined distribution system. The small system in this example both purchases and sells finished water and has its own Subpart H source; therefore it will be required to meet the monitoring requirements of the Schedule 1 system. The small system would not have the option of conducting only triggered *E. coli* monitoring; it would be required to monitor for *Cryptosporidium*, *E. coli*, and turbidity. Wholesale systems, regardless of size, must comply with the schedule and monitoring requirements of the largest system in their combined distribution system.

Q8: If a purchased system boosts its disinfectant level but does not otherwise treat purchased water, would this system be considered a consecutive system or, due to the addition of disinfectant, would this system be considered wholesale system?

A8: There are four possibilities for this system:

If the purchased system:	*The system is:*	*And would be on:*
Does not have its own Subpart H source but does sell finished water	Consecutive	The schedule of the largest system in the combined distribution system
Has its own Subpart H source and sells finished water	Wholesale	The schedule of the largest system in the combined distribution system
Does not sell finished water and does not have its own Subpart H source	Consecutive	The schedule of its own population class
Does not sell finished water but does have its own Subpart H source	Consecutive	The schedule of its own population class

Q9: What is the definition of "interconnection"? If a system purchases water from a wholesale system and also treats and distributes its own water from a Subpart H source, is it considered an interconnected system?

A9: Interconnection is defined as "the state of being connected." In terms of PWSs, if two systems are connected to each other, then they are interconnected. Yes, the system described in this question would be considered interconnected (i.e., part of a combined distribution system, a consecutive system). If this system sells finished water to another system, it must follow the compliance schedule of the largest system in the combined distribution system. If this system does not sell finished water to another system, it would follow the compliance schedule of its own population class (see Q8).

Removal/Inactivation Requirements

Q10: What is log turbidity removal?

A10: Log turbidity removal is a base 10 log value based on the influent and effluent turbidity concentrations. For example, a 0.5-log reduction corresponds to a 68 percent reduction in turbidity (influent turbidity is equal to 100 and effluent turbidity is equal to 32):

0.5-log = log (100/32)

Log removal values are used because they can be determined for each treatment unit in a treatment train. Then the individual values can be added to obtain a total log removal for the treatment train.

Q11: When providing maximum treatment instead of conducting source water monitoring, why must filtered systems provide 5.5-log *Cryptosporidium* removal/inactivation while unfiltered systems must only supply 3.0-log inactivation?

A11: Filtered systems must provide 5.5-log *Cryptosporidium* removal/inactivation to avoid source water monitoring because they most likely do not have the same high quality source water as unfiltered systems. Unfiltered systems must only provide 3.0-log inactivation to avoid source water monitoring because these systems have higher quality source water and are able to meet the filtration avoidance criteria in 40 CFR 141.71.

Q12: Depending on their source water *Cryptosporidium* concentration, unfiltered systems must provide at least 2.0-log or 3.0-log inactivation. Can this protection be provided by one disinfection method or must it come from a combination of treatment?

A12: Systems must use at least two disinfectants to meet the combined *Cryptosporidium*, *Giardia lamblia*, and virus inactivation requirements. One disinfectant must be chlorine dioxide, ozone, or ultraviolet (UV) light. *Cryptosporidium* inactivation can be accomplished by any one of these three disinfection methods. For example, using free chlorine to meet virus and *Giardia* inactivation requirements and using UV light to provide 2.0-log *Cryptosporidium* inactivation is sufficient.

Q13: Currently, conventional treatment plants receive a 2.0-log treatment credit for *Cryptosporidium*. Under the LT2ESWTR, the base removal/inactivation requirement will change to 3.0-log. Will systems in Bin 1 be required to provide an extra 1.0-log of treatment?

A13: Under the LT1ESWTR and the IESWTR, conventional treatment plants receive a 2.0-log reduction credit for *Cryptosporidium*. Subsequent to the promulgation of these rules, EPA has come to believe that conventional treatment plants operating under the conditions of the LT1ESWTR and the IESWTR are capable of providing 3.0-log *Cryptosporidium* removal. Under the LT2ESWTR, conventional treatment plants will receive a 3.0-log *Cryptosporidium* removal credit. Systems in Bin 1 will not be required to provide any additional treatment.

Grandfathering

Q14: What criteria must grandfathered data meet to be allowable under the LT2ESWTR?

A14: Grandfathered data must meet the following criteria to be allowable under the LT2ESWTR:

- Data must have been analyzed using approved laboratory methods.
- For each *Cryptosporidium* sample, the laboratory must have analyzed at least 10 L of sample or at least 2 mL of packed pellet volume.
- Sampling locations must meet the conditions of 40 CFR 141.703.
- Samples must have been collected no earlier than January 1999.

States also have discretion in approving or rejecting data submitted for grandfathering.

Q15: If a system wishes to grandfather *Cryptosporidium* source water data, does this data have to include *E. coli* and turbidity data as well, or is *Cryptosporidium* data alone sufficient? How much data needs to be grandfathered?

A15: If a system submitting *Cryptosporidium* data for grandfathering has *E. coli* and turbidity data available, these data should be submitted as well. If a system does not have *E. coli* and turbidity data, it can still submit *Cryptosporidium* data for grandfathering. A system can grandfather as much data as it has, as long as it meets the grandfathering requirements.

Q16: Can systems delay source water monitoring if they have submitted grandfathered data for approval?

A16: EPA anticipates there will be some variability in the amount of source water data systems will submit for grandfathering – some systems will have several sequential months of data, others will have focused their monitoring during a limited time of year, such as during just the fall or spring, and others will have most of the data they need with some data gaps. 40 CFR 141.701(h)

specifies that grandfathered data may substitute an equivalent number of months at the end of the monitoring period. Therefore, systems with sequential months of grandfathered data would begin source water monitoring according to the schedule in the LT2 rule, and could stop monitoring during the months represented by their grandfathered data. Similarly, 40 CFR 141.707(e)(1) indicates a system may only need to monitor to fill-in gaps in the grandfathered data. In this scenario, a system may not need to begin monitoring on the start date specified in the rule if they have adequate grandfathered data representative of that calendar month.

Q17: If a system has submitted a request to grandfather previously collected data but they have not heard whether their request is approved, must they begin source water monitoring on the date required by the LT2ESWTR?

A17: If a system's previously collected data meets all of the requirements for grandfathering data and would be representative of source water quality at the time the source water samples would be collected, the system would not need to begin monitoring. However, if the state subsequently rejects some of the data submitted for grandfathering, the system must begin additional monitoring 2 months after being notified of the inadequate samples and in accordance with a state-approved schedule.

Source Water Monitoring

Q18: Are systems required to conduct source water monitoring on a specific date, such as the 5th of each month, or can systems choose a flexible date, such as the first Monday of each month to collect their samples? How should systems handle weekend sampling (particularly for *E. coli* monitoring when the maximum sample holding time is 30 hours)?

A18: Systems can monitor on a specific date or on a flexible date as long as samples are taken at approximately the same time every month. Systems should work with labs to coordinate sampling schedules and to avoid sampling on weekends and holidays.

Q19: How can a system that switches between sources seasonally sample in a way that fulfills the LT2ESWTR requirements? Can the system subsequently change the way it switches between the two sources, or will the system be locked into using the sources exactly as they were used during initial monitoring?

A19: The system should follow standard operating procedures and sample from whichever source is in use on the scheduled day of sampling. As long as the system follows these requirements, it can later change the way it uses those sources.

Q20: When creating a composite source water sample from multiple sources, assuming a blended tap is not available, what volumes must be collected from each source? Also, what should the total composite sample volume be?

A20: When creating a composite sample, the system should collect the volume contributed from each source based on the proportion of flow that the sources contributed to the plant on the day of the sampling (e.g., if Source A contributed 75 percent of flow to the plant on the day of sampling and Source B contributed 25 percent of flow, the composite sample would be 75 percent from Source A and 25 percent from Source B). The composite sample should represent the stream being treated by the plant. The total sample volume for a composite sample is the same as for any sample: 10 L sample volume or 2 mL packed pellet volume.

Q21: What is an example of an acceptable reason for not collecting a source water sample within 2 days of the scheduled sampling date? Are problems in the distribution system or high turbidity events acceptable reasons for missing a source water sampling date?

A21: Issues with the source such as a very large rain event that poses danger to the sample collector are acceptable reasons for missing a source water monitoring deadline. Also, weather conditions, such as ice, that prevent access to the intake justify missing a source water monitoring deadline. A high turbidity event alone would not justify missing a source water monitoring deadline, and neither would issues in the distribution system. The primacy agency has additional discretion in determining acceptable justifications for missing samples.

Q22: If a system misses their January source water sample, can the system replace the sample in the following months or must the system wait until the following January to replace the sample?

A22: These situations must be handled on a case-by-case basis by the primacy agency. If the system can take a replacement sample that will be representative of the seasonal conditions of the omitted month, it may be possible to replace the sample. The Information Processing and Management Center (IPMC) and the LT2ESWTR data collection system will help systems and states identify source water samples that have been missed; if systems are notified early enough they can collect a replacement sample before seasonal conditions change.

Q23: If a system commits to providing treatment instead of conducting source water monitoring, can they later decide to conduct source water monitoring?

A23: Systems may decide to conduct source water monitoring before the applicable source water monitoring deadline has passed. However, after the deadline has passed, it may be difficult for the system to meet subsequent deadlines. Therefore a system must be very confident that it will be able to meet future deadlines before retracting its intent to treat notice and beginning source water monitoring.

Q24: Where would a system that uses a presedimentation basin without coagulant collect source water samples? If this system began to use coagulant after the first round of monitoring, where would it collect its second round samples?

A24: This system would collect first round samples after the presedimentation basin (as long as no coagulant is used). If the system starts to add coagulant to meet bin requirements, it would be required to collect samples before the presedimentation basin for second round monitoring.

Toolbox Options

Q25: If a system meets both the CFE and the IFE criteria, can the system receive *Cryptosporidium* treatment credit for both treatment options?

A25: Yes, systems meeting both CFE and IFE requirements may receive a 0.5-log *Cryptosporidium* treatment credit for each treatment, for a total of 1.0-log treatment credit.

Q26: If a system receiving the 0.5-log CFE turbidity toolbox credit exceeds 0.15 NTU more than 5 percent of the time, is there a grace period for the system to return to compliance without losing treatment credit?

A26: No, there is no grace period. The system would be out of compliance for the month when the exceedance occurred. The system would receive a TT violation and have to comply with public notification requirements. It would be up to the primacy agency to determine if the system would be allowed to continue receiving treatment credit for that toolbox option.

Q27: Are combined filter performance and individual filter performance standards based on measurements taken every 4 hours?

A27: No. Combined filter performance standards are based on measurements taken every 4 hours, but individual filter performance standards are based on measurements taken every 15 minutes as required by the IESWTR and the LT1ESWTR.

Q28: If a single process (e.g., UV light) is conducted in series, can a system receive additional *Cryptosporidium* log removal credit?

A28: Yes, systems can add processes together for additional *Cryptosporidium* treatment credit.

Laboratories

Q29: Is there a list of monitoring laboratories certified to analyze *Cryptosporidium*?

A29: A list of approved labs can be found at www.epa.gov/safewater/disinfection/lt2/lab_aprvlabs.html.

Q30: How will labs be trained to use the Stage 2/LT2ESWTR database?

A30: Labs will be trained to use the database as part of the lab certification program.

Q31: Do labs need to report sample results to the systems? Is this required by the LT2ESWTR?

A31: The LT2ESWTR requires that systems report monitoring results, and that systems serving 10,000 people or more submit results electronically, unless the primacy agency specifies otherwise.

Information Collecting and Reporting

Q32: Will the Data Collecting and Tracking System (DCTS) migrate violations to Safe Drinking Water Information System/Federal (SDWIS/Fed) or will states need to download violations manually?

A32: EPA received feedback from most states expressing interest in the ability to migrate violations and is working on this functionality.

Q33: Can states request that systems send reports to the state directly?

A33: States can require direct reporting for systems. EPA believes that states will not immediately have primacy and that, until then, reports will come to the state through the IPMC.

Support

Q34: Will systems be trained to use the Stage 2 DBPR and LT2ESWTR database?

A34: Yes, there will be Web casts to train systems on the databases. Also, states and regions will receive a module on the database at train-the-trainer sessions, so that they can train their systems on how to use the databases.

Q35: Will there be a guidance manual for the source water monitoring process? If so, when will it be available?

A35: Yes, there is a source water monitoring guidance manual. It is available electronically at www.epa.gov/safewater/disinfection/lt2/compliance.html and can be requested in hard copy by contacting EPA (contact information is available on the Web site).

Violations

Q36: Does the LT2ESWTR include specific public notification requirements?

A36: The LT2ESWTR requires public notification for a number of violations, but requires systems to provide special notice if they fail to collect three source water monitoring samples or if they miss the bin classification deadline.

Q37: If a system fails to meet the required monthly IFE or CFE turbidity limits as described in §141.718(a) and §141.718(b), are additional requirements triggered beyond the PN requirements associated with a TT violation?

A37: No, but the state has discretion to impose additional requirements if it feels that the system cannot meet the treatment requirements on a consistent basis.

Q38: If a system receives a TT violation, is it required to use supplementary toolbox options to provide additional log removal credit to ensure that necessary protection is achieved?

A38: If a system receives a TT violation, it can provide additional treatment or directly correct the problem that led to the TT violation. This is the same action recommended for a TT violation under the IESWTR and LT1ESWTR. If the state believes that the system will not be able to remedy the cause of the TT violation, a selection of additional toolbox treatment options may be warranted.

Other

Q39: If systems do not cover finished water storage facilities, what are the options? Is a risk mitigation plan still an option?

A39: Systems that cannot cover finished water storage facilities can provide at least 4.0-log virus, 3.0-log *Giardia lamblia*, and 2.0-log *Cryptosporidium* removal/inactivation using a protocol approved by the state and still be in compliance with the LT2ESWTR. However, there is no longer a risk mitigation option.

Section 3
State Implementation

EPA expects to undertake necessary rule implementation activities during the period of early implementation. During the early implementation period the state may elect to undertake some, or all, of the implementation activities, in cooperation with EPA. This will facilitate continuity of implementation and ensure that system-specific advice and decisions are made with the best available information and are consistent with existing state program requirements.

3.1 Overview of Implementation

The LT2ESWTR applies to all systems using surface water and GWUDI. Requirements and compliance dates differ between system types (i.e., population served and existing treatment). Primacy agencies should clearly define monitoring, reporting, performance, and follow-up requirements to help systems understand how the Rule will affect them and what they must do to comply. The main implementation activities for primacy agencies include the following:

- Address special primacy conditions.
- Identify affected systems.
- Communicate LT2ESWTR requirements to affected systems.
- Update data management systems.
- Approve laboratories for *Cryptosporidium* analysis.
- Specify any alternative *E. coli* indicator values for small systems.
- Oversee bin assignments.
- Award *Cryptosporidium* treatment credit for treatments already in place (primary treatment).
- Award *Cryptosporidium* treatment credit for implementation of options from the microbial toolbox.
- Oversee disinfection profiling and benchmarking.

To help state implementation efforts, the guidance in this section and in section 4 makes suggestions and provides alternatives that go beyond the minimum primacy agency requirements specified in the subsections of §142.16. Such suggestions are prefaced by "may" or "should" and are to be considered advisory. They are not required elements of states' applications for program revision.

3.2 Identify Special Primacy Conditions

There are provisions of the LT2ESWTR that allow states discretion in establishing decision-making criteria. The special primacy requirements for the LT2ESWTR, which address the most important discretionary items, are discussed in section 4.4 of this guidance. Although that section describes how a state might satisfy the requirements and obtain primacy, states should inform the systems of their specific requirements with sufficient lead time to meet the compliance dates.

The main provisions for which states must make a timely decision regarding system requirements include the following:

- States must establish criteria for approving watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox. To allow adequate time for

decision-making and planning, systems should be aware of state criteria for the watershed control program treatment credit 2 years before their treatment compliance date.

- If states intend to allow an alternative to *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people, they must develop appropriate alternative criteria. Small systems should be aware of the alternative indicator, trigger values, and acceptable analytical methods prior to conducting monitoring, which begins as early as October 1, 2008.

- States must establish protocols for awarding *Cryptosporidium* removal credits (both higher and lower) under the demonstration of performance toolbox option. At a minimum, systems will need to know the protocols in time to apply for demonstration of performance credit prior to the deadline for new treatment requirements (as early as April 1, 2012, for large systems). If a system's request for *Cryptosporidium* removal credits is not accepted by the state, the system could incur a TT violation if there is not enough time to implement another toolbox option.

- If states intend to allow alternative disinfectant protocols, they must establish the alternative ozone and chlorine dioxide CT values and an alternative approach to UV reactor validation testing, as applicable. Systems should be aware of these alternative procedures before new treatment requirements go into effect (April 1, 2012).

- Finally, states must establish criteria for assessing changes in the watershed and source water during the sanitary survey process.

3.3 Identify Affected Systems

As mentioned previously, the LT2ESWTR applies to all systems that use surface water or GWUDI as a source. The subsections below summarize the four main provisions of the LT2ESWTR (i.e., source water monitoring, treatment, disinfection profiling and benchmarking, and uncovered finished reservoirs) as they apply to different system types. The Rule generally presents four compliance schedules, which are based on the population served by systems, as summarized in Table 3-1.

Table 3-1. Compliance Schedules

If you have a Subpart H source and are this kind of system:	*You are on schedule number:*
System serving 100,000 or more people OR a wholesale system in a combined distribution system that contains a system serving 100,000 or more people	1
System serving 50,000 to 99,999 people OR a wholesale system in a combined distribution system with the largest system serving 50,000 to 99,999	2
System serving 10,000 to 49,999 people OR a wholesale system in a combined distribution system with the largest system serving 10,000 to 49,999	3
System serving fewer than 10,000 people	4

Wholesale PWSs must comply with Stage 2 DBPR and LT2ESWTR requirements based on the population of the largest PWS in the combined distribution system. This approach will ensure that PWSs have the same compliance schedule under both the LT2ESWTR and Stage 2 DBPR. Although consecutive systems without their own source are not required to conduct source water monitoring, they do need to cover any uncovered reservoirs or treat the discharge, and meet disinfection profiling and benchmarking requirements.

The state has discretion with respect to new systems and sources, but these systems will be required to conduct source water monitoring unless they provide 5.5-log of treatment for *Cryptosporidium* (filtered systems) or 3.0-log treatment (unfiltered systems) using options from the toolbox. Therefore, new systems and systems with new sources must contact the state regarding their requirements and schedule for source water monitoring.

Figure 3-1 shows a timeline with system activities on the top and primacy agency activities on the bottom.

Figure 3-1. Timeline of System and Primacy Agency Activities

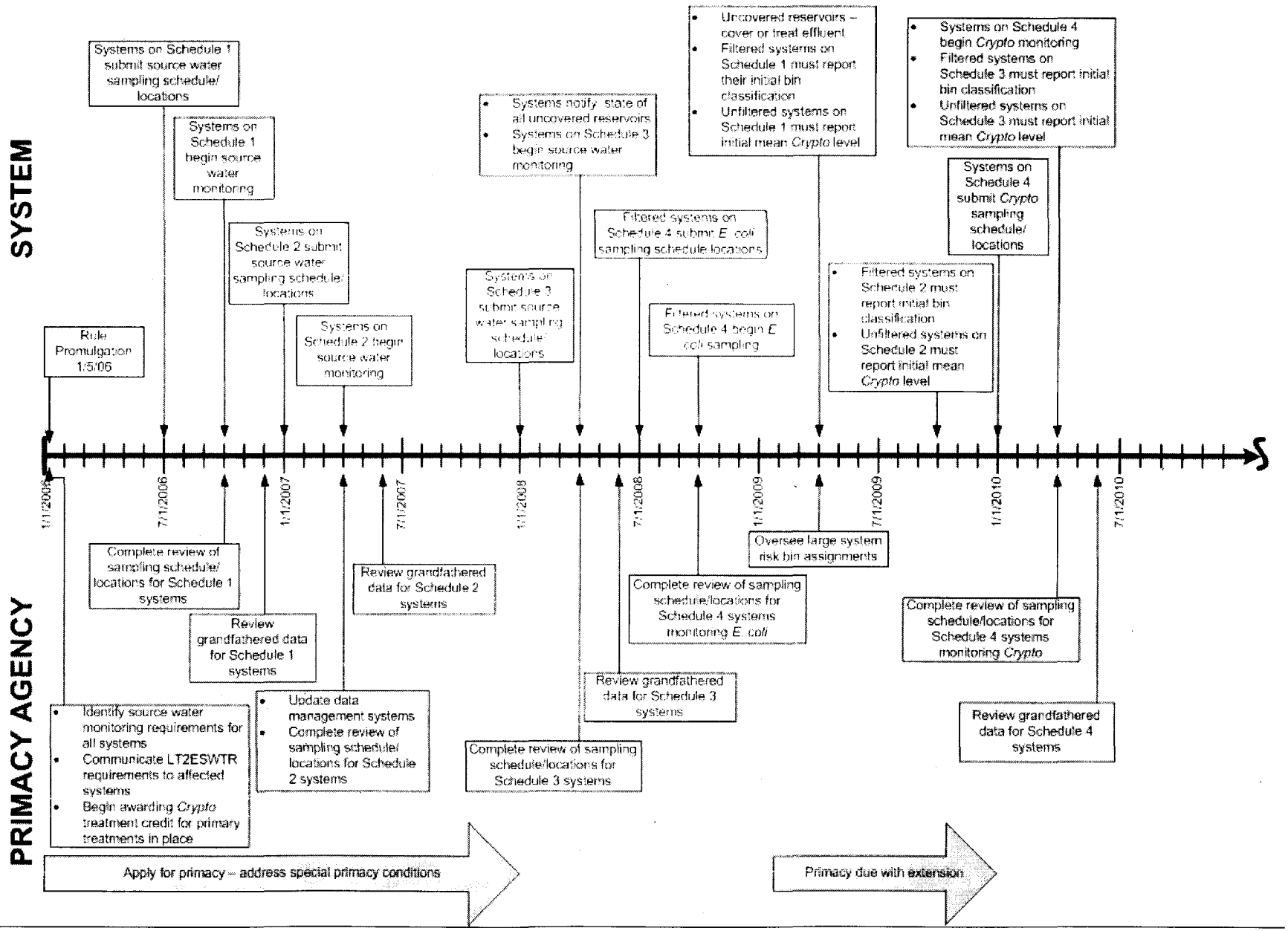


Figure 3-1. Timeline of System and Primacy Agency Activities (cont.)

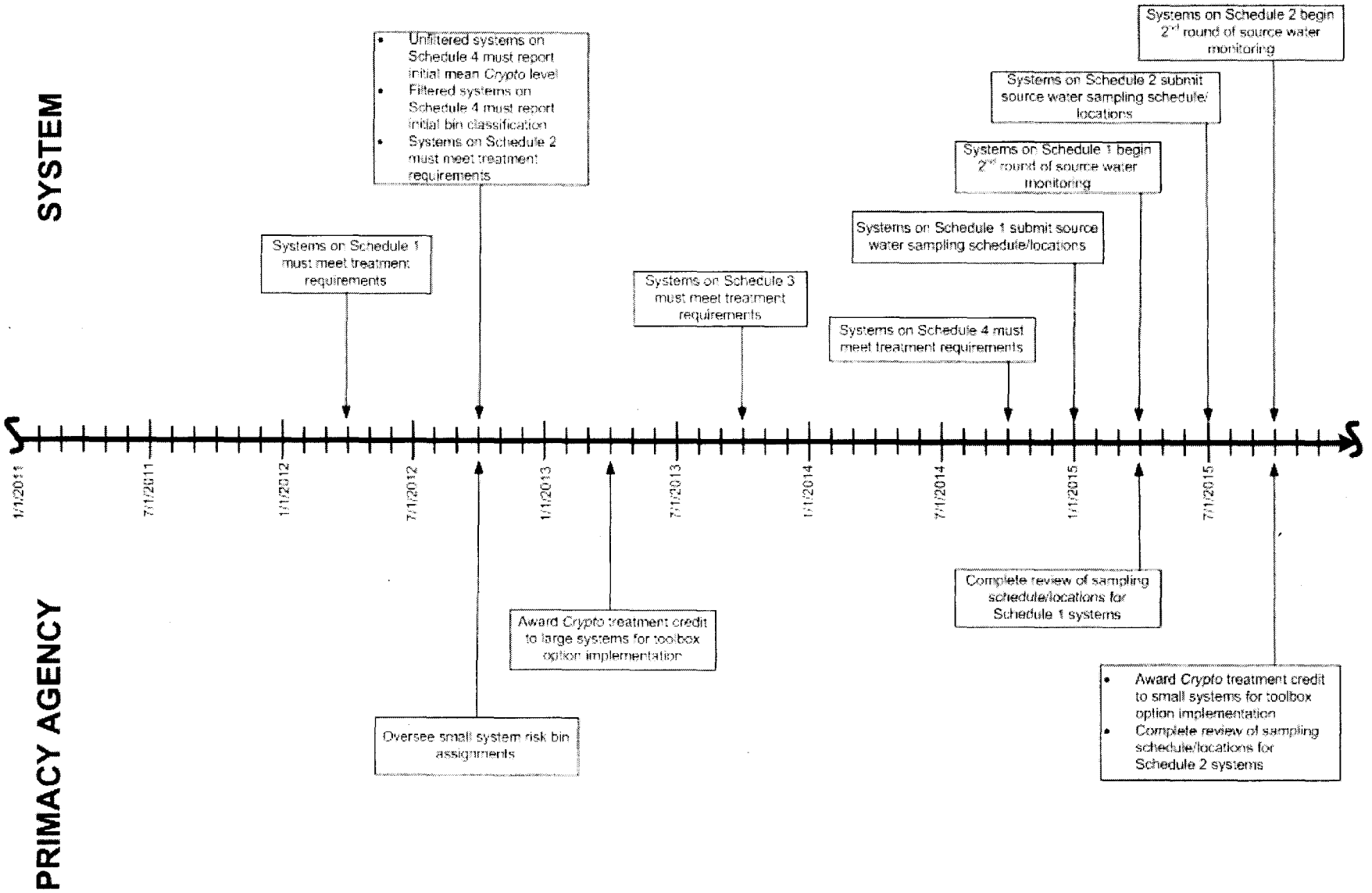
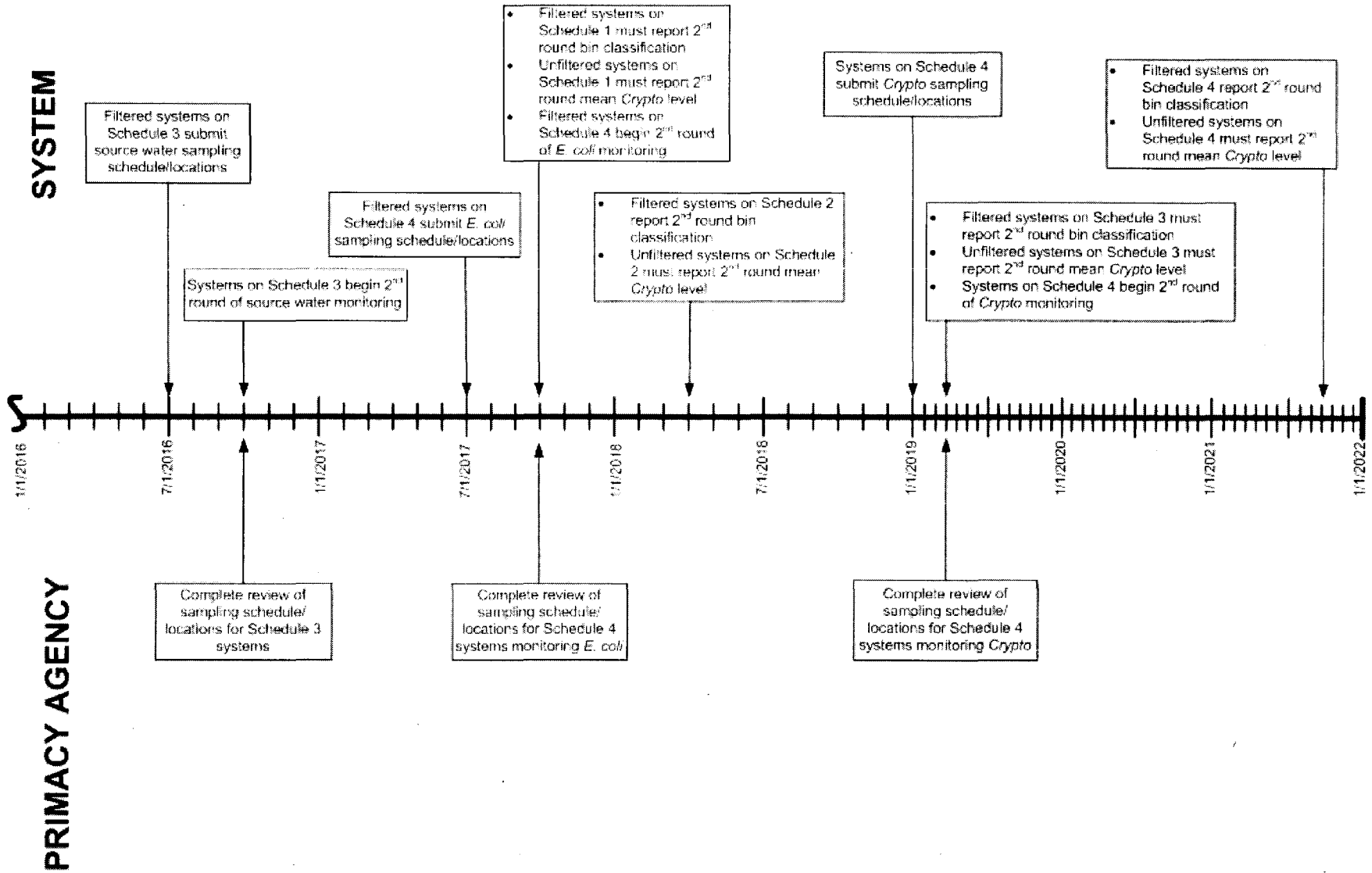


Figure 3-1. Timeline of System and Primacy Agency Activities (cont.)



3.3.1 Source Water Monitoring

Under the LT2ESWTR, all systems that use surface water or GWUDI as a source are required to conduct source water monitoring which may include *Cryptosporidium*, *E. coli*, and/or turbidity.

Systems that already provide 5.5-log (filtered systems) or 3.0-log (unfiltered systems) total treatment for *Cryptosporidium*, or that commit to providing this level of treatment by the applicable compliance deadline, are not required to conduct source water monitoring.

- Large systems (those serving 10,000 or more persons) that filter are required to monitor all three parameters.
- Small systems (those serving fewer than 10,000 people) that filter are required to monitor for *E. coli* initially and, depending on those results, may be required to monitor for *Cryptosporidium*.
- Large and small unfiltered systems are required to monitor for *Cryptosporidium* on the same schedule as their filtered counterparts, unless they elect to provide 3.0-log *Cryptosporidium* inactivation.

Previously collected ("grandfathered") data may be acceptable in some cases in lieu of monitoring, as long as specified criteria are met. EPA or the state must receive the grandfathered data no later than 2 months after the system is required to begin monitoring. EPA or the state can disapprove the data if it was generated during conditions that were not normal for the system (e.g., during a drought).

3.3.2 *Cryptosporidium* Treatment

For all systems required to conduct source water monitoring, the results of the source water monitoring determine whether additional *Cryptosporidium* treatment requirements will be necessary beyond those required by the IESWTR and LT1ESWTR. As shown in Table 1-1 on page 12, the lowest "bin" for filtered systems does not require any additional treatment. However, unfiltered systems must provide at least 2.0-log inactivation of *Cryptosporidium* for source water concentration of ≤ 0.01 oocyst/L and 3.0-log for > 0.01 oocysts/L. Additionally, all unfiltered systems must provide at least two methods of disinfection. Each of the methods must provide either 4.0-logs of virus inactivation, 3.0-logs of *Giardia* inactivation, or 2.0-logs of *Cryptosporidium* inactivation. The disinfection processes provided by unfiltered systems must collectively meet all 3 inactivation requirements (i.e., for viruses, *Giardia*, and *Cryptosporidium*).

3.3.3 Disinfection Profiling and Benchmarking

The IESWTR and LT1ESWTR required disinfection profiling and benchmarking for CWS and nontransient noncommunity water systems (NTNCWS) that exceed TTHM or HAA5 levels of 0.064 mg/L and 0.048 mg/L, respectively. Under these rules, profiling and benchmarking was calculated for *Giardia lamblia* inactivation. If ozone, chloramines, or chlorine dioxide was used as the primary disinfectant then profiling and benchmarking for viruses was also required. The LT2ESWTR extends the requirements to all CWS and NTNCWS that must monitor for *Cryptosporidium* (i.e., not just those that exceed the TTHM or HAA5 triggers) and small CWS and NTNCWS that only conduct *E. coli* monitoring. In addition, all systems required to conduct disinfection profiling and benchmarking must include virus inactivation under the LT2ESWTR. Systems that have previously conducted profiling under IESWTR or LT1ESWTR and have not made a significant change to disinfection practices and sources since the data was collected may use that data in calculating benchmarks under LT2ESWTR, assuming

that the data are substantially equivalent to those required under LT2 (i.e., equivalent in sample number, frequency, and data quality).

The LT2ESWTR disinfection profiling and benchmarking requirements apply to SWTR CWSs and NTNCWSs that plan to make a significant change to their disinfection practices. Significant changes include:

- Changes to the point of disinfection,
- Changes to the disinfectant(s) used in the treatment plant,
- Changes to the disinfection process, or
- Any other disinfection modification the state identifies as significant.

3.3.4 Uncovered Finished Water Reservoirs

The IESWTR and LT1ESWTR prohibit the construction of new uncovered reservoirs for finished water but did not address existing uncovered reservoirs. The LT2ESWTR requires systems with existing uncovered finished water reservoirs to either cover the reservoir or treat the reservoir discharge to achieve 4.0-log virus, 3.0-log *Giardia*, and 2.0-log *Cryptosporidium* inactivation using a protocol approved by the state.

3.4 Communicate LT2ESWTR Requirements to Affected Systems

If not already done by EPA or the state, states should consider notifying PWSs of the source water monitoring and resulting treatment requirements under the LT2ESWTR as soon as possible.

3.4.1 Source Water Monitoring Requirements

Table 3-2 summarizes the source water monitoring requirements and compliance dates for all systems.

Table 3-2. Source Water Monitoring Requirements and Compliance Dates

Requirement	Compliance Date (System Size)
Large filtered systems must monitor their source water for *Cryptosporidium*, *E. coli*, and turbidity, and large unfiltered systems must monitor for only *Cryptosporidium*.[1, 2]	
Submit sampling schedule	*Schedule 1:* July 1, 2006 *Schedule 2:* January 1, 2007 *Schedule 3:* January 1, 2008
Sample/monitor on at least a monthly basis for a 24 month period	Begin no later than: *Schedule 1:* October 1, 2006 *Schedule 2:* April 1, 2007 *Schedule 3:* April 1, 2008

Requirement	Compliance Date (System Size)
Conduct second round of source water monitoring on at least a monthly basis for a 24 month period	Begin no later than: *Schedule 1:* April 1, 2015 *Schedule 2:* October 1, 2015 *Schedule 3:* October 1, 2016
Small filtered systems must first monitor for *E. coli* or an alternative state-approved indicator of *Cryptosporidium*.[1, 2] They may choose to monitor for *Cryptosporidium* in lieu of *E. coli*.	
Submit *E. coli* sampling schedule	*Schedule 4:* July 1, 2008
Sample for *E. coli* or alternative indicator on at least a biweekly basis for a 12 month period	*Schedule 4:* Begin no later than October 1, 2008
If the average indicator concentration exceeds the trigger level,[3, 4] then the small filtered system must monitor for *Cryptosporidium*. Small unfiltered systems must monitor for *Cryptosporidium*.	
Submit *Cryptosporidium* sampling schedule	*Schedule 4:* January 1, 2010
Sample for *Cryptosporidium* in accordance with sampling schedule	*Schedule 4:* Begin no later than April 1, 2010
Second round of source water *E. coli* monitoring[2]	*Schedule 4:* Begin no later than October 1, 2017
Second round of source water *Cryptosporidium* monitoring	*Schedule 4:* Begin no later than April 1, 2019

1. Systems may be eligible to use previously collected (grandfathered) data to meet *Cryptosporidium* monitoring requirements if specified quality control criteria are met.
2. Systems are not required to monitor if they will provide at least 5.5-log *Cryptosporidium* treatment and notify EPA or the state.
3. Trigger levels are *E. coli* annual mean concentration of 10/100 mL for systems using lakes/reservoir sources and 50/100 mL for systems using flowing stream sources.
4. Systems that do not exceed the *E. coli* trigger level are classified in Bin 1 and are not required to provide *Cryptosporidium* treatment beyond LT1ESWTR levels.

States should consider how they will implement source water monitoring and treatment requirements. For example, if a large system finds high levels of *Cryptosporidium* in their source water, the state should encourage or require small systems that obtain water from the same source to provide additional treatment, regardless of their monitoring results (especially if large systems upstream are classified in Bin 4).

Although systems that provide 5.5-log (filtered systems) or 3.0-log (unfiltered systems) total treatment for *Cryptosporidium* are not required to conduct source water monitoring, states should ensure the treatment meets the requirements of the toolbox options as well as any state standards. Systems should be aware that the treatment may trigger profiling and benchmarking requirements, change disinfection byproduct formation, and affect consecutive systems. States should refer systems that intend to provide the maximum treatment level to EPA's *Simultaneous Compliance Manual for LT2 and Stage 2 DBP Rules*.

3.4.1.1 Grandfathered Data

Systems may elect to use *Cryptosporidium* data collected before the system is required to begin monitoring. Because deadlines for larger systems that request state approval of grandfathered data occur soon after rule promulgation, states are encouraged to work with EPA to ensure systems are informed of

the requirements in time to meet the associated deadlines and make arrangements with an approved laboratory.

Systems that plan to use previously collected monitoring results must report that they intend to submit these results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether the system intends to conduct additional monitoring to meet the initial source water monitoring requirements of §141.701(a). Systems must report this information no later than 3 months prior to the date that they must begin their first round of source water monitoring. Systems must then report previously collected monitoring results for grandfathering, along with the associated documentation listed below, no later than 2 months after the date that they must begin their first round of source water monitoring.

A PWS's grandfathered data package must address the following conditions [§141.707]:

- Samples must have been collected from the location(s) that complies with §141.703.
- The data set must include and the system must certify that the samples were representative of a plant's source water(s) and the source water(s) has not changed.
- The system must certify that all samples that were collected during the time period beginning with the first reported result and ending with the last reported result were submitted.
- Samples must have been collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999 (when EPA Method 1622 was first released as an inter-laboratory validated method). (The state may grant exceptions to this requirement based on §141.707(e)(1).)
- Samples must have been collected in equal intervals of time over the entire collection period (e.g., weekly, twice-per-month, monthly). (The state may grant exceptions to this requirement based on §141.707(e)(2).)
- For *Cryptosporidium*, sample volumes of at least 10 L must have been analyzed or, in cases where 10 L were not analyzed, at least 2 mL of packed pellet volume must have been analyzed.
- The data must have been generated by approved laboratories using approved analytical methods (for *E. coli*), and using the validated versions of EPA Methods 1622 or 1623 (for *Cryptosporidium*).
- For *Cryptosporidium*, the data are fully compliant with the QA/QC criteria specified in the LT2ESWTR and the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (c)(1) of this section were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms.

Requirements and guidance associated with the above recommendations are discussed in more detail in EPA's *Source Water Monitoring Guidance for Public Water Systems*. In addition, the guidance provides information on criteria for grandfathered data.

States may allow systems to conduct further monitoring to supplement incomplete data, or to replace results that do not appear to be representative of normal source water conditions. To make this determination, states should review the reported data to ensure that samples were evenly spaced throughout the monitoring period, especially during periods where runoff normally occurs. If monitoring was not conducted during runoff periods (or other periods normally associated with reduced water quality conditions, such as seasonal wastewater discharges), additional monitoring should be conducted. States should review the submitted reports *as soon as possible* to allow systems to make arrangements for additional source water monitoring, where necessary. Where additional monitoring is required by the state, systems are not required to begin this additional monitoring until 2 months after notification that data have been rejected or that additional monitoring is necessary.

3.4.1.2 Sampling Schedule and Locations

States should ensure systems select locations and times that meet the requirements discussed in section 1.2. Systems' schedules should coincide with obvious water quality events, such as runoff and seasonal wastewater discharges. For example, if stream flow records indicate that the heaviest seasonal runoff is at the end of March or early April, then the system should consider monitoring during this period or conduct additional monitoring to ensure this period is represented. More frequent monitoring may also be appropriate during seasonal periods of heavy rainfall. Note that if states wish to require more frequent monitoring, they should ensure that they have authority to do so.

Systems must collect source water samples for each plant at a location prior to any treatment, unless EPA or the state determines that collecting a sample before treatment is not feasible and the treatment is unlikely to have an adverse effect on sample analysis. EPA or the state may allow one set of results to be used for multiple plants if more than one plant draws water from the same influent.

Treatment plants may use multiple surface water sources and blended surface water and ground water sources. The use of multiple sources during monitoring must be consistent with routine operational practice. If there is a sampling tap after the sources are combined but prior to treatment, the sample should be collected from that tap. If no such tap is available, the system has two options:

1. Collect separate samples from each source and have the laboratory analyze each sample independently and calculate a weighted average concentration based on the relative contribution to total influent flow by each source; or

2. Manually collect bulk water samples from each source and mix the samples to create a composite bulk sample based on the proportional contribution of each source to the plant's influent flow.

If either of these two methods is used to manually create a representative source water sample from more than one source, states may wish to review the system's proposal for obtaining a valid sample. If one or more of the raw water sources are of low quality, the source(s) should not be under- or over-represented. For example, if a system typically uses a low quality source in combination with another source(s), but occasionally uses the low quality source by itself, the state should determine whether sampling should occasionally represent only that low quality source. This issue could be a critical concern for systems with sources of varying quality and may be necessary to ensure normal operating practices are captured through monitoring.

States should remind systems to make arrangements with laboratories as soon as possible to ensure their source water monitoring needs can be met. In addition, systems should ensure their laboratory will perform the necessary sample filtration if the system does not intend to filter their samples in the field.

Finally, states should remind systems to use an approved analytical method and an approved laboratory. EPA's Web site provides information on laboratories approved for *Cryptosporidium* analysis: www.epa.gov/safewater/disinfection/lt2/lab_aprvlabs.html.

3.4.1.3 Calculating Average *Cryptosporidium* Concentrations

Individual *Cryptosporidium* sample concentrations are calculated using the total number of oocysts counted, unadjusted for method recovery, divided by the volume assayed. If no oocysts are found in a sample, then the concentration value for that sample is zero (i.e., not the detection limit). The range of *Cryptosporidium* concentrations that define LT2ESWTR bins reflects consideration of analytical method recovery and the percent of *Cryptosporidium* oocysts that are assumed to be infectious. Consequently, sample analysis results will not be adjusted for these factors.

Cryptosporidium bin concentrations are calculated by averaging individual sample results from one or more years of monitoring. For unfiltered systems, the average is the mean of all the sample concentrations. For filtered systems, the method used to determine the average differs based on the number of samples collected as follows:

1. For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.

2. For systems that collect a total of 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.

3. For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.

4. For systems with plants operating only part of the year that monitor fewer than 12 months per year under §141.701(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

5. If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring; then use these monthly average concentrations, rather than individual sample concentrations, and one of the previous 4 procedures to calculate average *Cryptosporidium* concentration.

Example 3-1. Bin Classification for System Operating Part of Year

A system collects a sample every 2 weeks during the 3 months that its plant operates. If the number of samples or sampling frequency varied, the system would have to calculate its bin classification differently.

Plant *Crypto* Results (oocysts/L)					
Month 1	**Month 2**	**Month 3**	**Month 4**	**Month 5**	**Month 6**
N/A	N/A	N/A	N/A	N/A	0.081 0.072
Month 7	**Month 8**	**Month 9**	**Month 10**	**Month 11**	**Month 12**
0.035 0.002	0.000 0.003	N/A	N/A	N/A	N/A
Month 13	**Month 14**	**Month 15**	**Month 16**	**Month 17**	**Month 18**
N/A	N/A	N/A	N/A	N/A	0.046 0.055
Month 19	**Month 20**	**Month 21**	**Month 22**	**Month 23**	**Month 24**
0.002 0.005	0.072 0.002	N/A	N/A	N/A	N/A

- Add up all results in year 1 (Month 1 through Month 12) = (0.081+0.072+0.035+0.002+0.000+0.003) = 0.193 oocysts/L
- Add up all results in year 2 (Month 13 through Month 24) = (0.046+0.055+0.002+0.005+0.072+0.002) = 0.182 oocysts/L
- Divide sum by total number of results in year 1 = 0.093/6
- Result is arithmetic mean = 0.032 oocysts/L

Bin classification is based on year 1 because it has the highest average of all sample concentration during any 12-month period.

This system would be classified in Bin 1, since its *Cryptosporidium* level is less than 0.075 oocysts/L.

Although PWSs are responsible for monitoring and calculating their own bin classification, states should plan on reminding PWSs of the requirements and verifying the calculated bin classifications.

3.4.2 *Cryptosporidium* Treatment Requirements and Compliance Dates

Unfiltered systems will use their average *Cryptosporidium* concentration from source water monitoring to determine their bin assignments and additional *Cryptosporidium* treatment requirements. Unfiltered GWUDI systems can fall into one of two categories:

- Systems that receive filtration credit for filtration through the soil are treated as filtered systems.
- Systems that do not receive credit for filtration, but meet filtration avoidance, are treated as unfiltered systems.

Table 3-3 shows the treatment requirements for filtered systems according to existing treatment processes. Table 3-4 shows the treatment requirements for unfiltered systems.

Table 3-3. *Cryptosporidium* Treatment Requirements for Filtered Systems

If the source water *Cryptosporidium* concentration in oocyst/L is...	**And the system uses the following filtration treatment in full compliance with SWTR, IESWTR, and LT1ESWTR (as applicable), then the additional treatment requirements are...**			
	Conventional filtration treatment (including softening)	**Direct filtration**	**Slow sand or diatomaceous earth filtration**	**Alternative filtration technologies**
< 0.075.....Bin 1	None	None	None	None
≥ 0.0075 and < 1.0....Bin 2	1.0-log treatment...	1.5-log treatment...	1.0-log treatment...	(1)
≥ 1.0 and < 3.0.....Bin 3	2.0-log treatment...	2.5-log treatment...	2.0-log treatment...	(2)
≥ 3.0.....Bin 4	2.5-log treatment...	3.0-log treatment...	2.5-log treatment...	(3)

1. As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
2. As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
3. As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

Table 3-4. *Cryptosporidium* Treatment Requirements for Unfiltered Systems

If the source water *Cryptosporidium* concentration in oocyst/L is...	***Cryptosporidium* inactivation with either chlorine dioxide, ozone, or UV**
≤ 0.01	2.0-log inactivation
> 0.01	3.0-log inactivation

Filtered systems can use at least one of the treatment and management techniques in the "microbial toolbox" (described in section 3.8). Those in Bins 3 and 4 must achieve at least 1.0-log credit towards additional treatment using at least one of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV.

Unfiltered systems are required to use at least two different disinfectants to meet their overall inactivation requirements for viruses (4.0-log), *Giardia lamblia* (3.0-log), and *Cryptosporidium* (2.0 or 3.0-log). Each of the disinfectants must separately achieve the total inactivation required for at least one of the three pathogen types. The disinfection processes provided by unfiltered systems must collectively meet all 3 inactivation requirements (i.e., for viruses, *Giardia* and *Cryptosporidium*). For example, a system may use chloramines to meet virus inactivation requirements and UV to meet *Cryptosporidium* inactivation requirements; the system can meet *Giardia* inactivation requirements using UV or chloramines separately.

Compliance Dates

Filtered and unfiltered systems must achieve the additional treatment by the following dates:

- Systems serving 100,000 people or more, no later than April 1, 2012.
- Systems serving 50,000 to 99,999 people, no later than October 1, 2012.
- Systems serving 10,000 to 49,999 people, no later than October 1, 2013.
- Small systems fewer than 10,000 people, no later than October 1, 2014.

Wholesale systems must follow the schedule based on the population of the largest system in their combined distribution system. For systems making capital improvements, states may grant up to 2 additional years to comply.

3.4.3 Disinfection Profiling and Benchmarking

Disinfection profiling is conducted over a 12-month period and must be completed if a system plans to make a significant change to its disinfection practice. Previously collected data (i.e., disinfection profiles prepared to satisfy the requirements of the IESWTR or LT1ESWTR) may be used by systems that have not made significant changes in disinfection practices nor changed sources since the data were collected. Significant changes are defined as:

1. Moving the point of disinfection (does not include routine seasonal changes approved by the state);

2. Changing the type of disinfectant;

3. Changing the disinfectant process; or

4. Making other modifications designated as significant by the state.

Systems that developed *Giardia* disinfection profiles, but not virus disinfection profiles, under the IESWTR or LT1ESWTR may calculate virus profiles from the same operational data used to develop the *Giardia* profiles.

Under the IESWTR and LT1ESWTR, disinfection profiles and benchmarks are required to be kept on file for the state to review during the sanitary survey. In addition, any systems required to develop a disinfection profile for *Giardia* and viruses that plan to make significant changes in disinfection practice are required to calculate a benchmark and submit to the state for review: an evaluation of the disinfection profile; and an analysis of how the proposed change will affect the current benchmark.

EPA developed the *Disinfection Profiling and Benchmarking Guidance Manuals* for the IESWTR and LT1ESWTR. These manuals provide instruction to systems and states on the development of disinfection profiles, identification and evaluation of significant changes in disinfection practices, and considerations for setting an alternative benchmark.

3.4.4 Uncovered Finished Water Reservoir Requirements

Systems with uncovered finished reservoirs must cover the reservoir or treat reservoir discharge to 4.0-log virus, 3.0-log *Giardia,* and 2.0-log *Cryptosporidium* inactivation and/or removal by April 1, 2009, or be in compliance with a state-approved alternative schedule.

3.4.5 Methods of Communication

3.4.5.1 Written Notification

Providing written notice of a final rule for PWSs serves two purposes: 1) the receiving system obtains a formal notice of upcoming regulatory requirements and a timeline for compliance (in addition to EPA's publication of the Rule in the *Federal Register*); and 2) the primacy agency has a hard-copy document that it may file and use in subsequent compliance tracking efforts.

Written notification can be in the form of a letter from the state to affected systems. The letter should include a summary of rule requirements and timeframes and direct the reader to an appropriate contact if questions arise. States should consider including fact sheets or other summary materials with the letter. Appendix C of this guidance includes additional publications that are intended to be distributed to water systems through mailings, training sessions, or other educational forums. These publications are also available at www.epa.gov/safewater/disinfection/lt2. They provide overviews of the LT2ESWTR to help systems understand the provisions of the Rule and determine which provisions apply to their system. They also describe the benefits and general implications of the Rule. Although valuable, these resources do not substitute for official rule language. States should consider mailing official rule language with the letter or including in the letter the Web site address where the regulatory language can be accessed. States should also consider posting these materials on their Web sites for easy access.

A sample letter notifying systems of their schedule number and LT2ESWTR requirements is provided in Example 3-1. States may wish to develop similar letters and tailor the messages for the appropriate size categories covered by the Rule, or to accommodate those systems for which the provisions are either limited or unique.

In addition to notifying systems of their requirements, states may also want to consider providing written notice to a system on the status of their LT2ESWTR submitted compliance documents. Templates for these letters can be found in Appendix E. Written notification should include:

- Summary of the issue.
- Appropriate contact if questions arise.
- Fact sheet or other summary materials (optional).

Example 3-2. Sample Letter Notifying Systems of Schedule Number

State Letterhead

System Name
System Address
City State Zip

October 15, 2006

★ ★ ★ Important New Rule Roll Out ★ ★ ★
Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) – Schedule 3

The LT2ESWTR was published in the *Federal Register* on January 5, 2006. The goal of the new LT2ESWTR is to reduce the risk of disease caused by *Cryptosporidium* and other microorganisms by identifying the systems at the greatest risk for source water contamination. EPA finalized both the LT2ESWTR and the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) at the same time. Together, these rules will improve protection against microbial contamination while reducing risks from disinfection byproducts. Please be sure to also read the enclosed information regarding the Stage 2 DBPR.

Under the LT2ESWTR, filtered systems will need to collect source water *Cryptosporidium*, *E. coli*, and turbidity samples once per month from every surface water or ground water under the direct influence of surface water (GWUDI) source for a period of 24 months. However, if you already have monitoring data for these contaminants, you may be able to "grandfather" the data. The LT2ESWTR will also allow you to grandfather just *Cryptosporidium* data without the associated *E. coli* and turbidity data.

Unfiltered systems will need to collect source water *Cryptosporidium* samples at least once per month for 24 months. However, if you already have monitoring data for *Cryptosporidium*, you may be able to "grandfather" the data.

Instead of conducting source water monitoring or submitting grandfathered data, systems may choose to provide the maximum treatment required by the LT2ESWTR. Download the LT2ESWTR from EPA's website at www.epa.gov/safewater/disinfection/lt2/regulations.html#prepub.

EPA and state records show that your system is required to comply with the source water monitoring requirements on **Schedule 3**. These requirements are based on the information that your system:

- Serves 10,000 to 49,999 people **OR** sells water and the largest system in your combined distribution system serves 10,000 to 49,999 people; and
- Treats surface water or GWUDI source.

A combined distribution system is a group of water systems that buy/sell water from/to each other.
If you believe our records are incorrect, or you have a question, please notify us at stage2mdbp@epa.gov as soon as possible, or contact the "Contact Person" listed for your state at:
www.epa.gov/safewater/disinfection/lt2/pdfs/contacts_lt2_compliancehelp.pdf.

By **January 1, 2008** (3 months prior to beginning source water monitoring), Schedule 3 systems must submit to EPA a sampling schedule and description of sample location(s), and/or provide a notice stating you plan to submit grandfathered data, or a notice that you intend to provide additional treatment rather than monitor source water.

Enclosed is a Quick Reference Guide that provides information on the requirements of the LT2ESWTR. In addition, EPA has developed a number of guidance documents and factsheets to help systems through this process that may be found at www.epa.gov/safewater/disinfection/lt2/compliance.html.

LT2ESWTR Guidance Material

- **Source Water Monitoring Guidance Manual for Public Water Systems for the Long-Term 2 Enhanced Surface Water Treatment Rule** (EPA 815-R-06-005) – Provides surface water systems, laboratories, states, and Tribes with a review of the source water monitoring provisions. This guidance manual provides direction to the systems regarding how, where, and when to monitor, how to report the data, how to submit "grandfathered" data (e.g., previously collected data), and how evaluate data and determine risk bin classification for filtered systems and treatment requirements for unfiltered systems.
- **LT2ESWTR Factsheets** – EPA has developed several factsheets that summarize information on various topics pertaining to the LT2ESWTR. The factsheets are:
  - Factsheet: Source Water Monitoring for the LT2ESWTR: Systems Serving At Least 10,000 People
  - Long Term 2 Enhanced Surface Water Treatment Rule: Data Collection and Tracking System
  - Long Term 2 Enhanced Surface Water Treatment Rule: Lab Fact Sheet

Other LT2ESWTR Guidance Materials

For additional guidance on implementing the LT2ESWTR, you can refer to the following EPA materials located at: www.epa.gov/safewater/disinfection/lt2/compliance.html.

- On-line Sample Collection Module (www.epa.gov/safewater/lt2/training/index.html).

Your state may have state-specific materials to assist you in complying with the LT2ESWTR.

How to get copies of EPA guidance materials

To obtain copies of the materials listed above you can:

- Download materials at www.epa.gov/safewater/disinfection/lt2/compliance.html.
- Call the Safe Drinking Water Hotline at 1-800-426-4791.
- Call the National Service Center for Environmental Publications at 1-800-490-9198 or visit their Web site at www.epa.gov/ncepihom.

To determine if your state drinking water agency or EPA is implementing the LT2ESWTR you may contact the Safe Drinking Water Hotline, or visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2/compliance.html.

Training Opportunities

EPA will present webcasts on the LT2ESWTR and Stage 2 DBPR and Compliance Assistance Tools for Water Systems.

These webcasts will be open to system operators and regulators. Registration information maybe found on the Drinking Water Academy website at www.epa.gov/OGWDW/dwa/calendar.html.

3.4.5.2 Slide Presentation

Slide presentations of the LT2ESWTR may be used by state staff, technical assistance, or other training providers to present the background of the Rule, rule requirements, and its benefits.

EPA developed a "Train the Trainer" program, Webcasts, and in-person training sessions to assist with implementation of the LT2ESWTR. States should coordinate with technical assistance providers for any training sessions. Materials used for the training sessions are available on EPA's Web site at www.epa.gov/safewater/disinfection/training.html.

The EPA Drinking Water Academy compiles PowerPoint training sessions on the LT2ESWTR. Copies of the presentations may be used to train other state personnel and technical assistance resources, water system personnel, and the public. EPA's Drinking Water Academy slides are available electronically on EPA's Web Site at www.epa.gov/safewater/dwa.html.

3.4.5.3 Guidance Documents and Seminars

Technical guidance documents developed for the LT2ESWTR are useful for conveying rule requirements and specific aspects of rule implementation to state staff and system staff and operators. These aspects include source water monitoring and selecting and implementing options from the microbial toolbox. The guidance documents can be used as stand-alone references or as supporting materials in LT2ESWTR-specific training events. See section 2 of this manual for more information on these references. Links to these documents can be provided on state Web sites.

3.5 Update Data Management Systems

Although state data management systems vary to suit state-specific requirements and needs, EPA recommends that all states update their data systems in light of the LT2ESWTR to enable efficient tracking of affected systems, compliance status, and other information useful in implementing this rule.

As required under §142.14, records to be kept by states under the LT2ESWTR include the following:

- Results of source water *Cryptosporidium* and *E. coli* monitoring.
- *Cryptosporidium* bin classification for each filtered system, including any changes to initial bin classification based on the watershed assessment conducted during the sanitary survey or the second round of monitoring.
- For each unfiltered system, the determination of whether the mean source water *Cryptosporidium* level is above 0.01 oocysts/L and whether that determination changes with the second round of monitoring.
- The treatment processes or control measures that each system employs to meet LT2ESWTR requirements.
- A list of systems required to cover or treat the discharge of an uncovered finished water reservoir.

While many of these records may be maintained through hard-copy files, it may be helpful to have data systems that easily identify systems for which these records exist.

Because source water monitoring by large systems will begin 9 months following promulgation of the LT2ESWTR, EPA expects to act as the primacy agency with oversight responsibility for large system sampling, analysis, and data reporting. To facilitate collection and analysis of large system monitoring data, EPA is developing an internet-based electronic data collection and tracking system. This approach is similar to that used under the Unregulated Contaminant Monitoring Rule (UCMR). Analytical results for *Cryptosporidium*, *E. coli*, and turbidity will be reported directly to this database using web forms and software that can be downloaded free of charge. EPA will make large system monitoring data available to states when states assume primacy for the LT2ESWTR, or earlier under a state agreement with EPA.

3.6 Ensure that Ongoing Watershed Assessment is Conducted and Adjust Treatment Requirements

Because treatment requirements are related to the degree of source water contamination, the LT2ESWTR contains provisions to assess changes in a system's source water quality following initial bin classification. After completion of the initial round of *Cryptosporidium* monitoring, EPA requires that states conduct a follow-up source water assessment as part of the ongoing sanitary survey process. During the sanitary survey, the state must determine whether significant changes have occurred in the watershed that could lead to increased contamination of the source water and what appropriate follow-up action is needed.

Developing a plan to assess the watershed and determine appropriate follow-up action is a special primacy condition of the LT2ESWTR (see section 4.4.1 for guidance to address this special primacy condition).

3.7 Award *Cryptosporidium* Removal Credit for Primary Treatments in Place

Under IESWTR and LT1ESWTR, conventional treatment systems and slow sand or diatomaceous earth filtration systems received 2.0-log *Cryptosporidium* removal credit. As stated in the preamble to LT2ESWTR, EPA estimated (based on the review of numerous studies) that these systems that are incompliance with IESWTR and LT1ESWTR are capable of achieving 3.0-log removal; therefore, EPA recommends a 3.0-log removal credit be awarded. Additionally, EPA recommends that direct filtration plants (that lack a sedimentation basin) be awarded 2.5-log removal credits. It is the states' discretion to determine how to address these changes in their regulations. EPA is unable to recommend an average log removal credit for alternative filtration technologies like membranes, bag filters, and cartridge filters due to variability among products. As a result, credit for these devices must be determined by the state.

EPA's *Membrane Filtration Guidance Manual* provides guidance for conducting and evaluating challenge tests, as well as routine integrity testing and monitoring requirements to ensure the necessary level of treatment is maintained. Most membrane processes will likely achieve 5.5-log *Cryptosporidium* removal that allows systems to avoid source water monitoring requirements.

EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for challenge testing bag and cartridge filters. Note that the guidance is directed towards testing of bag and cartridge filters that follow primary filtration and provide an additional 2.0-log and 2.5-log credit. While most of the guidance is still

applicable to primary treatment, states should evaluate all aspects of the bag or cartridge filter process with respect to actual source water quality.

As described in §141.718, a state may award greater credit to a system that demonstrates through a state-approved protocol that it reliably achieves a higher level of *Cryptosporidium* removal. Conversely, a state may award less credit to a system where the state determines, based on site-specific information, that the system is not achieving the degree of *Cryptosporidium* removal indicated in Table 3-5.

Table 3-5. Suggested *Cryptosporidium* Removal Credit Towards LT2ESWTR Requirements for Well-Run Water Treatment Plants[1]

Plant type	Conventional treatment (includes softening plants)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Treatment credit	3.0-log	2.5-log	3.0-log	Determined by state

1. Applies to plants in full compliance with the SWTR, IESWTR, and LT1ESWTR as applicable

3.8 Award *Cryptosporidium* Removal Credit for Implementation of Options from the Microbial Toolbox

In order to achieve the *Cryptosporidium* removal requirements of the bin categories, systems must supplement the removal credit they receive for primary TTs by implementing options from the microbial toolbox. Each toolbox option is associated with a certain log removal or inactivation credit. Table 3-6 summarizes presumptive credits and associated design and implementation criteria for microbial toolbox components.

Table 3-6. Microbial Toolbox: Options, Log Credits, and Summary of Design/Implementation Criteria

Toolbox Option	*Cryptosporidium* log credit with design and implementation criteria
Source Toolbox Components	
Watershed control program	0.5-log credit for state-approved program including EPA-specified elements. (Section 3.8.1)
Alternative source/intake management	No presumptive credit. Systems may conduct simultaneous monitoring for LT2ESWTR bin classification at alternative intake locations or under alternative intake management strategies. (Section 3.8.2)
Pre-filtration Toolbox Components	
Pre-sedimentation basin with coagulation	0.5-log credit with continuous operation and coagulant addition; basins must achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative state-approved performance criteria; all flow must pass through the basins. (Section 3.8.3)

Toolbox Option	*Cryptosporidium* log credit with design and implementation criteria
Two-stage lime softening	0.5-log additional credit for two-stage softening (single-stage softening is credited as equivalent to conventional treatment). Chemical addition and hardness precipitation must occur in both stages, and both stages must treat 100% of the flow. (Section 3.8.4)
Bank filtration (as pretreatment)	0.5-log credit for 25 ft. setback; 1.0-log credit for 50 ft. setback; aquifer must contain granular material and in at least 90 percent of the length of a core, grains less than 1.0 mm in diameter constitute 10 percent of the material; average turbidity must be less than 1 NTU; no presumptive credit for bank filtration that serves as pretreatment when source water monitoring is performed from the well (after bank filtration). (Section 3.8.5)
Treatment Performance Toolbox Components	
Combined filter performance	0.5-log credit for CFE turbidity ≤ 0.15 NTU in 95 percent of samples each month. (Section 3.8.6)
Individual filter performance	0.5-log credit (in addition to 0.5-log combined filter performance credit) if IFE turbidity is ≤ 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. (Section 3.8.7)
Demonstration of performance	Credit awarded to unit process or treatment train based on demonstration to the state, through use of a state-approved protocol. (Section 3.8.8)
Additional Filtration Toolbox Components	
Bag filters	Up to 2.0-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety (for individual bag filters); up to a 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety (for bag filters in series). (Section 3.8.9)
Cartridge filters	Up to 2.0-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety (for individual cartridges) ; up to a 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety (for cartridges in series). (Section 3.8.9)
Membranes (microfiltration, ultrafiltration, nanofiltration, reverse osmosis)	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. (Section 3.8.10)
Second stage filtration	0.5-log credit for second separate granular media filtration stage; treatment train must include coagulation prior to first filter. (Section 3.8.11)
Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. (Section 3.8.12)
Inactivation Toolbox Components	
Chlorine dioxide	Log credit based on measured CT in relation to CT table. (Section 3.8.13)
Ozone	Log credit based on measured CT in relation to CT table. (Section 3.8.14)
UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. (Section 3.8.15)

Each component is described in more detail in the LT2ESWTR language. EPA developed the following guidance manuals to assist systems with implementing toolbox components: *UV Disinfection Guidance Manual*, *Membrane Filtration Guidance Manual*, and *LT2ESWTR Toolbox Guidance Manual*.

States award credit for toolbox options that are satisfactorily implemented. States should be prepared to assist systems in understanding the requirements associated with each toolbox option and selecting appropriate toolbox options. For most options, systems must monitor and/or report operating data to the state, on a monthly basis, verifying proper treatment was achieved. Sections 3.8.1 to 3.8.15 briefly describe each option and the associated requirements.

3.8.1 Watershed Control Program [40 CFR 141.716(a)]

Watershed control programs are intended to reduce source water *Cryptosporidium* levels. A system's watershed control program must be approved by the state. Only filtered systems are eligible for watershed control program credits since unfiltered systems are already required to maintain a watershed control program that minimizes the potential for contamination by *Cryptosporidium* as a criterion to avoid filtration.

States will base their approval of a system's watershed control program on their review of the system's proposed watershed control plan and supporting documentation. States may revoke *Cryptosporidium* treatment credit for a watershed control program at any point if the state determines that a PWS is not implementing the approved watershed control plan.

3.8.1.1 What are the Requirements for State Approval of Watershed Control Programs?

States must receive notification from systems that intend to pursue a 0.5-log *Cryptosporidium* treatment credit for a watershed control program no later than 2 years before the applicable treatment compliance date. Notification includes the system proposing to develop a watershed control plan and submitting it for state approval.

States should ensure that systems' applications for initial program approval include the following minimum elements:

- Identification of an "area of influence," outside of which *Cryptosporidium* or fecal contamination are significantly less likely to affect the treatment plant intake.
- Identification of sources of *Cryptosporidium* contamination and an assessment of the impact of these sources on the system's source water quality.
- An analysis of control measures that could address the identified potential and actual sources of *Cryptosporidium* contamination.
- A plan that specifies goals and defines and prioritizes specific actions to reduce source water *Cryptosporidium* levels.

States must receive systems' proposed watershed control plan, a request for program approval, and a request for 0.5-log *Cryptosporidium* treatment credit no later than 1 year before the system's applicable treatment compliance date.

States will review the system's initial proposed watershed control plan and either approve or reject the plan. If the state approves the plan, the system will be awarded 0.5-log credit towards LT2ESWTR

Cryptosporidium treatment requirements. If the state rejects the plan, the state may work with the system to resolve the issues. If the state fails to respond to a system and the system meets all the requirements, the watershed control plan will be considered approved and 0.5-log *Cryptosporidium* treatment credit will be awarded. The state may subsequently withdraw this approval.

3.8.1.2 What are the System's Requirements for Maintaining State Approval of Watershed Control Programs?

After the state has approved a system's watershed control program, the state should receive the following information from the system to continue to be eligible for the 0.5-log *Cryptosporidium* treatment credit:

- An annual watershed control program status report.
- A state-approved watershed sanitary survey report every 3 years for CWSs and every 5 years for NCWSs.

The annual watershed control program status report must describe the system's implementation of the approved plan and assess whether the plan achieved its goals. It must explain how the system is addressing any shortcomings in plan implementation, including any previously identified by the state or identified during the watershed sanitary survey. In addition, the plan must describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If the system determines changes to the watershed control program are necessary, the system must notify the state in advance of any changes and list any actions that may reduce the level of source water protection. Actions to mitigate any reductions in source water protection must also be identified.

The watershed sanitary survey must be conducted every 3 year for CWSs and every 5 years for NCWSs according to state guidelines and by persons approved by the state to conduct watershed surveys. The survey must encompass the area of the watershed that was identified in the state-approved watershed control plan as the area of influence and, at a minimum, assess the implementation of actions to reduce *Cryptosporidium* levels and identify any significant new sources of *Cryptosporidium*.

The annual status reports, watershed control plan, and annual watershed sanitary surveys must be made available to the public upon request. These documents must be in a plain language format and include criteria for evaluating the success of the program in achieving plan goals. The state may withhold portions of the annual status report, watershed control plan, and watershed sanitary survey from the public based on security considerations.

3.8.1.3 What Resources are Available to Systems and States?

Source water assessments conducted by states under section 1453 of the SDWA can provide a foundation for assessing the vulnerability of a watershed by providing the preliminary analyses of watershed hydrology, a starting point for defining the area of influence, and an inventory and hierarchy of actual and potential contamination sources.

EPA developed the *LT2ESWTR Toolbox Guidance Manual* to assist water systems in developing their watershed control programs and states in their assessment and approval of these programs. The guidance addresses contamination by *Cryptosporidium* and other pathogens from both non-point sources (e.g., agricultural and urban runoff, septic tanks) and point sources (e.g., sewer overflows, publicly owned treatment works (POTWs), and concentrated animal feeding operations (CAFOs)). In addition, the guidance manual incorporates available information on the effectiveness of different control measures to reduce *Cryptosporidium* levels and provides case studies of watershed control programs. The manual also

includes resources available to assist systems in building partnerships and implementing watershed protection activities.

3.8.2 Alternative Source [40 CFR 141.716(b)]

Plants may be able to reduce influent *Cryptosporidium* levels by changing the intake placement (either within the same source or to an alternate source) or by managing the timing or level of withdrawal. Because the effect of changing the location or operation of a plant intake on influent *Cryptosporidium* levels will be site-specific, states may not grant presumptive credit for this option. Rather, if a system is concerned that *Cryptosporidium* levels associated with the current plant intake location and/or operation will result in a bin assignment requiring additional treatment under the LT2ESWTR, the system may conduct concurrent *Cryptosporidium* monitoring reflecting a different intake location or different intake management strategy.

States should ensure that systems' concurrent monitoring conforms to the sample frequency, sample volume, analytical method, and other requirements that apply to the system for *Cryptosporidium* monitoring. The system must monitor its current plant intake in addition to any alternative intake location or withdrawal strategy, and must submit sampling plans for both strategies to the state 3 months prior to the start of sampling. In addition to all monitoring results, states should also receive supporting information from the system documenting the conditions under which the alternative intake location/management samples were collected. The state will then make a determination as to whether the plant may be assigned to an LT2ESWTR bin using alternative intake location/management monitoring results.

If a plant's bin assignment is based on a new intake operation strategy, it is important for the plant to continue to use this new strategy in routine operation. Therefore, the state must receive documentation from the system on its new intake operation strategy along with additional monitoring results.

3.8.3 Pre-sedimentation with Coagulant [40 CFR 141.717(a)]

States may grant 0.5-log *Cryptosporidium* treatment credit to a system with a presedimentation process that achieves at least 0.5-log influent turbidity reduction [$\log_{10}$ (monthly mean of daily influent turbidity) - $\log_{10}$ (monthly mean of daily effluent turbidity)]. The system may also comply with state-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material. In addition, the presedimentation process must comply with the following on a monthly basis: (1) continuous operation while the treatment plant is in use; (2) treat 100 percent of the plant flow; and (3) continuous addition of a coagulant. To be eligible for credit, PWSs must report compliance with these conditions to the state each month.

Alternatively, states may grant the 0.5-log *Cryptosporidium* treatment credit for presedimentation processes based on a demonstration of performance. Demonstration of performance provides an option for PWSs with presedimentation processes that do not meet the conditions for treatment credit previously discussed and for PWSs that wish to receive more than 0.5-log *Cryptosporidium* treatment credit for their presedimentation processes. Demonstration of performance criteria are described in section 3.8.8.

3.8.4 Two-stage Lime Softening [40 CFR 141.717(b)]

States may grant 0.5-log credit to systems with two-stage lime softening plants. Lime softening is a process in which chemical addition and hardness precipitation occur in a clarifier prior to a filtration process. Lime softening can be categorized into two general types: (1) single-stage softening that includes a primary clarifier and filtration process; and (2) two-stage softening, which has a secondary clarifier after

the primary clarifier prior to the filtration process. Single-stage softening plants are not eligible for the 0.5-log credit. To grant the 0.5-log credit, the state must ensure that the plant has a second clarification stage between the primary clarifier and filtration process that is operated continuously and that both clarification stages treat 100 percent of the plant flow. Chemical addition and hardness precipitation must occur in both clarifiers.

3.8.5 Bank Filtration [40 CFR 141.717(c)]

In order for a state to grant a system *Cryptosporidium* treatment credit, its wells must be drilled in an unconsolidated, predominantly sandy aquifer. Wells with a ground water flow path of at least 25 feet will receive 0.5-log credit and at least 50 feet will receive 1.0-log credit. Only horizontal and vertical wells are eligible for this credit. Springs and infiltration galleries are not eligible for treatment credit for bank filtration.

The ground water flow path for vertical wells is the distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary as defined in FEMA flood hazard maps) to the well screen. The ground water flow path for horizontal wells is the distance from the river bed under normal flow conditions to the closest horizontal well lateral screen.

Systems must characterize the aquifer by collecting core samples. Core samples should be collected from the surface to at least the bottom of the well screen. From grain analyses, at least 90 percent of the core length, the recovered core material must contain at least 10 percent fine-grained material (grains less than 1.0 mm diameter).

Bank filtration devices must be monitored for turbidity at least once every 4 hours at the wellhead. The state must receive notification if a system's monthly average exceeds 1 NTU using the daily maximum turbidity values. The state must determine whether previously allowed credit is still appropriate based on the system's assessment identifying the cause of the high turbidity levels in the well.

States may also approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study. The study must meet the following criteria:

- It must follow a state-approved protocol.
- It must involve the collection of data on the removal of *Cryptosporidium* (or a surrogate for *Cryptosporidium*) and related hydrogeologic and water quality parameters during the full range of operating conditions.
- It must include sampling from both the production well and monitoring wells that are screened and located along the shortest flow path between the surface water source and production wells.

3.8.6 Combined Filter Performance [40 CFR 141.718(a)]

States may grant additional *Cryptosporidium* treatment credit to certain plants (e.g., conventional or direct filtration processes) that maintain finished water turbidity at levels significantly lower than previously required (e.g., 0.3 NTU). Conventional and direct filtration plants may receive an additional 0.5-log towards *Cryptosporidium* treatment requirements if the CFE is less than or equal to 0.15 NTU in at least 95 percent of the measurements taken each month for compliance with the SWTR and IESWTR or LT1ESWTR. Compliance with this criterion must be based on turbidity measurements of the CFE every 4 hours (or more frequently) while the plant system serves water to the public. States may not grant this

credit to systems with membrane, bag/cartridge, slow sand, or diatomaceous earth plants, due to the lack of documented correlation between effluent turbidity and *Cryptosporidium* removal in these processes.

3.8.7 Individual Filter Performance [40 CFR 141.718(b)]

States may grant systems with conventional or direct filtration processes 0.5-log *Cryptosporidium* treatment credit (in addition to credit for combined filter performance) if turbidity measurements collected for IESWTR or LT1ESWTR compliance meet the following turbidity criteria: (1) filtered water turbidity less than or equal to 0.15 NTU in at least 95 percent of the 15-minute values recorded at each filter in each month; and (2) no individual filter has a measured turbidity level greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

3.8.8 Demonstration of Performance [40 CFR 141.718(c)]

The state may award treatment credits other than the prescribed treatment credit based on a demonstration of performance study that meets the following criteria:

- The study must follow a state-approved protocol.
- The study must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

Where a system can demonstrate that a plant, or a unit process within a plant, achieves a *Cryptosporidium* removal (or inactivation) efficiency greater than the presumptive credit specified in the LT2ESWTR, it may be appropriate for the state to grant the system a higher *Cryptosporidium* treatment credit. States may award a higher level of *Cryptosporidium* treatment credit to a system where the state determines, based on site-specific testing with a state-approved protocol, that a treatment plant (or a unit process within a plant) reliably achieves a higher level of *Cryptosporidium* removal on a continuing basis.

Alternatively, states may award a lower level of *Cryptosporidium* treatment credit to a system where a state determines, based on site-specific information, that a plant (or a unit process within a plant) achieves a *Cryptosporidium* removal efficiency less than a presumptive credit specified in the LT2ESWTR.

State approval must be in writing. The state may require systems to report operational data on an ongoing basis (e.g., monthly or quarterly) to establish that the conditions under which demonstration of performance credit was awarded are maintained during routine operation. EPA's *LT2ESWTR Toolbox Guidance Manual* describes potential approaches to demonstration of performance testing.

Note that plants receiving *Cryptosporidium* treatment credit through a demonstration of performance are not eligible for the presumptive credit associated with some microbial toolbox components. For example, if a conventional filtration plant receives a demonstration of performance credit of 4.0-log for *Cryptosporidium* removal, the plant may not receive additional presumptive credit for the CFE toolbox option.

3.8.9 Bag and Cartridge Filtration [40 CFR 141.719(a)]

States can grant systems using bag and cartridge filters for secondary filtration (i.e., they have a primary filtration process that meets the SWTR, IESWTR, or LT1ESWTR finished water turbidity requirements) up to 2.0-log *Cryptosporidium* treatment credit for individual filters and up to 2.5-log *Cryptosporidium* treatment credit for filters operated in series. To be eligible for removal credit, the filtration process must be a pressure-driven separation process that removes particulate matter larger than 1 μm using an

engineered porous filtration media through either surface or depth filtration. Removal efficiency must be demonstrated through a challenge test with an applied safety factor conducted on a full-scale bag or cartridge filter.

Challenge testing involves evaluating each bag or cartridge filter for its removal efficiency of *Cryptosporidium* oocysts (or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts). Challenge testing is not required to be site-specific; rather, it is intended to be product-specific. Due to the variability in performance, the LT2ESWTR requires a safety factor of 1.0-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series. States may use their discretion in considering data from challenge studies conducted prior to promulgation of this regulation in lieu of additional testing. Requirements and guidance for conducting challenge studies on bag and cartridge filters are presented in the *LT2ESWTR Toolbox Guidance Manual.*

3.8.10 Membrane Filtration [40 CFR 141.719(b)]

To grant removal credit to systems using membrane filtration, states must ensure that the membrane technology is a pressure- or vacuum-driven separation process in which particulate matter larger than 1 µm is rejected by an engineered barrier, primarily through a size exclusion mechanism. The membrane technology must also allow for routine direct integrity testing while in operation that verifies the removal efficiency demonstrated through challenge testing is being achieved. The definition of membrane filtration includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

Criteria for determining the level of treatment credit for membrane filtration include:

- Challenge test—a test of the membrane's ability to remove introduced *Cryptosporidium* oocysts or surrogates in simulation of operational conditions. Challenge testing is required for specific products and is not intended to be site-specific.

- Direct integrity test—a physical test applied to the membrane unit in order to identify and isolate integrity breeches. Direct integrity testing includes routine testing of each membrane unit that demonstrates removal efficiency equal to or greater than that awarded from the challenge test. Systems must conduct testing at least once per day while in operation (unless the state approves a lesser frequency) and submit a monthly report to the state summarizing all direct integrity test results above the control limit associated with the *Cryptosporidium* removal credit and the corrective action that was taken in each case.

- Indirect integrity monitoring—monitoring an aspect of filtered water quality that indicates how much particulate matter is removed (e.g., turbidity monitoring, particle monitoring). Indirect integrity monitoring includes continuously monitoring each membrane unit. Since direct integrity testing is continuous, systems are not subject to integrity testing requirements.

The removal efficiency demonstrated during challenge testing establishes the maximum removal credit that a membrane filtration process is eligible to receive, provided this value is less than or equal to the maximum log removal value that can be verified by the direct integrity test. The system may use data from challenge studies conducted prior to promulgation of the LT2ESWTR in lieu of additional testing if the data meet the criteria in the Rule.

Additional requirements and guidance for conducting the three tests to comply with the LT2ESWTR is provided in EPA's *Membrane Filtration Guidance Manual.*

3.8.11 Second Stage Filtration [40 CFR 141.719(c)]

States can grant systems using a second filtration stage an additional 0.5-log *Cryptosporidium* removal credit if the secondary filtration consists of rapid sand, dual media, GAC, or other fine grain media in a separate stage following rapid sand or dual media filtration. A cap, such as GAC, on a single stage of filtration will not qualify for this credit. The first stage of filtration must be preceded by a coagulation step, and both stages must treat 100 percent of the flow.

3.8.12 Slow Sand Filters [40 CFR 141.719(d)]

States can grant systems using slow sand filtration as a *secondary* filtration step following a primary filtration process (e.g., conventional treatment or direct filtration) an additional 2.5-log *Cryptosporidium* treatment credit. There must be no disinfectant residual in the influent water to the slow sand filtration process, and all flow must be treated by both filtration processes to receive credit. Note that this credit differs from the credit for slow sand filtration as a *primary* filtration process, where states can grant plants a *Cryptosporidium* removal credit of 3.0-log for the LT2ESWTR.

While the removal mechanisms that make slow sand filtration effective as a primary filtration process would also be operative when used as a secondary filtration step, EPA has little data on this specific application. The 2.5-log credit for slow sand filtration as a secondary filtration step, in comparison to 3.0-log credit as a primary filtration process, is a conservative measure reflecting greater uncertainty in its effectiveness. In addition, the 2.5-log credit for slow sand filtration as part of the microbial toolbox is consistent with recommendations in the Stage 2 M-DBP Agreement in Principle.

3.8.13 Chlorine Dioxide [40 CFR 141.720(b)]

Inactivation credit for *Cryptosporidium* is dependent on the "CT" achieved on a daily basis. CT is the product of the disinfectant concentration, C (mg/L) and disinfectant contact time, T (minutes). Systems must calculate CT at least once each day, based on measurements of C and T during peak hourly flow, and use the CT values presented in §141.720 and EPA's *LT2ESWTR Toolbox Guidance Manual* to determine log inactivation credit. Systems with several disinfection segments (i.e., a treatment unit process with a measurable disinfectant residual level and a liquid volume) may calculate CT values for each segment and sum those values to obtain a total CT, then use the table in §141.720(b)(1) to calculate the total log inactivation credit.

Alternatively, states may consider CT values other than those specified in the LT2ESWTR if the system can demonstrate, through the use of a state-approved protocol for on-site disinfection challenge studies, that the CT values are adequate to achieve the inactivation required under the LT2ESWTR. EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for conducting a site-specific inactivation study.

3.8.14 Ozone [40 CFR 141.720(b)]

As with chlorine dioxide, the CT values are used to determine the level of *Cryptosporidium* inactivation by ozone disinfection. States should refer to either the rule language or EPA's *LT2ESWTR Toolbox Guidance Manual* for CT values for various log inactivation credits. The *LT2ESWTR Toolbox Guidance Manual* also provides guidance on calculating CT values for different disinfection reactor designs and operations.

States may consider CT values other than those specified in the LT2ESWTR if the system can demonstrate, through the use of a state-approved protocol for on-site disinfection challenge studies, that the CT values are adequate to achieve the inactivation required under the LT2ESWTR. EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for conducting a site-specific inactivation study.

3.8.15 Ultraviolet Light [40 CFR 141.720(d)]

States may award credit to systems using UV disinfection processes for inactivation of *Cryptosporidium*, *Giardia*, and viruses. To be eligible for UV disinfection credit, the system must demonstrate a delivered UV dose using the results of a reactor validation test and on-line monitoring. Validation testing must determine a range of operating conditions under which the reactor delivers the required UV dose and can be monitored by the system.

- Operating conditions must include flow rate, UV intensity, and lamp status, at a minimum.

- Validated conditions determined by testing 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, and inlet and outlet piping or channel configurations of the UV reactor.

UV reactors may be validated for a specific system or under a wide range of conditions, thus providing disinfection credit for a variety of applications. Monitoring is used to demonstrate that the system maintains validated operating conditions during routine use. Validation testing and on-line monitoring results may be available from the UV technology provider. EPA's *UV Disinfection Guidance Manual* provides a protocol for validating reactors and guidance on the design and implementation of UV systems.

The LT2ESWTR presents the UV doses required to receive credit for up to 3.0-log inactivation of *Cryptosporidium* and *Giardia lamblia* and up to 4.0-log inactivation of viruses. These dose values are for UV light at a wavelength of 254 nm as delivered by a low pressure mercury vapor lamp and intended for post-filter applications of UV in filtration plants and for systems that meet the filtration avoidance criteria. However, the dose values can be applied to other UV applications (e.g., medium pressure mercury vapor lamps), as described in EPA's *UV Disinfection Guidance Manual.*

3.9 Oversee Disinfection Profiling and Benchmarking

The state should review the system's disinfection profiling data during the sanitary survey process. In addition, when a system plans to make a significant change to their disinfection process, it is required to conduct profiling and must calculate a benchmark. The profile and benchmark must be submitted to the state with an evaluation of how the new process will affect the current benchmark. Significant changes in disinfection practice are defined as: 1) moving the point of disinfection (this is not intended to include routine seasonal changes already approved by the state); 2) changing the type of disinfectant; 3) changing the disinfection process; or 4) making other modifications designated as significant by the state.

3.10 Review Changes in Treatment or Control Measures Used to Meet *Cryptosporidium* Treatment Requirements

Depending on the toolbox option, systems are required to submit plans, testing data, and monitoring results to ensure the additional treatment is appropriate. System reporting requirements are described for each toolbox option in §141.721, and are included in section 1 of this manual. Systems will also submit documentation supporting any change in their disinfection process. States should develop reporting protocols, review procedures, and follow-up steps to ensure all documentation and reported information is addressed in a timely manner.

3.11 Review Covers and Treatment for Uncovered Finished Water Reservoirs

Systems must notify the state if they use uncovered reservoirs by April 1, 2008, and cover or treat uncovered finished water reservoirs by April 1, 2009, or be in compliance with an alternative state-approved schedule. The LT2ESWTR requires that systems with uncovered finished water reservoirs must: 1) cover the reservoir; or 2) treat reservoir discharge to the distribution system to achieve a 4.0-log virus, 3.0-log *Giardia,* and 2.0-log *Cryptosporidium* inactivation and/or removal.

3.12 Approve Laboratories for Monitoring *Cryptosporidium*

Given the potentially significant implications in terms of both cost and public health protection of microbial monitoring under the LT2ESWTR, analytical work must be accurate and reliable within the limits of approved methods.

Because states do not currently approve laboratories for *Cryptosporidium* analysis and LT2ESWTR monitoring will begin as early as October 1, 2006, EPA will initially assume responsibility for *Cryptosporidium* laboratory approval. EPA expects, however, that states will include *Cryptosporidium* analysis in their state laboratory certification programs in the future.

EPA established the Laboratory Quality Assurance (QA) Evaluation Program for *Cryptosporidium* analysis to identify laboratories that can meet LT2ESWTR data quality objectives. This is a voluntary program open to laboratories involved in analyzing *Cryptosporidium* in water. Under this program, EPA assesses the ability of laboratories to reliably measure *Cryptosporidium* occurrence with EPA Methods 1622 and 1623 using both performance testing samples and an on-site evaluation. For more information on the program, visit EPA's Web site at www.epa.gov/safewater/disinfection/lt2/lab_home.html.

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Section 4

State Primacy Revision Application

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40 CFR Part 142 sets out requirements for states to obtain and/or retain primary enforcement responsibility (primacy) for the Public Water System Supervision (PWSS) program as authorized by Section 1413 of the SDWA. The 1996 SDWA Amendments updated the process for states to obtain and/or retain primacy. On April 28, 1998, EPA promulgated the Primacy Rule to reflect these statutory changes (63 *FR* 23361).

4.1 State Primacy Program Revision

Pursuant to §142.12, Revision of State Programs, complete and final requests for approval of program revisions to adopt new or revised EPA regulations must be submitted to the EPA Administrator no later than 2 years after promulgation of the new or revised federal regulations (see Table 4-1). Until those applications are approved, EPA Regions have responsibility for directly implementing the LT2ESWTR. The state and EPA can agree to implement the Rule together during this period. However, if a state is eligible for interim primacy, it will have full implementation and enforcement authority. States that have primacy for all existing NPDWRs are considered to have interim primacy for any new or revised regulation. Interim primacy for the LT2ESWTR would begin on the date the final and complete primacy revision application is submitted or the effective date of the new state regulation (whichever is later), and ends when EPA makes a final determination.

A state may be granted an extension of time, up to 2 years, to submit its application package. During any extension period, an extension agreement outlining the state's and EPA's responsibilities is required.

Table 4-1. State Rule Implementation and Revision Timetable for the LT2ESWTR

EPA/State Action	Time Frame
Rule published by EPA	January 5, 2006
State and region establish a process and agree upon a schedule for application review and approval (optional)	March 5, 2006
State, at its option, submits *draft* program revision package to region including: Preliminary Approval Request, Draft State Regulations and/or Statutes, Regulation Crosswalk	July 5, 2006 (Recommended)
Regional (and Headquarters if necessary) review of draft	Completed within 90 days of state submittal of draft (Recommended)
State submits complete and final program revision package to region including: Adopted State Regulations Regulation Crosswalk §142.10 Primacy Update Checklist §142.14 and 142.15 Reporting and Recordkeeping §142.16 Special Primacy Requirements Attorney General's Enforceability Certification	January 5, 2008*
States with approved extensions submit complete and final program revision package	January 5, 2010**

EPA/State Action	Time Frame
EPA final review and determination: Regional Review (program and Office of Regional Counsel (ORC)) Headquarters Concurrence and Waivers (OGWDW) Public Notice Opportunity for Hearing EPA's Determination	Completed within 90 days of state submittal of final package (45 days Region) (45 days Headquarters)***

* EPA suggests submitting an application by October 5, 2007, to ensure timely approval. EPA regulations allow states until January 5, 2008, for this submittal.
** EPA suggests submitting an application by October 5, 2010 for states with approved extensions to ensure timely approval.
*** At least one state application per region.

4.1.1 The Revision Process

EPA recommends a two-step process for approval of state program revisions. The steps consist of submission of a draft request (optional) and submission of a complete and final request for program approval. Figure 4-1 diagrams these processes and their timing.

Draft Request—The state may submit a draft request for EPA review and tentative determination. The request should contain drafts of all required primacy application materials (with the exception of a draft Attorney General's Statement). A draft request should be submitted as soon as practicable; EPA recommends submitting it within 6 months of rule promulgation. EPA will make a tentative determination as to whether the state program meets the applicable requirements. EPA intends to make a tentative determination within 90 days.

Complete and Final Request—This submission must be in accordance with §142.12(c)(1) and (2) and include the Attorney General's statement. The state should also include its response to any comments or program deficiencies identified in the tentative determination (if applicable). Submission of only a final request may make it more difficult for states to address any necessary changes within the allowable time for state rule adoption.

EPA recommends that states submit their complete and final revision package within 21 months (by October 5, 2008) of rule promulgation. This will ensure that states will have interim primacy as soon as possible and will prevent backlogs of revision applications to adopt future federal requirements.

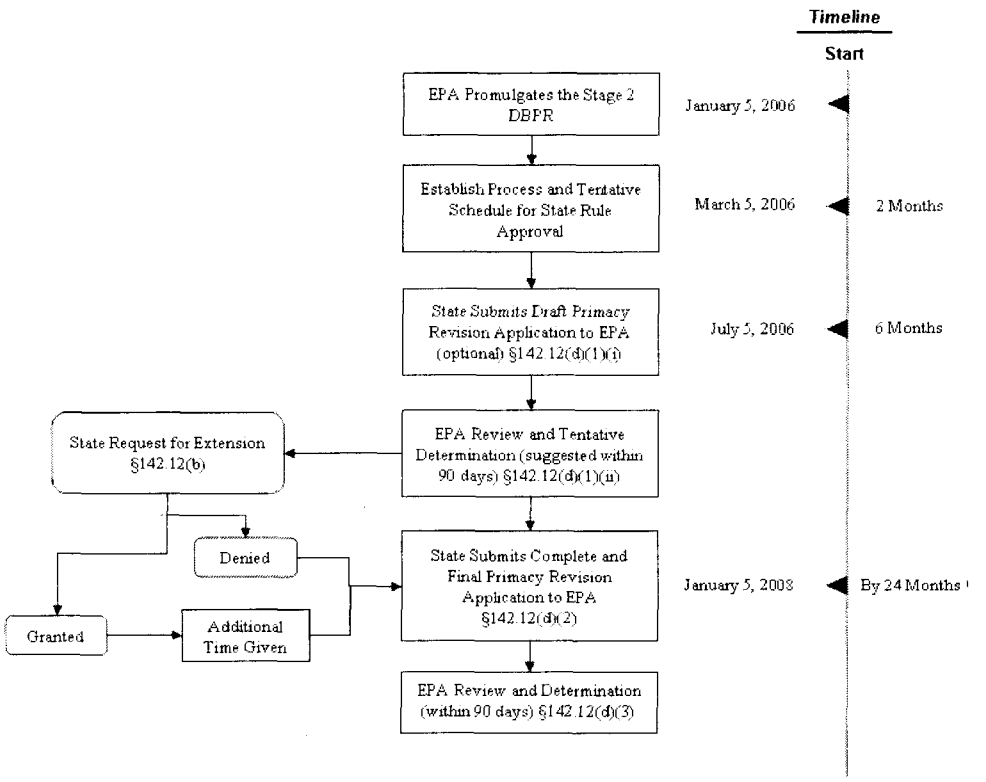
The state and region should agree to a plan and timetable for submitting the state primacy revision application as soon as possible after rule promulgation—ideally within 5 months of promulgation.

4.1.2 The Final Review Process

Once a state application is complete and final, EPA has a regulatory (and statutory) deadline of 90 days to review and approve or disapprove the revised program. OGWDW will conduct a detailed concurrent review of the first state package from each region. The regional office should submit its comments with the state's package within 45 days for review by Headquarters (HQ). When the region has identified all significant issues, OGWDW waives concurrence on all other state programs in that region, although EPA HQ retains the option to review additional state programs, as appropriate. The Office of General Counsel (OGC) has delegated its review and approval to the Office of Regional Counsel (ORC).

In order to meet the 90-day deadline for packages undergoing review by HQ, the review period is equally split by giving the regions and HQ 45 days each to conduct their respective reviews. For the first package in each region, regions should forward copies of the primacy revision applications and their evaluations to the Drinking Water Protection Division Director in OGWDW no later than 45 days after state submittal. The Drinking Water Protection Division Director takes the lead on the HQ review process.

Figure 4-1. Recommended Review Process for State Request for Approval of Program Revisions



[1] Start date may be extended if state grants system additional time

4.2 State Primacy Program Revision Extensions

4.2.1 The Extension Process

Under §142.12(b), states may request that the 2-year deadline for submitting the complete and final packages for EPA approval of program revisions be extended for up to 2 additional years in certain circumstances. The extension request must be submitted to EPA within 2 years of the date that EPA published the regulation. The Regional Administrator has been delegated authority to approve extension applications. Concurrence by HQ on extensions is not required.

Therefore, the state must either adopt regulations pertaining to the LT2ESWTR and submit a complete and final primacy revision application or request an extension of up to 2 years by January 5, 2008.

4.2.2 Extension Request Criteria

For an extension to be granted under §142.12(b), the state must demonstrate that it is requesting the extension because it cannot meet the original deadline for reasons beyond its control and despite a good faith effort to do so. A critical part of the extension application is the state's proposed schedule for submission of its complete and final request for approval of a revised primacy program. The application must also demonstrate at least one of the following:

(i) That the state currently lacks the legislative or regulatory authority to enforce the new or revised requirements;

(ii) That the state currently lacks the program capability adequate to implement the new or revised requirements; or,

(iii) That the state is requesting the extension to group two or more program revisions in a single legislative or regulatory action.

In addition, the state must be implementing the EPA requirements to be adopted in its program revision within the scope of its current authority and capabilities.

4.2.3 Conditions of the Extension

Until the State Primacy Revision Application has been submitted, the state and EPA regional office will share responsibility for implementing the primary program elements as indicated in the extension agreement. The state and the EPA regional office should discuss these elements and address terms of responsibility in the agreement.

These conditions will be determined during the extension approval process and are decided on a case-by-case basis. The conditions must be included in an extension agreement between the state and the EPA regional office.

Conditions of an extension agreement may include:

- Informing PWSs of the new EPA (and upcoming state) requirements and the fact that the region will be overseeing implementation of the requirements until they approve the state program revisions or until the state submits a complete and final revision package if the state qualifies for interim primacy.

- Collecting, storing, and managing laboratory results, public notices, and other compliance and operation data required by the EPA regulations.

- Assisting the region in the development of the technical aspects of enforcement actions and conducting informal follow-up on violations (e.g., telephone calls, letters).

- Providing technical assistance to PWSs.

- For states whose request for an extension is based on a current lack of program capability adequate to implement the new requirements, taking steps agreed to by the region and the state to remedy the deficiency during the extension period.

- Providing the region with all the information required under §142.15 for state reporting.

Example 4-1 provides a checklist the region can use to review state extensions or to create an extension agreement.

Until states have primacy, EPA is the primacy enforcement authority. However, historically states have played a role in implementation for various reasons—most importantly, since states have the local knowledge and expertise and have established relationships with their systems.

The state and EPA should be viewed as partners in this effort, working toward two very specific public health-related goals. The first goal is to achieve a high level of compliance with the regulation. The second goal is to facilitate efficient co-regulation during the transition period before the state has primacy, including interim primacy, for the Rule. In order to accomplish these goals, education, training, and technical assistance will need to be provided to water suppliers on their responsibilities under the LT2ESWTR.

Example 4-1. Example Extension Request Checklist

{Date}

{Regional Administrator}
Regional Administrator
U.S. EPA Region **{Region}**
{Street Address}
{City, State, Zip}

RE: Request/approval for an Extension Agreement

Dear **{Regional Administrator}**:

The State of **{State}** is requesting an extension to the date that the final primacy revisions are due to EPA for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) until **{insert date - no later than January 5, 2010}**, as allowed by 40 CFR 142.12 and would appreciate your approval. Staff of the **{State Department/Agency}** have conferred with your staff and have agreed to the requirements listed below for this extension. This extension is being requested because the State of **{State}**:

☐ Is planning to group two or more program revisions into a single legislative or regulatory action.
☐ Currently lacks the legislative or regulatory authority to enforce the new or revised requirements.
☐ Currently lacks adequate program capability to implement the new or revised requirements.

{State Department/Agency} will be working with EPA to implement the LT2ESWTR within the scope of its current authority and capability, as outlined in the six areas identified in §142.12(b)(3)(i-vi):

i) Informing PWSs of the new EPA (and upcoming state) requirements and the fact that EPA will be overseeing implementation of the requirements until EPA approves the state revision.

State	EPA	
____	____	Provide copies of regulation and guidance to other state agencies, public water systems (PWSs), technical assistance providers, associations, or other interested parties.
____	____	Educate and coordinate with state staff, PWSs, the public, and other water associations about the requirements of this regulation.
____	____	Notify affected systems of their requirements under the LT2ESWTR.
____	____	Other:

ii) Collecting, storing and managing laboratory results, public notices, and other compliance and operation data required by the EPA regulations.

State	EPA	
____	____	Devise a tracking system for PWS reporting pursuant to the LT2ESWTR.
____	____	Keep PWSs informed of reporting requirements during development and implementation.
____	____	Report LT2ESWTR violation and enforcement information to SDWIS as required.
____	____	Other:

iii) Assisting EPA in the development of the technical aspects of the enforcement actions and conducting informal follow-up and violations (telephones calls, letters, etc.).

State	EPA	
____	____	Issue notices of violation (NOVs) for treatment technique, MCL, and monitoring/reporting violations of the LT2ESWTR.

____ ____ Provide immediate technical assistance to PWSs with treatment technique, MCL, and/or monitoring/reporting violations to try to bring them into compliance.

____ ____ Refer all violations to EPA for enforcement if they have not been resolved within 60 days of the incident that triggered the violation. Provide information as requested to conduct and complete any enforcement action referred to EPA.

____ ____ Other:

iv) Providing technical assistance to PWSs.

State EPA

____ ____ Conduct training within the state for PWSs on LT2ESWTR requirements.

____ ____ Provide technical assistance through written and/or verbal correspondence with PWSs.

____ ____ Provide on-site technical assistance to PWSs as requested and needed to ensure compliance with this regulation.

____ ____ Coordinate with other technical assistance providers and organizations to provide accurate information and aid in a timely manner.

____ ____ Other:

v) Providing EPA with all information prescribed by the State Reporting Requirements in §142.15.

State EPA

____ ____ Report any violations incurred by PWSs for this regulation each quarter.

____ ____ Report any enforcement actions taken against PWSs for this regulation each quarter.

____ ____ Report any variances or exemptions granted for PWSs for this regulation each quarter.

____ ____ Other:

vi) For states whose request for an extension is based on a current lack of program capability to implement the new or revised requirements, taking the following steps to remedy the capability deficiency.

State EPA

____ ____ Acquire additional resources to implement these regulations (list of specific steps being taken attached as **{List A}**).

____ ____ Provide quarterly updates describing the status of acquiring additional resources.

____ ____ Other:

I affirm that the **{State Department/Agency}** will implement provisions of the LT2ESWTR as outlined above

_____

{Agency Director or Secretary} Date

_____

{Name of State Agency}

I have consulted with my staff and approve your extension for the aforementioned regulation. I affirm that EPA Region **{Region}** will implement provisions of the LT2ESWTR as outlined above.

_____

Regional Administrator Date
EPA Region **{Region}**

This Extension Agreement will take effect upon the date of the last signature.

4.3 State Primacy Package

The Primacy Revision Application package should consist of the following sections:

- ☐ State Primacy Revision Checklist
- ☐ Text of the State's Regulation
- ☐ Primacy Revision Crosswalk
- ☐ State Reporting and Recordkeeping Checklist
- ☐ Special Primacy Requirements
- ☐ Attorney General's Statement of Enforceability

4.3.1 The State Primacy Revision Checklist

This section is a checklist of general primacy requirements, as shown in Table 4-2. In completing this checklist, the state must identify the program elements that it has revised in response to new federal requirements. **If an element has been revised, the state should indicate a "Yes" answer in the "Revision to State Program" column and should submit appropriate documentation.** For elements that did not require revision, the state need only list the citation and date of adoption in the "Revision to State Program" column. During the application review process, EPA will insert findings and comments in the final column.

The 1996 SDWA Amendments include new provisions for PWS definition and administrative penalty authority. States must adopt provisions at least as stringent as these new provisions, now codified at §142.2 and 142.10. Failure to revise these elements can affect primacy for the LT2ESWTR.

States may bundle the primacy revision packages for multiple rules. If states choose to bundle requirements, the Attorney General's Statement should reference all of the rules included.

4.3.2 Text of the State's Regulation

Each primacy application package should include the text of the state regulation.

4.3.3 Primacy Revision Crosswalk

The Primacy Revision Crosswalk, in Appendix A, should be completed by states in order to identify state statutory or regulatory provisions that correspond to each federal requirement. If the state's provisions differ from federal requirements, the state should explain how its requirements are no less stringent.

Table 4-2. State Primacy Revision Checklist

Required Program Elements		Revision to State Program	EPA Findings/Comments
§141.2	Definitions		
§142.10(b)(6)(iii)	Right of entry		
§142.10(b)(6)(iv)	Authority to require records		
§142.10(b)(6)(v)	Authority to require public notification		
§142.10(b)(6)(vi)	Authority to assess civil and criminal penalties		
§142.10(b)(6)(vii)	Authority to require CCRs		
§142.10(c)	Maintenance of records		
§142.10(d)	Variance/exemption conditions (if applicable)*		
§142.10(e)	Emergency plans		
§142.10(f)	Administrative Penalty Authority**		

* Regulations published in the August 14, 1998 *Federal Register*.
** Requirement from the 1996 Amendments. Regulations published in the April 28, 1998 *Federal Register*.

4.3.4 State Recordkeeping and Reporting Checklist [40 CFR 142.14, 40 CFR 142.15]

The LT2ESTWR adds state reporting and state recordkeeping requirements. The state should use the Primacy Revision Crosswalk in Appendix A to demonstrate that state reporting and recordkeeping requirements are consistent with federal requirements. If state requirements are not the same as federal requirements, the state must explain how its requirements are "no less stringent" as per §142.10. States may want to include in their State Primacy Revision Application how long the state will keep the records and in what format the data will be kept.

The Primacy Revision Crosswalk includes state recordkeeping and reporting requirements indicating that the state must:

- Keep records of the results of *E. coli* and *Cryptosporidium* monitoring.
- Keep records of the *Cryptosporidium* bin classification for each filtered system, including any changes to initial bin classification based on watershed survey or second round of monitoring.
- Keep records of the determination of whether each unfiltered system has a mean source water *Cryptosporidium* level above 0.01 oocysts/L, along with any changes in this determination due to the second round of source water monitoring.
- Keep records of the treatment processes or control measures that each system employs to meet their *Cryptosporidium* treatment requirements.
- Keep a list of systems required to cover or treat the effluent of an uncovered finished water reservoir.

- Report to EPA the initial bin classification for each system and any changes in bin classifications due to watershed assessment during sanitary surveys or the second round of *Cryptosporidium* monitoring.

- Report to EPA the determination of whether each unfiltered system meeting filtration avoidance criteria has a mean source water *Cryptosporidium* level above 0.01 oocysts/L, along with any changes in this determination due to the second round of source water monitoring.

4.3.5 Special Primacy Requirement [40 CFR 142.16]

The Special Primacy Requirements section of the crosswalk is where the state has the opportunity to describe how it will satisfy these provisions. Special primacy conditions pertain to specific regulations where implementation of the rule involves activities beyond general primacy provisions. States must include these rule-distinct provisions in an application for approval or revision of their program. Section 4.4 provides guidance on how states may choose to meet the special primacy requirements of the LT2ESWTR.

4.3.6 Attorney General's Statement of Enforceability [40 CFR 142.12(c)(2)]

The complete and final primacy revision application must include an Attorney General's Statement certifying that the state regulations were duly adopted and are enforceable (unless EPA has waived this requirement by letter to the state). The Attorney General's Statement should also certify that the state does not have any audit privilege or immunity laws, or if it has such laws, that these laws do not prevent the state from meeting the requirements of the SDWA. If a state has submitted this certification with a previous revision package, then the state should indicate the date of submittal and the Attorney General need only certify that the status of the audit laws has not changed since the prior submittal. An example of an Attorney General's Statement is presented in Example 4-2.

4.3.6.1 Guidance for States on Audit Privilege and/or Immunity Laws

In order for EPA to properly evaluate the state's request for approval, the State Attorney General or independent legal counsel should certify that the state's environmental audit immunity and/or privilege and immunity law does not affect its ability to meet enforcement and information gathering requirements under SDWA. This certification should be reasonably consistent with the wording of the state audit laws and should demonstrate how state program approval criteria are satisfied.

EPA will apply the criteria outlined in its "Statement of Principles" memo issued on February 14, 1997, (www.epa.gov/epaoswer/hazwaste/state/policy/policies.htm) to determine whether states with audit laws have retained adequate enforcement authority for any authorized federal programs. The principles articulated in the guidance are based on the requirements of federal law, specifically the enforcement and compliance and state program approval provisions of environmental statutes and their corresponding regulations. The Principles provide that if provisions of state law are ambiguous, it will be important to obtain opinions from the State Attorney General or independent legal counsel interpreting the law as meeting specific federal requirements. If the law cannot be so interpreted, changes to state laws may be necessary to obtain federal program approval. Before submitting a package for approval, states with audit privilege and/or immunity laws should initiate communications with appropriate EPA regional offices to identify and discuss the issues raised by the state's audit privilege and/or immunity law.

The guidance for states on Audit Law Privilege and/or Immunity Laws is currently under review. If amended, EPA will issue an addendum to this document with the revised guidance.

Example 4-2. Example of Attorney General's Statement

Model Language

I hereby certify, pursuant to my authority as (1) and in accordance with the Safe Drinking Water Act as amended, and (2), that in my opinion the laws of the [State/Commonwealth of (3)] [or tribal ordinances of (4)] to carry out the program set forth in the "Program Description" submitted by the (5) have been duly adopted and are enforceable. The specific authorities provided are contained in statutes or regulations that are lawfully adopted at the time this Statement is approved and signed and will be fully effective by the time the program is approved.

I. For States with No Audit Privilege and/or Immunity Laws

Furthermore, I certify that [State/Commonwealth of (3)] has not enacted any environmental audit privilege and/or immunity laws.

II. For States with Audit Laws that do Not Apply to the State Agency Administering the Safe Drinking Water Act

Furthermore, I certify that the environmental [audit privilege and/or immunity law] of the [State/Commonwealth of (3)] does not affect the ability of (3) to meet enforcement and information gathering requirements under the Safe Drinking Water Act because the [audit privilege and/or immunity law] does not apply to the program set forth in the "Program Description." The Safe Drinking Water Act program set forth in the "Program Description" is administered by (5); the [audit privilege and/or immunity law] does not affect programs implemented by (5), thus the program set forth in the "Program Description" is unaffected by the provisions of [State/Commonwealth of (3)] [audit privilege and/or immunity law].

III. For States with Audit Privilege and/or Immunity Laws that Worked with EPA to Satisfy Requirements for Federally Authorized, Delegated, or Approved Environmental Programs

Furthermore, I certify that the environmental [audit privilege and/or immunity law] of the [State/Commonwealth of (3)] does not affect the ability of (3) to meet enforcement and information gathering requirements under the Safe Drinking Water Act because [State/Commonwealth of (3)] has enacted statutory revisions and/or issued a clarifying Attorney General's Statement to satisfy requirements for federally authorized, delegated, or approved environmental programs.

Seal of Office

_____
Signature

_____
Name and Title

_____
Date

(1) State Attorney General or attorney for the primacy agency if it has independent legal counsel.

(2) 40 CFR 142.11(a)(6)(i) for initial primacy applications or 40 CFR 142.12(c)(1)(iii) for primacy program revision applications.

(3) Name of state or commonwealth.

(4) Name of tribe.

(5) Name of primacy agency.

4.4 Guidance for the Special Primacy Requirements of the LT2ESWTR

To ensure that a state program includes all the elements necessary for an effective and enforceable program under the LT2ESWTR, a state primacy application must include a description of how the state will accomplish the following:

- Approve an alternative to *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people.
- Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.
- Approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.
- Approve protocols for removal credits under the demonstration of performance toolbox option and for alternative ozone and chlorine dioxide values.
- Approve an alternative approach to UV reactor validation testing in the microbial toolbox.

This section contains information and guidance that states can use when addressing these special primacy requirements of the LT2ESWTR. The guidance addresses special primacy conditions in the same order that they occur in the Rule. Additional information related to these requirements is available in EPA's *LT2ESWTR Toolbox Guidance Manual.*

4.4.1 Establishment of Alternative to *E. coli* Levels that Trigger *Cryptosporidium* Monitoring

§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. *In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 1) Approve an alternative to the* E. coli *levels that trigger* Cryptosporidium *monitoring by filtered systems serving fewer than 10,000 people.*

Guidance

To reduce the monitoring burden for small filtered systems, the LT2ESWTR includes a 2-phase monitoring strategy for small systems. This approach is based on ICR and Information Collection Rule Supplemental Surveys (ICRSS) data indicating that systems with low source water *E. coli* levels are likely to have low *Cryptosporidium* levels. Under this approach, small filtered systems must initially sample for *E. coli* beginning October 1, 2008 (unless they elect to monitor for *Cryptosporidium),* and, if results are above the trigger levels (see section 1.2.2), conduct *Cryptosporidium* monitoring.

As recommended by the Stage 2 M-DBP Advisory Committee, EPA will evaluate *Cryptosporidium* indicator relationships in the LT2ESWTR monitoring data collected by large systems. If these data support the use of different indicator levels to trigger small system *Cryptosporidium* monitoring, EPA will issue guidance with recommendations.

Under the LT2ESWTR, states may also approve source water monitoring for filtered systems serving fewer than 10,000 people using an indicator other than *E. coli*. It also allows states to approve alternatives to the threshold annual mean *E. coli* concentrations provided in §141.701(a)(4)(i), (ii), and (v) that trigger source water *Cryptosporidium* monitoring for filtered systems serving fewer than 10,000 people. When approving an alternative, the state must include in its approval the basis for its determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a water system will exceed the Bin 1 *Cryptosporidium* level (0.075 oocyst/L) than the applicable *E. coli* trigger value in the rule (i.e., 10 *E. coli*/100 mL for systems using lake/reservoir sources; 50 *E. coli*/100 mL for systems using flowing stream sources).

The LT2ESWTR requires all filtered systems serving 10,000 people or more to begin source water monitoring at least 18 months before filtered water systems serving fewer than 10,000 people. Systems serving 10,000 people or more will be required to sample for *Cryptosporidium*, *E. coli* and turbidity. The *E. coli* and turbidity data collected by the larger systems will be used by EPA to confirm or, if necessary, refine the use of *E. coli* and turbidity as indicators for monitoring by filtered systems serving fewer than 10,000 people. The EPA will review the indicator data collected by the larger systems and, if appropriate, issue guidance to states on alternative triggers. This guidance may be issued prior to when filtered systems serving fewer than 10,000 people are required to begin monitoring.

States intending to approve alternative indicators or alternative *E. coli* trigger concentrations must describe in their primacy application how they will decide whether the alternative indicator or trigger value is an effective indicator of *Cryptosporidium* contamination. States should consider any additional EPA guidance on alternative indicators and triggers, developed using the indicator data collected by the larger systems, when reviewing alternative approaches to indicator monitoring. States should also consider the most recent peer-reviewed research on the relationships between *Cryptosporidium* surface water concentrations and indicator parameters.

4.4.2 Assessment of Significant Changes in Watershed and Source Water

§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. *In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 2) Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.*

Guidance

States must conduct sanitary surveys for all surface water and GWUDI systems that assess the condition of eight primary water system components, including the source water [§142.10(b)(2) and 142.16(b)]. §142.16(n)(1) requires states to "assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action." Examples of significant changes are new point source discharges, new non-point source discharges, and changes to land use such as land development changes in farming and logging practices.

During a sanitary survey, the state must assess whether significant changes have occurred in the watershed since the system conducted source water monitoring for bin classification that could lead to increased contamination of the source water. In cases where a significant change has occurred, states must decide whether corrective measures or additional treatment are needed and determine appropriate follow-up action. States should first require that corrective measures be taken to address the source of

contamination. Where this is not feasible or not successful, states may reclassify the system into a higher treatment bin. If a system is re-classified as the result of the sanitary survey, states must report the re-classification to EPA [§142.15].

This section of the guidance discusses three components of the watershed and source water assessment process: preparing for the sanitary survey, conducting the survey, and determining follow-up action.

Preparation for the Survey

The following aspects of source water protection are discussed in the EPA guidance documents *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* and *State Source Water Assessment and Protection Programs Guidance*. The state or state-approved surveyor may wish to review or address these items before conducting a sanitary survey of a watershed:

- The state source water delineation and assessment for the watershed.
- Historical and current raw water quality records, particularly microbial analyses.
- Water system drawings and design information.
- Water quality violation history.
- Previous sanitary survey reports.
- Complaints received by local, state, and federal agencies regarding water quality or potential contamination within the watershed.
- Updates from local, state, or federal regulatory agencies regarding their monitoring of permitted discharges within the relevant watershed(s) (e.g., National Pollutant Discharge Elimination System (NPDES) and Total Maximum Daily Loads (TMDL) programs).
- Updates from state and federal land-management agencies regarding their monitoring of on-going activities within the relevant watershed(s).
- Where applicable, states may also wish to request that the system personnel that were involved in preparation of a watershed control plan accompany the surveyor during the survey.

Where available, the inspector should also review the following information from unfiltered systems or from filtered systems that receive 0.5-log *Cryptosporidium* removal credit for watershed control under the LT2ESWTR:

- The system's watershed control plan.
- The annual watershed control program status reports submitted by the system, where applicable (systems that have received 0.5-log *Cryptosporidium* credit for watershed control under the LT2ESWTR must submit an annual report).

Copies of relevant information should be taken along during the survey for on-site review and comparison to existing conditions. Potential changes in the watershed or source water conditions that are identified

from these references should then be evaluated during the survey. States may wish to require that their surveyors take specific equipment (e.g., cameras/camcorders, sampling/analysis equipment, and GPS devices) to document the status of potential threats to water quality. Chapter 2 of the *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* contains a more detailed list of equipment.

Evaluation During the Survey

Chapter 3 of the *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* discusses the source component of a sanitary survey. The following topics are addressed:

- Watershed management program.
- Source vulnerability assessment.
- Source water quality.
- Source water quantity.
- Location of source facilities.
- Capacity of source facilities.
- Design of source facilities.
- Condition of source facilities.
- Transmission of source water.

Also, Chapter 2 of EPA's *LT2ESWTR Toolbox Guidance Manual* provides recommendations for implementing the watershed sanitary survey required by the §141.725(a)(4)(ii) and suggests activities to complete during the survey. While these recommendations were developed for systems that have an approved watershed control plan for supplemental *Cryptosporidium* treatment credit, they also address several issues that should be considered when evaluating watersheds.

- Review the effectiveness of the watershed control program to date. (For example, have water quality monitoring results indicated a change in water quality?)

- Identify any new significant actual or potential sources of *Cryptosporidium*.

- Verify and re-evaluate the applicability of the area of influence, potential and existing sources of *Cryptosporidium*, monitoring locations and results, and the implementation of control measures.

- Verify that the system has control and practices such control over watershed areas and activities as described in the watershed protection plan.

- Confirm that public access is properly restricted from areas identified in the watershed control plan. Review the means by which the system monitors and enforces restrictions.

- Confirm that fencing and signs have not been vandalized or removed.

- Identify any significant hydrological changes in the watershed that could affect *Cryptosporidium* loading.

- Inspect the intake structure and identify any modifications to its location or design.

Finally, existing vulnerabilities and elements of watershed control plans that require on-going efforts by the system should be evaluated during the survey. High-risk sources should be assessed and discussed with system staff. Site visits to the more critical sources may be appropriate. Development patterns should be reviewed because urban and suburban growth is difficult to control in some areas. Water quality control measures that rely upon "gentlemen's agreements," public education, or even best-management practices are often difficult to enforce and should be reviewed for adequacy. Because funding for such efforts is often reduced during tight budgetary conditions, the surveyor may wish to assess such efforts if they are a significant component of watershed protection. The surveyor should also assess whether the system is regularly evaluating the effectiveness of its watershed control program (if one has been implemented).

Follow-up Action

States should also develop criteria for assessing whether changes within watersheds require corrective measures by the systems. Certain changes *may* warrant immediate action (i.e., changes that can have an immediate impact upon water quality). Examples of those warranting immediate action include:

- Inadequate implementation of best management practices.
- NPDES permit violations at wastewater treatment plants, confined animal feedlot operations, etc.
- Dramatic natural events (floods, forest fires, earthquakes, ice flows, landslides) can transport or expose contaminants (e.g., fine-grained sediments, mining wastes, animal and septic system wastes).
- Prolonged drought conditions may warrant special preparatory measures to minimize impacts from waste accumulations that are washed into source waters when precipitation returns.
- Lack of a current emergency response plan.
- Accidental or illegal waste discharges and spills.

Other changes may not result in immediate impacts, but may still warrant corrective measures to minimize long-term impacts. Examples include the following:

- New NPDES permits or changes in existing NPDES permits that involve increased loading of contaminants.
- Changes in land use patterns.
- Changes in agricultural cropping, chemical application, or irrigation practices.
- Unattended soil erosion.
- Changes in other non-point discharge source activities (e.g., grazing, manure application, commercial or residential development).

- Stream or riverbed modifications.

- A watershed public education program that no longer receives adequate funding and/or that has poor stakeholder participation.

As discussed earlier, corrective measures should generally be progressive in nature. In any case, states should have the authority to require corrective measures, and to enforce all original and subsequent conditions of watershed protection. Where land in the watershed is publicly owned, state or federal land-management agencies can often help states and systems to implement corrective actions.

Following is a discussion of appropriate follow-up actions from the *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI).*

> "Deficiencies of a minor nature may require no more response than to notify the system operator of the violation and set a time frame for the operator to correct the situation. A moderate deficiency could prompt the state to require the operator to respond within 30 days with a proposed solution to the deficiency and a schedule for correcting the situation. For significant deficiencies, the state must immediately inform the system operator of the deficiency. In some cases, the deficiency may be such that a boil water notice must be issued to the customers in order to protect public health. In all cases, the state should indicate the required time frame for a response, the required action for the response, and the consequences of failing to respond. The consequences could include revocation of the operating permit, suspension of the permit until the deficiency is corrected, and fines or penalties levied against the system operator. When significant deficiencies exist, a consent agreement, administrative order, or litigation by the appropriate court may be necessary to ensure prompt and proper correction. The state should make regular and continued inspections of the facility until all deficiencies have been corrected . . .
>
> The system operator, upon receipt of the sanitary survey report, should prepare a response to the state addressing the survey findings which may include deficiencies of varying degrees of severity. The water system's response should be returned to the state within 45 days, and must be returned within the 45-day timeframe when the sanitary survey findings include significant deficiencies."

EPA's *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* discusses all aspects of sanitary surveys from survey preparation through follow-up compliance activities. In particular, the manual discusses source water vulnerability, protection, quality, and quantity and evaluation of infrastructure, including the location, design, capacity and condition of critical source water collection facilities. Citations and locations of this manual and other helpful references are listed below.

References for more detailed guidance

1. *LT2ESWTR Toolbox Guidance Manual.* USEPA, N.d.e. Forthcoming. (www.epa.gov/safewater/disinfection/lt2)

2. Guidance Manual for Conducting Sanitary Surveys of Public Water Systems; Surface Water and Ground Water Under the Direct Influence (GWUDI). USEPA, 1999. EPA 815-R-99-016. (www.epa.gov/safewater/mdbp/pdf/sansurv/sansurv.pdf)

3. Watershed Sanitary Survey Guidance Manual. Cal-Nevada Section AWWA, 1993. (www.ca-nv-awwa.org/)

4. *State Source Water Assessment and Protection Programs Guidance.* USEPA, 1997. EPA 816-R-97-009. (www.epa.gov/safewater/source/swpguid.html)

4.4.3 Approval of Watershed Control Programs

§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. *In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 3) Approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.*

Guidance

Filtered systems that develop a state-approved watershed control program designed to reduce the level of *Cryptosporidium* in the watershed can receive a 0.5-log credit towards the *Cryptosporidium* treatment requirement of LT2ESWTR. EPA has specified the elements that must be included in a watershed control program to obtain this credit. The required elements are found in §141.716(a) and are briefly described below:

- An analysis of *Cryptosporidium* vulnerability, including characterization of watershed hydrology, identification of the area of influence to be considered in future watershed surveys, identification of both potential and actual sources of *Cryptosporidium* contamination, and an assessment of the relative impact of the sources of *Cryptosporidium* on the system's source water, and an estimate of the seasonal variability of the contamination.

- An analysis of control measures that could mitigate contamination.

- A plan that establishes goals and defines and prioritizes specific actions to reduce source water *Cryptosporidium*. The plan must explain expectations, partners and their roles, resource requirements and commitments, and provide a schedule for plan implementation.

Systems must notify the state of their intent to develop a watershed control program. Notification must occur no later than 2 years before the systems' treatment compliance date listed in §141.713(c). Systems must submit a proposed initial watershed control plan and a request for plan approval. The proposal is due no later than 1 year before the systems' treatment compliance date. If the state does not respond to a system regarding approval of the watershed control program and it meets the necessary requirements, it will be considered approved. However, the state may subsequently withdraw the approval.

To meet this special primacy requirement, states must provide a description of how they will approve a watershed control program for the 0.5-log credit. A key element of the approval should be that the system provides to the state sufficient information to indicate at least 0.5-log reduction of the source water *Cryptosporidium* concentration is feasible through implementation of the watershed control program. If a watershed program is already in place, the description must include any additional measures that will be implemented to reduce source water contamination. The description of the state's approach to this

approval process should include the elements of the review process, resources, as well as criteria for granting approval.

Chapter 2 of EPA's *LT2ESWTR Toolbox Guidance Manual* provides information intended to assist systems in developing their watershed control programs and to assist states in assessing these programs. The chapter includes case studies on successful programs, system steps in applying for approval, required components of the program, and suggestions for maintenance of the program. The guidance addresses assessments of plans by the state, including an extensive checklist containing potential assessment criteria that will help states review systems' watershed control plans (Table 2.1 in the *LT2ESWTR Toolbox Guidance Manual*) and evaluations of annual status reports. The guidance also includes suggested components of a watershed sanitary survey. An adequate response to this special primacy requirement could include reference to the use of this guidance document for evaluating and approving proposed plans.

In addition to the *LT2ESWTR Toolbox Guidance Manual*, states may utilize EPA's new Watershed Initiative to help formulate effective watershed control programs. The Watershed Initiative was conceived to encourage successful community-based approaches to restore, preserve, and protect the nation's watersheds. This is a competitive grant program that provides funding to watershed organizations to encourage the protection and restoration of water resources. EPA plans to select up to 20 watersheds throughout the country for grants to support promising watershed-based approaches to improving water quality. More information on the program as well as criteria for nomination materials and the process for applying for these grant monies are available through the Watershed Initiative Web site indicated below.

EPA is developing a strategy for Waterborne Microbial Disease Control. Objectives of the strategy are to address all important sources of contamination, anticipate emerging problems, and use program and research activities to unite the influences of both the SDWA and the Clean Water Act on microbial contamination of the nation's waters. A presentation titled, "Developing a Strategy for Waterborne Microbial Disease Control," from the November 6, 2001, Waterborne Microbial Disease Stakeholder Meeting is available at the Web site provided below.

References for more detailed guidance

1. *LT2ESWTR Toolbox Guidance Manual.* USEPA, N.d.c. Forthcoming. (www.epa.gov/safewater/disinfection/lt2)

2. EPA Watershed Initiative, as proposed in 67 *FR* 36172, January 15, 2002. (www.epa.gov/owowwtr1/watershed/initiative/background.html)

3. *Developing a Strategy for Waterborne Microbial Disease Control.* USEPA, 2002. (www.epa.gov/ost/humanhealth/microbial/proceedings/strategy/)

4.4.4 Establishment of Protocols for Approving Removal Credits Under the Demonstration of Performance Toolbox Option

§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 4) Approve protocols for demonstration of performance treatment credits in the microbial toolbox.

Guidance

As discussed in detail in section 3.8.8, when a system can demonstrate that a plant (or a unit process within a plant) achieves a *Cryptosporidium* removal efficiency greater than the presumptive credit specified in the §141.711 and §§141.715 through 141.719 the system may be able to receive a higher *Cryptosporidium* treatment credit based on site-specific testing with a state-approved protocol. The treatment plant (or a unit process within a plant) must reliably achieve a higher level of *Cryptosporidium* removal on a continuing basis. States may also award a lower level of *Cryptosporidium* treatment credit to a system if the state determines, based on site-specific information, that a plant or a unit process within a plant achieves a *Cryptosporidium* removal efficiency less than a presumptive credit specified in the LT2ESWTR.

The demonstration of performance toolbox option applies to physical treatment processes including presedimentation, coagulation/flocculation, sedimentation, filtration (including bank filtration and secondary filtration), and two-stage softening. Treatment credit for disinfection processes is based on system performance (i.e., CT values).

Since demonstration of performance applies to physical removal processes at a treatment plant, systems may not claim credit for the toolbox options listed below if that component is included in the demonstration of performance credit.

- Presedimentation
- Two-stage lime softening
- Bank filtration
- Combined or individual filter performance
- Membrane filters
- Bag and cartridge filters
- Second stage filtration

Additionally, some treatment options may enhance *Cryptosporidium* treatment while reducing the effectiveness of other aspects of treatment. For example, under certain circumstances, changes in the coagulation, flocculation, and/or sedimentation processes that result in better sedimentation performance may interfere with effective performance of the filters causing short filter runs or reduced filter removal efficiency. The resulting overall performance of the plant may not be an improvement over the presumptive credit. Therefore, systems and states should carefully evaluate the overall treatment process in addition to the portion addressed in the demonstration of performance.

States must establish criteria for determining how additional credits will be granted. States also have the authority to request additional information not specified by the Rule to document that systems are in compliance [§141.718(c)(3)]. The demonstration of performance process for microbial treatment is discussed in Chapter 12 of the *LT2ESWTR Toolbox Guidance Manual*. Chapter 12 discusses critical aspects of developing and administering a demonstration of performance process, including criteria development and evaluation, testing protocol, monitoring, and reporting. States are encouraged to use the manual in preparing their demonstration of performance program and primacy revision applications.

Systems serving 10,000 people or more must report the results of their demonstration of performance testing to the primacy agency by April 1, 2012, October 1, 2012, or October 1, 2013 (depending on system size). Systems serving fewer than 10,000 people must report the results of their demonstration of performance testing to the primacy agency by October 1, 2014. If states are interested in this demonstration of performance toolbox option, state primacy regulations should be developed, reviewed, and approved in advance of these deadlines to allow systems adequate time to pursue the option.

References for more detailed guidance

1. *LT2ESWTR Toolbox Guidance Manual.* USEPA, N.d.e. Forthcoming. (www.epa.gov/safewater/disinfection/lt2)

4.4.5 Establishment of Protocols for Approving Alternative Ozone and Chlorine Dioxide CT Values

§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 5) Approve protocols for alternative ozone and chlorine dioxide CT values in the microbial toolbox.

Guidance

Systems that use chlorine dioxide or ozone may receive inactivation credit under LT2ESWTR based on CT values. To receive treatment credit, systems must measure the water temperature, disinfectant contact time, and residual disinfectant concentration at least once each day and determine the log inactivation credit using the CT Tables in §141.720(b). Specific criteria are as follows:

- The temperature of the disinfected water must be measured at least once per day at each residual disinfectant concentration sampling point.
- The disinfectant contact time (T) must be determined for each day during peak hourly flow.
- The residual disinfectant concentration (C) of the water before or at the first customer must be measured each day during peak hourly flow.
- The CT Tables in §141.720(b) are used to determine *Cryptosporidium* log inactivation credit based on the water temperature and the product of disinfectant concentration and CT.

The LT2ESWTR allows states to approve alternative CT values for chlorine dioxide and ozone on a site-specific basis [§141.720]. Inactivation rates may be sensitive to water quality and operational conditions at individual systems. Therefore, states may allow systems to perform a site-specific inactivation study to generate CT tables specific to their facility. The study would involve measuring actual *Cryptosporidium* inactivation performance under site conditions. If accepted by the state, the system would then be required to meet the CT values established in the site-specific inactivation study and maintain the operating conditions used in the site-specific study. Guidance on site-specific studies is provided in Appendix A of the *LT2ESWTR Toolbox Guidance Manual.*

States that intend to approve alternative CT values for systems must describe in their primacy application what protocols they will require for site-specific studies.

References for more detailed guidance

1. *LT2ESWTR Toolbox Guidance Manual.* USEPA, N.d.e. Forthcoming. (www.epa.gov/safewater/disinfection/lt2)

4.4.6 Establishment of Alternative Approach to UV Reactor Validation Testing

§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 6) Approve an alternative approach to UV reactor validation testing in the microbial toolbox.

Guidance

The LT2ESTWR requires that systems use UV reactors that have undergone validation testing to determine the operating conditions under which the required UV dose will be delivered [§141.720(d)(2)]. The operating conditions must include flow, UV intensity as measured by a UV sensor, and UV lamp status. The following specific factors, as described in §141.720(d)(2)(i), must be addressed when determining the operating conditions:

- 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.
- Inlet and outlet piping or channel configurations of the UV reactor.

The LT2ESTWR also allows states to approve an alternative approach to validation testing [§141.720(d)(2)(iii)]. States that intend to approve an alternative approach must describe in their primacy application how they will determine whether the alternative approach will assess reactor performance at least as well as the validation approach in the Rule. This flexibility was included to allow consideration of new technology developments that were not widely accepted at the time that this rule was written. Acceptance of an alternative approach should reflect EPA guidance and/or peer reviewed research and be consistent with generally accepted engineering practices for the treatment scenario under consideration.

For example, computational fluid dynamics (CFD) modeling has been used to estimate the UV dose distribution in specific reactor configurations. However, at the time that the LT2ESWTR was developed, CFD modeling was generally regarded by regulators as insufficient to replace full-scale reactor testing because uncertainty and error ranges for CFD models are not known. Also, synthetic microspheres may someday be useful as replacements for challenge microorganisms that could be used in full-scale validation testing.

States should note that UV reactors previously validated under certain existing protocols (i.e., prior to publication of this document) may receive log inactivation credit. The validation test must provide data on UV dose delivery and monitoring for a documented UV reactor and the proper analysis of those data must relate the measured performance to the required level of pathogen log inactivation credit. Acceptable protocols include the Austrian Standards ÖNORM M 5873-1 and M 5873-2, and the German Guideline DVGW W294. UV reactors certified by DVGW and ÖNORM for a *B. subtilis* RED of 40 mJ/cm2 can be granted 3.0-log *Cryptosporidium* and 3.0-log *Giardia* inactivation credit (DVGW 1997, ÖNORM 2003).

However, validation under NWRI/AwwaRF Guidelines and NSF Standard 55 (NWRI/AwwaRF 2003, NSF 2002) may not meet the requirements of the Rule. States that use NWRI/AwwaRF Guidelines and NSF Standard 55 should describe how these validations would be evaluated to ensure that the requirements of the Rule are met.

References for more detailed guidance

1. *Ultraviolet Disinfection Guidance Manual*. USEPA, 2006. EPA 815-R-06-007. (www.epa.gov/safewater/disinfection/lt2)

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Section 5
SDWIS Reporting and SNC Definitions

Note: This section is under development.

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Section 6

Public Notification and Consumer Confidence Report Examples

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This section provides examples of violations that systems may incur under the LT2ESWTR. These examples address the public notification and CCR requirements for systems that incur these kinds of violations. Public notification and notification in the CCR are required follow-up activities for violations of the NPDWR. Also included in the examples are sample public notices and sample excerpts from CCR reports that would meet these public notification and CCR requirements. In the public notification samples, the language in italics is required in Appendix B to Subpart Q of §141.211.

Issue 1: Failure to Take Action on Uncovered Finished Water Reservoir

System Description - System A

System A is a Subpart H system serving 12,000 people. The system has five finished water reservoirs, two of which are uncovered.

Situation

On April 1, 2008, System A submits plans to the state detailing how and when it plans to cover its two uncovered finished water reservoirs. Systems are required to have a cover or treatment in place for all uncovered finished water reservoirs by April 1, 2009 or on a schedule approved by the state. However, System A does not cover its finished water reservoirs until January 27, 2010, returning to compliance with the LT2ESWTR one year after the schedule submitted to the state.

Public Notification and CCR Requirements

System A has committed a TT violation as a result of the system's failure to have both of its uncovered finished water reservoirs covered by April 1, 2009. The system could have chosen to either cover the reservoir or treat the discharge from its uncovered finished water reservoirs to achieve inactivation and/or removal of 4.0-log virus, 3.0-log *Giardia lamblia*, and 2.0-log *Cryptosporidium* by the April 1, 2009 compliance date. System A also could have asked the state to approve an alternative schedule. However, since System A failed to implement any of the above options with regard to its finished water reservoirs before the April 1, 2009 deadline, the system is in violation of the LT2ESWTR. This is a TT violation and requires Tier 2 public notification. The system must provide public notification within 30 days of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that may not have received the information by mail or the direct delivery method used. For any unresolved violation following an initial Tier 2 notice, notice must be repeated every 3 months for as long as the violation persists. The system was aware of the violation on April 1, 2009. Repeat public notification would be required in this example until the violation is resolved on January 27, 2010.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-1.

All TT violations must also be included in the system's annual CCR. An explanation of how the system returned to compliance could also be included. An example of a report of this violation that could be used in the system's CCR is shown in Example 6-2.

Example 6-1. Example Tier 2 Public Notification for Failure to Take Action on Uncovered Finished Water Reservoir

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
System A Failed to Cover the Uncovered Finished Water Reservoirs by the Required Date

Our water system recently violated a standard that requires all finished water reservoirs to be covered or the discharge from the reservoirs to be treated. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

We were required to cover or treat the discharge of all uncovered finished water reservoirs by April 1, 2009. Although we did not cover or treat the discharge of our uncovered finished water reservoirs by this date, we are developing plans to cover them. We expect to have them covered by the end of January 2010.

What should I do?

There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may be at increased risk and should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1 (800) 426-4791. If you have specific health concerns, consult your doctor.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

An uncovered reservoir used to store treated water is susceptible to contamination from animals, such as birds or insects. Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

What is being done?

We have initiated the project to cover the uncovered finished water storage reservoirs. We expect to have the reservoirs covered by the end of January 2010. Until our finished water reservoirs are covered, you will receive a notice similar to this every 3 months.

For more information, please contact John Johnson, manager of System A, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System A.

State Water System ID# GA1234582. Sent: 4/15/2009

Example 6-2. Example of a Notice in the CCR for Failure to Take Action on Uncovered Finished Water Reservoir

Water Quality Data

Contaminant	MCL/ MRDL/ TT	MCLG	Value	Date	Violation	Source
Giardia lamblia, Heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium*	TT	0		April 2009	Yes*	Sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

*System A incurred a treatment technique violation for failing to cover or treat the discharge from its uncovered finished water storage reservoirs by April 1, 2009. More information about this violation is provided in the violation section.

Violation

- We had begun the project but were unable to meet the deadline to cover our uncovered finished water storage reservoirs. All uncovered finished water storage reservoirs are required to be covered or the discharge treated by April 1, 2009. We did not have a state-approved schedule in place to extend the deadline. The system is planning to complete the project to install covers on the reservoirs in January 2010.

  An uncovered reservoir used to store treated water is susceptible to contamination from animals, such as birds. Inadequately treated water or treated water that is contaminated may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Issue 2: Failure to Notify the State before Making a Significant Change in Disinfection Practice

System Description - System B

System B is a large Subpart H system serving 109,000 people. It currently uses a conventional filtration treatment plant as defined in §141.2 and chlorinates its water at the entry to the presedimentation basin and after the filtration process. System B created a disinfection profile under §141.708.

Situation

On January 1, 2010, System B modifies its disinfection process by eliminating the presedimentation basin chlorine application point and increasing the post-filtration chlorine dose. The PWS developed a disinfection profile that contains all the elements described in §141.708(a)(1) through (3), however, the system did not submit the plan to the state before making the change. System B submitted the plan to the state on March 1, 2010.

Public Notification and CCR Requirements

Although System B appropriately prepared the necessary significant disinfection practice modification plan, it did not notify the state prior to changing disinfection practices. System B has committed a monitoring and reporting (M/R) violation as a result of the system's failure to notify the state prior to making a significant change to its treatment process. This M/R violation requires Tier 3 public notification, unless the state requires a higher tier notification. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System B is a CWS, it could use the CCR to inform the public of the Tier 3 violation if the CCR is released within 1 year of the system learning of the violations. For this particular example, the system became aware of the violation on February 1, 2010 and returned to compliance on March 1, 2010. The public could therefore be informed of the violation in the CCR produced for calendar year 2010 if the CCR is released prior to February 1, 2011 (the CCR for calendar year 2010 is required to be released by July 1, 2011, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, if public notification is provided by other means, this violation would still have to be reported by the system in the CCR produced for calendar year 2010, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-3. An example of a report of these violations in the CCR is shown in Example 6-4.

Example 6-3. Example Tier 3 Public Notification for Failure to Receive Approval Before Making a Significant Change in Disinfection Practice

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
System B Failed to Receive Approval Before Making a Significant Change to our Disinfection Practice

Our water system recently failed to notify the state prior to significantly modifying our disinfection practices. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

On January 1, 2010, we made some changes at the water treatment plant to reduce disinfection byproducts in the distribution system. We stopped chlorinating at the presedimenation basin and increased the amount of chlorine we add after the water is filtered. This is considered a significant change to our disinfection practice and we were required to notify the state before making the change. We prepared a plan with specific information on proposed changes to our disinfection practices, including a description of the proposed change, specific disinfection records, and an analysis of how the proposed change would affect the levels of disinfection in our system. However, we did not submit a copy of the report to the state before making any changes to our disinfection practices.

What should I do?

There is nothing you need to do. Although this change modified our treatment process, our facility continues to provide more than the minimum required inactivation treatment for disease-causing organisms.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

This change to our disinfection practices without notifying the state did not adversely impact our water quality and we have met all treatment requirements. Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. However, we are not aware of any health effects on you, our customer, as a result of this modification.

What is being done?

We submitted our plans to the state on March 1, 2010. The state approved the changes to disinfection process on April 1, 2010.

For more information, please contact John Johnson, manager of System B, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System B.

State Water System ID# GA1234582. Sent: April 10, 2010

Example 6-4. Example of a Notice in the CCR for Failure to Notify the State before Making a Significant Change in Disinfection Practice

Violation

- On January 1, 2010 we stopped adding chlorine to the early stages of our treatment process and increased the amount of chlorine we add before the water is distributed to consumers. We prepared a plan with specific information on the proposed changes, including a description of the proposed changes, specific disinfection records, and an analysis of how the proposed change would affect the levels of disinfection in our system. However we did not submit a copy of the report to the state before making the changes.

  A change to our disinfection practices without state approval did not adversely impact our water quality and we continue to meet all treatment requirements. Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. However, we are not aware of any health effects that occurred as a result of this modification.

  We submitted our plans on March 1, 2010. The state approved the changes to disinfection process on April 1, 2010. This violation is now resolved.

Issue 3: Failure to Provide the Level of Treatment Appropriate for Bin Classification

System Description - System C

System C is a small Subpart H system using surface water and serving 7,500 people. It currently uses a conventional filtration treatment plant as defined in §141.2 and uses chlorine as its primary disinfectant.

Situation

System C, which monitors for *Cryptosporidium*, meets its source water monitoring requirements since it begins 24 months of monthly source water monitoring by April 1, 2010. System C finishes this monthly monitoring for its initial round of source water monitoring by April 1, 2012. The system determines that its *Cryptosporidium* bin concentration is 0.9 oocysts/L, which classifies it as Bin 2. System C therefore needs to provide an additional 1.0-log of *Cryptosporidium* treatment by October 1, 2014 or be in compliance with a state-approved alternative schedule. System C chooses to install UV disinfection to achieve the necessary treatment credits. Since UV will meet *Giardia* and *Cryptosporidium* requirements, System C may be able to decrease the amount of chlorine currently used. The system is required to submit its plans to the state for approval. After receiving approval of its plan from the state, System C proceeds to install and operate its additional treatment. On April 1, 2015, System C installs and begins operating UV disinfection applied as the last step of treatment.

Public Notification and CCR Requirements

System C has committed a TT violation. The required treatment was not installed and operational prior to the compliance date of October 1, 2014. Treatment should have been installed by October 1, 2014. The system could have been granted a 2 year extension, but in this example it was not. This is a TT violation and requires Tier 2 public notification. The system must provide public notification within 30 days of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. For any unresolved violation following an initial Tier 2 notice, notice must be repeated every 3 months for as long as the violation persists. System C became aware of the violation on November 2, 2014. Repeat public notification is required in this instance since the violation was not resolved until April, 1 2015.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-5.

All TT violations must also be included in the system's annual CCR. An explanation of how the system returned to compliance could also be included. An example of a report of this violation that could be used in the system's CCR is shown in Example 6-6.

Example 6-5. Example Tier 2 Public Notification for Failure to Provide the Level of Treatment Appropriate for Bin Classification

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
System C Failed to Provide the Appropriate Level of Treatment Within the Required Time Frame

Our water system failed to install our new UV disinfection system by the required treatment date of October 1, 2014. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

We are required to install and have additional treatment operating to provide additional *Cryptosporidium* inactivation or removal by October 1, 2014. We anticipate the system will be operational in April, 2015.

What should I do?

There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may be at increased risk and should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1 (800) 426-4791. If you have specific health concerns, consult your doctor.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours.

Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

What is being done?

We are currently under construction for the project and we expect to have the additional treatment operating by April, 2015.

For more information, please contact John Johnson, manager of System C, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System C.

State Water System ID# GA1234582. Sent: November 20, 2014

Example 6-6. Example of a Notice in the CCR for Failure to Provide the Level of Treatment Appropriate for Bin Classification

Water Quality Data

Contaminant	MCL/ MRDL/ TT	MCLG	Value	Date	Violation	Source
Cryptosporidium	TT	0		October 2014	Yes*	

*System C incurred a treatment technique violation for failing to provide the level of treatment appropriate for our system's treatment classification. More information about this violation is provided in the violation section.

Violation

- Our water system failed to provide the level of treatment appropriate for our system's treatment classification. We were required to install and have additional treatment operating to provide additional *Cryptosporidium* removal by October 1, 2014. The system became operational in April, 2015. You were notified of this violation in November, 2014 and again in February, 2015.
- Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Issue 4: Failure to Conduct Source Water Monitoring (Initial or Second Round)

System Description - System D

System D is a small Subpart H system serving 3,000 people that uses a small lake as a source. Small systems that provide filtration or are required to provide filtration must initially conduct 1 year of bi-weekly sampling (one sample every 2 weeks) for *E. coli*, beginning October 1, 2008. These systems are triggered into *Cryptosporidium* monitoring only if the initial *E. coli* monitoring indicates a mean concentration greater than 10 *E. coli*/100 mL for systems using a reservoir or lake as their primary source. The small systems that exceed these *E. coli* trigger values must either monitor for *Cryptosporidium* twice-per-month for 1 year, or at least monthly for 2 years beginning April 1, 2010.

Situation

System D begins conducting *E. coli* monitoring on October 1, 2008. After 1 year of monitoring, System D determines that its annual mean *E. coli* concentration is 31 *E. coli*/100 mL. System E does not conduct any further source water monitoring and does not intend to install TTs to achieve 5.5-log of treatment for *Cryptosporidium*.

Public Notification and CCR Requirements

System D has committed an M/R violation during the first 3 months for failure to collect three or more *Cryptosporidium* samples and report the results to EPA or the state. Based on the annual mean concentration of *E. coli* determined by the initial source water monitoring (31 *E. coli*/100 mL is greater than 10 *E. coli*/100 mL), System D is required to begin source water monitoring for *Cryptosporidium* at least monthly for 2 years no later than April 1, 2010. Failing to take three or more samples is an M/R violation that required special notice at the same level as Tier 2 public notice within 30 days of learning of the violation. The system became aware of the violation on July 12, 2010. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered. Repeat notices must be provided every 3 months as long as the violation exists.

An example of a public notice that fulfills the public notification requirements is shown in Example 6-7. An example of a report of this violation in the CCR is shown in Example 6-8.

Example 6-7. Example Tier 2 Public Notification for Failure to Conduct Source Water Monitoring (Initial or Second Round) and Report the Results

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Monitoring and Reporting Requirements Not Met for System D

We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at Plant A is sufficient to adequately treat the water for *Cryptosporidium*. We are required to complete this monitoring and make this determination by April 1, 2012. We did not monitor or test on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, October 1, 2014.

What should I do?

There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriates means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

What was done?

On August 2, 2010, we will begin collecting the required source water monitoring samples.

For more information, please contact John Johnson, manager of System D, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System D.

State Water System ID# GA1234589. Sent: July 20, 2010

Example 6-8. Example of a Notice in the CCR for Failure to Conduct Source Water Monitoring (Initial or Second Round) and Report the Results

Violation

- Our water system recently failed to conduct additional source water monitoring as required. We were required to begin source water monitoring for *Cryptosporidium* at least once each month for 2 years no later than April 1, 2010. On August 2, 2010 we began collecting the required source water monitoring samples.
- Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Issue 5: Failure to Submit a Source Water Monitoring Schedule 3 Months Prior to Date System is Required to Begin Monitoring

System Description - System E

System E is an unfiltered Subpart H system serving 2,500 people that meets all the criteria for avoiding filtration found in §141.71.

Situation

System E submits a sampling schedule to the state for the initial round of source water monitoring January 1, 2010, however, it forgets about the second round of source water monitoring that is required and does not submit a sampling schedule. On March 1, 2019, 1 month before System E is required to begin the second round of source water monitoring, a neighboring water system reminds System E that it is required to conduct a second round of source water monitoring. System E develops a sampling schedule and fulfills its source water M/R requirements in accordance with the schedule in §141.701(c).

Public Notification and CCR Requirements

System E has committed an M/R violation for failing to submit a sampling schedule to the state for the second round of source water monitoring before January 1, 2019 (i.e., 3 months before the second round of source water monitoring), even if it conducts the required monitoring and reported the results to the state. This is an M/R violation and the system must provide Tier 3 public notice of the violation. The system must provide public notification within 1 year of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System E is a CWS, it could use the CCR to inform the public of the Tier 3 violations if the CCR is released within 1 year of the system's learning of the violations. For this particular example, the system became aware of the M/R violation on March 1, 2019. The public could therefore be informed of the violation in the CCR produced for calendar year 2019 if the CCR is released prior to March 1, 2020 (the CCR for calendar year 2019 is required to be released by July 1, 2020, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, whether public notification is provided by other means, the violation would still have to be reported by the system in the CCR produced for calendar year 2019, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-9. An example of a report of this violation in the CCR is shown in Example 6-10.

Example 6-9. Example Tier 3 Public Notification for Failure to Submit a Source Water Monitoring Schedule 3 Months Prior to Date System is Required to Begin Monitoring

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Monitoring and Reporting Requirements Not Met for System E

Our water system recently failed to submit a source water monitoring schedule 3 months before the date we were required to begin the monitoring. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct the situation.

What should I do?

There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What was done?

On March 10, 2019, 1 month before we were required to begin the source water monitoring, we developed a monitoring schedule and fulfilled our source water monitoring and reporting requirements as required.

For more information, please contact John Johnson, manager of System E, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System E.

State Water System ID# GA1234589. Sent: March 20, 2019

Example 6-10. Example of a Notice in the CCR for Failure to Submit a Source Water Monitoring Schedule 3 Months Prior to Date System is Required to Begin Monitoring

Violation

- We failed to submit a source water monitoring schedule 3 months before the date we were required to begin the source water monitoring.

- On March 10, 2019, 1 month before we were required to begin the source water monitoring, we developed a sampling schedule and fulfilled our source water monitoring and reporting requirements as required.

Issue 6: Failure to Collect Samples in Accordance with Sampling Schedule

System Description - System F

System F is a small filtered Subpart H system serving 9,000 people.

Situation

System F has two qualified operators. While System F is conducting its required source water monitoring for *E. coli*, the operator that usually collects the bi-weekly *E. coli* sample goes on vacation for 1 month. System F's other operator decides to wait until his/her colleague returns to work to continue the required source water monitoring instead of collecting the samples themselves. Therefore, System F does not collect samples for the month of December 2008.

Public Notification and CCR Requirements

System F has committed an M/R violation for failing to sample within 2 days before, or 2 days after the scheduled date. The LT2ESWTR allows systems that face "extreme conditions," situations "that may pose danger to the sampler," "unforeseen" situations, or situations that "cannot be avoided" to sample as close to the scheduled date as is feasible and to submit an explanation for the alternative sampling date with the analytical results. A vacationing operator does not satisfy any of these scenarios. Since the system failed to collect the sample, this is an M/R violation and the system must provide Tier 3 public notice of the violation. The system must contact the state to revise their sampling schedule by adding dates for missed samples. Notification must be provided by mail or other direct delivery method (such as hand delivery) and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System F is a CWS, it could use the CCR to inform the public of the Tier 3 violation if the CCR is released within 1 year of the system's learning of the violations. For this particular example, the system became aware of the M/R violation on January 1, 2009. The public could therefore be informed of the violation in the CCR produced for calendar year 2009 if the CCR is released prior to January 1, 2010 (the CCR for calendar year 2009 is required to be released by July 1, 2010, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, whether public notification is provided by other means, the violation would still have to be reported by the system in the CCR produced for calendar year 2009, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-11. An example of a report of this violation in the CCR is shown in Example 6-12.

Example 6-11. Example Tier 3 Public Notification for Failure to Collect Samples in Accordance with Sampling Schedule

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Monitoring and Reporting Requirements Not Met for System F

Our system is required to collect one year of bi-weekly source water samples. In the month of December 2008, we failed to collect the source water samples. We are required to collect these samples to determine if additional treatment of our source water is necessary. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

What should I do?

There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What was done?

On January 10, 2009, we submitted a request to the state to sample our source water next December so that we will have representative samples from each month. The state approved our request for this change on January 24, 2009. This adjusted schedule will not affect our ability to determine if more treatment is needed, or to install such treatment within the required time frame, if it is necessary.

For more information, please contact John Johnson, manager of System F, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System F.

State Water System ID# GA1234589. Sent: January 26, 2009

Example 6-12. Example of a Notice in the CCR for Failure to Collect Samples in Accordance with Sampling Schedule

Violation

- We failed to collect two source water samples in December 2008 in accordance with our sampling schedule. Our system is required to collect bi-weekly source water samples.
- In January 2009, we negotiated with the state a schedule for sampling in December 2009. These samples were collected as required and no additional treatment needs are necessary for our system.

Issue 7: Failure to Sample at an Appropriate Location

System Description - System G

System G is a large Subpart H system serving 15,000 people. System G uses bank filtration to meet the source water filtration requirement of §141.173(b). The water body adjacent to the collector well is a large river.

Situation

On April 1, 2008, System G begins to conduct monthly monitoring for *Cryptosporidium*. System G collects its first two samples from the well, after bank filtration. The system source water monitoring plan indicated it would collect samples from the river. The state identifies the sample location error and directs the system to begin sampling from the adjacent river, beginning June 1, 2008. The state further directs the system to collect source water samples for April and May of 2010 (at the end of the 2-year monitoring period) to ensure representative samples are obtained for each calendar month for 2 years.

Public Notification and CCR Requirements

System G has committed an M/R violation. Systems using bank filtration as an alternative filtration to meet the *Giardia lamblia* and virus inactivation and *Cryptosporidium* removal requirements of §414.173(b) or 141.552(a) must take surface water samples prior to bank filtration. Only unfiltered GWUDI systems meeting the filtration avoidance criteria in §141.71 and bank filtered systems that receive no treatment credit for bank filtration can collect samples from the well (after bank filtration). This is an M/R violation and the system must provide Tier 3 public notice of the violation. The system must provide notification within 1 year of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System G is a CWS, it could use the CCR to inform the public of the Tier 3 violations if the CCR is released within 1 year of the system's learning of the violation. For this particular example, the system became aware of the violation on May 10, 2008. The public could therefore be informed of the violation in the CCR produced for calendar year 2008 if the CCR is released prior to May 10, 2009 (the CCR for calendar year 2008 is required to be released by July 1, 2009, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, whether public notification is provided by other means, this violation would still have to be reported by the system in the CCR produced for calendar year 2008, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-13. An example of a report of this violation in the CCR is shown in Example 6-14.

Example 6-13. Example Tier 3 Public Notification for Failure to Sample at an Appropriate Location

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
System G Did Not Collect Source Water Samples at the Correct Location

Our system is required to collect source water samples once each month for two years. These samples are to be collected prior to any treatment and will be used to determine if additional treatment is necessary. On April 1, 2008, we began to conduct the required monitoring for *Cryptosporidium*. However, the first two samples were collected at the wrong location. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

What should I do?

There is nothing you need to do. You do not need to boil your water or take other corrective actions. This monitoring violation did not affect our water treatment system and was only intended to indicate the quality of our source water before any treatment is applied. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What was done?

On May 10, 2008, we determined the samples were collected at the wrong location. The sampling location has been corrected and the samples will now be collected at the appropriate location. This situation is now resolved.

For more information, please contact John Johnson, manager of System G, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by System G.

State Water System ID# GA1234589. Sent: May 15, 2008

Example 6-14. Example of a Notice in the CCR for Failure to Sample at an Appropriate Location

Violation

- We failed to collect the first two source water monitoring samples at the appropriate location. Our system uses bank filtration to meet the *Giardia lamblia* and virus inactivation and *Cryptosporidium* removal requirements and must take surface water samples. On April 1, 2008, we began to conduct monitoring for *Cryptosporidium*, however, the first two samples collected were collected at the wrong location in the system.
- On May 10, 2008, we determined the samples were collected at the wrong location. The sampling location has been corrected and the samples will now be collected at the appropriate location. The situation is now resolved. This issue had no affect on the treatment system or the quality of the water we provide.

Appendix A

Primacy Revision Crosswalk

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SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
SUBPART A–GENERAL			
§141.2 DEFINITIONS			
Bag filters	§141.2		
Bank filtration	§141.2		
Cartridge filters	§141.2		
Flowing stream	§141.2		
Lake/reservoir	§141.2		
Membrane filtration	§141.2		
Plant intake	§141.2		
Presedimentation	§141.2		
Two-stage lime softening	§141.2		
Uncovered finished water reservoir	§141.2		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
SUBPART Q–PUBLIC NOTIFICATION OF DRINKING WATER VIOLATIONS			
§141.211 SPECIAL NOTICE FOR REPEATED FAILURE TO CONDUCT MONITORING OF THE SOURCE WATER FOR *CRYPTOSPORIDIUM* AND OR FAILURE TO DETERMINE BIN CLASSIFICATION OR MEAN *CRYPTOSPORIDIUM* LEVEL.			
The owner or operator of a community or non-community water system that is required to monitor source water under § 141.701 must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any 3 months of monitoring as specified in § 141.701(c). The notice must be repeated as specified in § 141.203(b).	§141.211(a)		
Systems must give special notice for failure to determine bin classification or mean *Cryptosporidium* level	§141.211(b)		
The public notice must follow the requirements for a Tier 2 public notice prescribed in § 141.203(c). The public notice must be presented as required in § 141.205(c).	§141.211(c)		
Mandatory language must be included in the special notice. The special notice for repeated failure to conduct monitoring must contain the following language: We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at the (treatment plant name) is sufficient to adequately remove *Cryptosporidium* from your drinking water. We are required to complete this monitoring and make this determination by (required bin determination date). We ''did not monitor or test'' or ''did not complete all monitoring or testing'' on schedule and, therefore, we may	§141.211(d)(1)-(3)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate *Cryptosporidium* removal. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, (date). For more information, please call (name of water system contact) of (name of water system) at (phone number). The special notice for failure to determine bin classification or mean Cryptosporidium level must contain the following language: We are required to monitor the source of your drinking water for Cryptosporidium in order to determine by (date) whether water treatment at the (treatment plant name) is sufficient to adequately remove Cryptosporidium from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of (date). For more information, please call (name of water system contact) of (name of water system) at (phone number). Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.			

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
APPENDIX A TO SUBPART Q OF PART 141–NPDWR VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE			
10. LT2EWTR violations MCL/MRDL/TT Violations Tier of Public Notice Required — Citation 2 — 141.710–141.720 Monitoring and Testing Procedure Violations Tier of Public Notice Required — Citation 2*, 3 — 141.701–141.705; 141.708–141.709 * Failure to collect at least 3 samples for *Cryptosporidium* analysis is a Tier 2 violation requiring special notice.	Appendix A I.A.10		
SUBPART W–ENHANCED FILTRATION AND DISINFECTION FOR *CRYPTOSPORIDIUM*			
§141.700 GENERAL REQUIREMENTS			
The requirements of this subpart W are NPDWR. The regulations in this subpart establish or extend TT requirements in lieu of MCLs for *Cryptosporidium*. These requirements are in addition to requirements for filtration and disinfection in subparts H, P, and T of this part.	§141.700(a)		
Applicability. The requirements of this subpart apply to all subpart H systems, which are PWSs supplied by a surface water source and PWSs supplied by a ground water source under the direct influence of surface water.	§141.700(b)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Wholesale systems, as defined in §141.2, must comply with the requirements of this subpart based on the population of the largest system in the combined distribution system.	§141.700(b)(1)		
The requirements of this subpart for filtered systems apply to systems required by NPDWR to provide filtration treatment, whether or not the system is currently operating a filtration system.	§141.700(b)(2)		
The requirements of this subpart for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in subparts H, P, and T of this part, as applicable.	§141.700(b)(3)		
Requirements. Systems subject to this subpart must comply with the following requirements:	§141.700(c)		
Systems must 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*, and turbidity as described in §§141.701 through 141.706, to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.	§141.700(c)(1)		
Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in §§141.708 through 141.709.	§141.700(c)(2)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in §141.710 and provide additional treatment for *Cryptosporidium*, if required, as described in §141.711. All unfiltered systems must provide treatment for *Cryptosporidium* as described in §141.712. Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in §141.713.	§141.700(c)(3)		
Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility or treat the discharge from the facility as described in §141.714.	§141.700(c)(4)		
Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in §§141.715 through 141.720.	§141.700(c)(5)		
Systems must comply with the applicable recordkeeping and reporting requirements described in §§141.721 through 141.722.	§141.700(c)(6)		
Systems must address significant deficiencies identified in sanitary surveys performed by EPA as described in §141.723.	§141.700(c)(7)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
§141.701 SOURCE WATER MONITORING			
Systems must conduct the following monitoring on the schedule in paragraph (c) of this section unless they meet the monitoring exemption criteria in paragraph (d) of this section.	§141.701(a)		
Filtered systems serving at least 10,000 people must sample their source water for *Cryptosporidium, E. coli,* and turbidity at least monthly for 24 months.	§141.701(a)(1)		
Unfiltered systems serving at least 10,000 people must sample their source water for *Cryptosporidium* at least monthly for 24 months.	§141.701(a)(2)		
Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months.	§141.701(a)(3)(i)		
A filtered system serving fewer than 10,000 people may avoid *E. coli* monitoring if the system notifies the state that it will monitor for *Cryptosporidium* as described in paragraph (a)(4) of this section. The system must notify the state no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring under § 141.701(c).	§141.701(a)(3)(ii)		
Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under paragraph (a)(3) of this section:	§141.701(a)(4)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
For systems using lake/reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/ 100 mL.	§141.701(a)(4)(i)		
For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/ 100 mL.	§141.701(a)(4)(ii)		
The system does not conduct *E. coli* monitoring as described in paragraph (a)(3) of this section.	§141.701(a)(4)(iii)		
Systems using ground water under the direct influence of surface water (GWUDI) must comply with the requirements of paragraph (a)(4) of this section based on the *E. coli* level that applies to the nearest surface water body. If no surface water body is nearby, the system must comply based on the requirements that apply to systems using lake/reservoir sources.	§141.701(a)(4)(iv)		
For filtered systems serving fewer than 10,000 people, the state may approve monitoring for an indicator other than *E. coli* under paragraph (a)(3) of this section. The state also may approve an alternative to the *E. coli* concentration in paragraph (a)(4)(i), (ii) or (iv) of this section to trigger *Cryptosporidium* monitoring. This approval by the state must be provided to the system in writing and must include the basis for the state's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in § 141.710.	§141.701(a)(5)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.	§141.701(a)(6)		
Systems may sample more frequently than required under this section if the sampling frequency is evenly spaced throughout the monitoring period.	§141.701(a)(7)		
Systems must conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in paragraph (a) of this section, unless they meet the monitoring exemption criteria in paragraph (d) of this section. Systems must conduct this monitoring on the schedule in paragraph (c) of this section.	§141.701(b)		
Systems must begin monitoring required in §141.701(a) and (b) no later than the month beginning with the date listed in this section.	§141.701(c)		
Monitoring Avoidance. Filtered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium,* equivalent to meeting the treatment requirements of Bin 4 in § 141.711.	§141.701(d)(1)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Unfiltered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 3-log *Cryptosporidium* inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L in § 141.712.	§141.701(d)(2)		
If a system chooses to provide the level of treatment in paragraph (d)(1) or (2) of this section, as applicable, rather than start source water monitoring, the system must notify the state in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under § 141.702. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the state in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in § 141.713.	§141.701(d)(3)		
Plants operating only part of the year. Systems with subpart H plants that operate for only part of the year must conduct source water monitoring in accordance with this subpart, but with the following modifications:	§141.701(e)		
Systems must sample their source water only during the months that the plant operates unless the state specifies another monitoring period based on plant operating practices.	§141.701(e)(1)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Systems with plants that operate less than six months per year and that monitor for *Cryptosporidium* must collect at least six *Cryptosporidium* samples per year during each of two years of monitoring. Samples must be evenly spaced throughout the period the plant operates.	§141.701(e)(2)		
New sources. A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under paragraph (c) of this section must monitor the new source on a schedule the state approves. Source water monitoring must meet the requirements of this subpart. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of §§ 141.710 and 141.711 or § 141.712, as applicable, for the new source on a schedule the state approves.	§141.701(f)(1)		
The requirements of § 141.701(f) apply to subpart H systems that begin operation after the monitoring start date applicable to the system's size under paragraph (c) of this section.	§141.701(f)(2)		
The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under § 141.710 or determination of the mean *Cryptosporidium* level under § 141.712, as applicable.	§141.701(f)(3)		
Failure to collect any source water sample required under this section in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of §§ 141.702 through 141.706 is a monitoring violation.	§141.701(g)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in paragraph (c) of this section to meet the initial source water monitoring requirements in paragraph (a) of this section. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in § 141.707.	§141.701(h)		
§141.702 SAMPLING SCHEDULES			
Systems required to conduct source water monitoring under § 141.701 must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.	§141.702(a)		
Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in § 141.701(c) for each round of required monitoring.	§141.702(a)(1)		
Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under § 141.701(a) to EPA electronically at *https://intranet.epa.gov/lt2/*.	§141.702(a)(2)(i)		
If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that EPA approves.	§141.702(a)(2)(ii)		
Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring § 141.701(a) to the state.	§141.702(a)(3)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Systems must submit sampling schedules for the second round of source water monitoring § 141.701(b) to the state.	§141.702(a)(4)		
If EPA or the state does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.	§141.702(a)(5)		
Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (i.e., within a five-day period around the schedule date) unless one of the conditions of paragraph (b)(1) or (2) of this section applies.	§141.702(b)		
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 must sample as close to the scheduled date as is feasible unless the state approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the state concurrent with the shipment of the sample to the laboratory.	§141.702(b)(1)		
If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in § 141.704, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.	§141.702(b)(2)(i)		

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The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the state approves an alternative resampling date. The system must submit an explanation for the delayed sampling date to the state concurrent with the shipment of the sample to the laboratory.	§141.702(b)(2)(ii)		
Systems that fail to meet the criteria of paragraph (b) of this section for any source water sample required under § 141.701 must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the state for approval prior to when the system begins collecting the missed samples.	§141.702(c)		
§141.703 SAMPLING LOCATIONS			
Systems required to conduct source water monitoring under § 141.701 must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the state may approve one set of monitoring results to be used to satisfy the requirements of § 141.701 for all plants.	§141.703(a)		
Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of paragraph (b)(2) of this section.	§141.703(b)(1)		

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The state may approve a system to collect a source water sample after chemical treatment. To grant this approval, the state must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.	§141.703(b)(2)		
Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.	§141.703(c)		
Bank filtration. Systems that receive *Cryptosporidium* treatment credit for bank filtration under § 141.173(b) or § 141.552(a), as applicable, must collect source water samples in the surface water prior to bank filtration.	§141.703(d)(1)		
Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (i.e., after bank filtration). Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under § 141.717(c).	§141.703(d)(2)		
Multiple sources. Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in paragraph (e)(1) or (2) of this section. The use of multiple sources during monitoring must be consistent with routine operational practice.	§141.703(e)		

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If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.	§141.703(e)(1)		
If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either paragraph (e)(2)(i) or (ii) of this section for sample analysis.	§141.703(e)(2)		
Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.	§141.703(e)(2)(i)		
Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.	§141.703(e)(2)(ii)		

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Additional Requirements Systems must submit a description of their sampling location(s) to the state at the same time as the sampling schedule required under § 141.702. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the state does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).	§141.703(f)		
§141.704 ANALYTICAL METHODS			
Cryptosporidium. Systems must analyze for *Cryptosporidium* using *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA* (EPA-815-R-05-002) or *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA* (EPA-815-R-05-001), which are incorporated by reference.	§141.704(a)		
Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL as generated by the methods listed in paragraph (a) of this section. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in paragraph (a) of this section, up to a packed pellet volume of at least 2 mL.	§141.704(a)(1)		
Matrix spike (MS) samples, as required by the methods in paragraph (a) of this section, must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under § 141.705.	§141.704(a)(2)(i)		

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If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.	§141.704(a)(2)(ii)		
Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.	§141.704(a)(3)		
E. coli. Systems must use methods for enumeration of *E. Coli* in source water approved in § 136.3(a) of this title.	§141.704(b)		
The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of paragraph (b)(2) of this section.	§141.704(b)(1)		
The state may approve on a case- by-case basis the holding of an *E. Coli* sample for up to 48 hours between sample collection and initiation of analysis if the state determines that analyzing an *E. Coli* sample within 30 hours is not feasible. *E. Coli* samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in § 136.3(a) of this title.	§141.704(b)(2)		
Systems must maintain samples between 0°C and 10°C during storage and transit to the laboratory.	§141.704(b)(3)		
Turbidity. Systems must use methods for turbidity measurement approved in § 141.74(a)(1).	§141.704(c)		

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§141.705 REQUIREMENTS FOR USE OF AN APPROVED LABORATORY			
Cryptosporidium. Systems must have *Cryptosporidium* samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of *Cryptosporidium* in Water or a laboratory that has been certified for *Cryptosporidium* analysis by an equivalent state laboratory certification program.	§141.705(a)		
E. coli. Any laboratory certified by the EPA, the National Environmental Laboratory Accreditation Conference or the state for total coliform or fecal coliform analysis under § 141.74 is approved for *E. Coli* analysis under this subpart when the laboratory uses the same technique for *E. Coli* that the laboratory uses for § 141.74.	§141.705(b)		
Turbidity. Measurements of turbidity must be made by a party approved by the state.	§141.705(c)		
§141.706 REPORTING SOURCE WATER MONITORING RESULTS			
Systems must report results from the source water monitoring required under § 141.701 no later than 10 days after the end of the first month following the month when the sample is collected.	§141.706(a)		
All systems serving at least 10,000 people must report the results from the initial source water monitoring required under § 141.701(a) to EPA electronically at https://intranet.epa.gov/lt2/.	§141.706(b)(1)		

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If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that EPA approves.	§141.706(b)(2)		
Systems serving fewer than 10,000 people must report results from the initial source water monitoring required under § 141.701(a) to the state.	§141.706(c)		
All systems must report results from the second round of source water monitoring required under § 141.701(b) to the state.	§141.706(d)		
Systems must report the applicable information in paragraphs (e)(1) and (2) of this section for the source water monitoring required under § 141.701.	§141.706(e)		
Systems must report the following data elements for each *Cryptosporidium* analysis: (1) PWS ID (2) Facility ID (3) Sample collection date (4) Sample type (field or matrix spike) (5) Sample volume filtered (L), to nearest 1/4 L (6) Was 100% of filtered volume examined (7) Number of oocysts counted	§141.706(e)(1)		
For matrix spike samples, systems must also report the sample volume spiked and estimated number of oocysts spiked. These data are not required for field samples.	§141.706(e)(1)(i)		

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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.	§141.706(e)(1)(ii)		
For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.	§141.706(e)(1)(iii)		
Systems must report the following data elements for each *E. coli* analysis: (1) PWS ID (2) Facility ID (3) Sample collection date (4) Analytical method number (5) Method type (6) Source type (flowing stream, lake/reservoir, GWUDI) (7) *E. coli*/100 mL (8) Turbidity (Systems serving fewer than 10,000 people that are not required to monitor for turbidity under §141.701(c) are not required to report turbidity with their *E. coli* results.)	§141.706(e)(2)		

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§141.707 GRANDFATHERING PREVIOUSLY COLLECTED DATA			
Systems may comply with the initial source water monitoring requirements of § 141.701(a) by grandfathering sample results collected before the system is required to begin monitoring (i.e., previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in this section and the state must approve.	§141.707(a)(1)		
A filtered system may grandfather *Cryptosporidium* samples to meet the requirements of § 141.701(a) when the system does not have corresponding *E. Coli* and turbidity samples. A system that grandfathers *Cryptosporidium* samples without *E. Coli* and turbidity samples is not required to collect *E. Coli* and turbidity samples when the system completes the requirements for *Cryptosporidium* monitoring under § 141.701(a).	§141.707(a)(2)		
E. coli sample analysis. The analysis of *E. Coli* samples must meet the analytical method and approved laboratory requirements of §§ 141.704 through 141.705.	§141.707(b)		
Cryptosporidium sample analysis. The analysis of *Cryptosporidium* samples must meet the criteria in this paragraph.	§141.707(c)		
Laboratories analyzed *Cryptosporidium* samples using one of the analytical methods in paragraphs (c)(1)(i) through (vi) of this section, which are incorporated by reference.	§141.707(c)(1)		
Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-002.	§141.707(c)(1)(i)		

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Method 1622: Cryptosporidium in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-001.	§141.707(c)(1)(ii)		
Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA, 2001, United States Environmental Protection Agency, EPA-821-R-01-025.	§141.707(c)(1)(iii)		
Method 1622: Cryptosporidium in Water by Filtration/IMS/FA, 2001, United States Environmental Protection Agency, EPA-821-R-01-026.	§141.707(c)(1)(iv)		
Method 1623: *Cryptosporidium and Giardia in Water by Filtration/IMS/FA*, 1999, United States Environmental Protection Agency, EPA-821-R-99-006.	§141.707(c)(1)(v)		
Method 1622: Cryptosporidium in Water by Filtration/IMS/FA, 1999, United States Environmental Protection Agency, EPA-821-R-99-001.	§141.707(c)(1)(vi)		
For each *Cryptosporidium* sample, the laboratory analyzed at least 10 L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods listed in paragraph (c)(1) of this section.	§141.707(c)(2)		
Sampling location. The sampling location must meet the conditions in § 141.703.	§141.707(d)		

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Sampling frequency. Cryptosporidium samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in § 141.702(b)(1) and (2) if the system provides documentation of the condition when reporting monitoring results.	§141.707(e)		
The state may approve grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the state specifies to ensure that the data used to comply with the initial source water monitoring requirements of § 141.701(a) are seasonally representative and unbiased.	§141.707(e)(1)		
Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems must follow the monthly averaging procedure in § 141.710(b)(5) or § 141.712(a)(3), as applicable, when calculating the bin classification for filtered systems or the mean *Cryptosporidium* concentration for unfiltered systems.	§141.707(e)(2)		
Reporting monitoring results for grandfathering. Systems that request to grandfather previously collected monitoring results must report the following information by the applicable dates listed in this paragraph. Systems serving at least 10,000 people must report this information to EPA unless the state approves reporting to the state rather than EPA. Systems serving fewer than 10,000 people must report this information to the state.	§141.707(f)		

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Systems must report that they intend to submit previously collected monitoring results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of § 141.701(a). Systems must report this information no later than the date the sampling schedule under § 141.702 is required.	§141.707(f)(1)		
Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in paragraphs (f)(2)(i) through (iv) of this section, no later than two months after the applicable date listed in § 141.701(c).	§141.707(f)(2)		
For each sample result, systems must report the applicable data elements in § 141.706.	§141.707(f)(2)(i)		
Systems must certify that the reported monitoring results include all results the system generated during the time period beginning with the first reported result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring under this subpart, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in this section.	§141.707(f)(2)(ii)		

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Systems must certify that the samples were representative of a plant's source water(s) and the source water(s) have not changed. Systems must report a description of the sampling location(s), which must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.	§141.707(f)(2)(iii)		
For *Cryptosporidium* samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (c)(1) of this section were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.	§141.707(f)(2)(iv)		
If the state determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the state may disapprove the data. Alternatively, the state may approve the previously collected data if the system reports additional source water monitoring data, as determined by the state, to ensure that the data set used under § 141.710 or § 141.712 represents average source water conditions for the system.	§141.707(g)		

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If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring under § 141.701(a) and some of the data are rejected due to not meeting the requirements of this section, systems must conduct additional monitoring to replace rejected data on a schedule the state approves. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.	§141.707(h)		
§141.708 REQUIREMENTS WHEN MAKING A SIGNIFICANT CHANGE IN DISINFECTION PRACTICE			
Following the completion of initial source water monitoring under § 141.701(a), a system that plans to make a significant change to its disinfection practice, as defined in paragraph (b) of this section, must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in § 141.709. Prior to changing the disinfection practice, the system must notify the state and must include in this notice the information in paragraphs (a)(1) through (3) of this section	§141.708(a)		
A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in § 141.709.	§141.708(a)(1)		
A description of the proposed change in disinfection practice.	§141.708(a)(2)		

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An analysis of how the proposed change will affect the current level of disinfection.	§141.708(a)(3)		
Significant changes to disinfection practice are defined as follows:	§141.708(b)		
Changes to the point of disinfection;	§141.708(b)(1)		
Changes to the disinfectant(s) used in the treatment plant;	§141.708(b)(2)		
Changes to the disinfection process; or	§141.708(b)(3)		
Any other modification identified by the state as a significant change to disinfection practice.	§141.708(b)(4)		
§141.709 DEVELOPING A PROFILE			
Systems required to develop disinfection profiles under § 141.708 must follow the requirements of this section. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire plant, based on CT99.9 values in Tables 1.1 through 1.6, 2.1 and 3.1 of § 141.74(b) as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the state.	§141.709(a)		

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Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in paragraphs (b)(1) through (4) of this section. Systems with more than one point of disinfectant application must conduct the monitoring in paragraphs (b)(1) through (4) of this section for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in § 141.74(a).	§141.709(b)		
For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the state.	§141.709(b)(1)		
For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the state.	§141.709(b)(2)		
The disinfectant contact time(s) (t) must be determined during peak hourly flow.	§141.709(b)(3)		
The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.	§141.709(b)(4)		
In lieu of conducting new monitoring under paragraph (b) of this section, systems may elect to meet the requirements of paragraphs (c)(1) or (2) of this section.	§141.709(c)		

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Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of paragraph (b) of this section may use these data to develop disinfection profiles as specified in this section if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.	§141.709(c)(1)		
Systems may use disinfection profile(s) developed under § 141.172 or §§ 141.530 through 141.536 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under § 141.172 or §§ 141.530 through 141.536 must develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.	§141.709(c)(2)		
Systems must calculate the total inactivation ratio for *Giardia lamblia* as specified in paragraphs (d)(1) through (3) of this section.	§141.709(d)		
Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (d)(1)(i) or (ii) of this section.	§141.709(d)(1)		

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Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.	§141.709(d)(1)(i)		
Determine successive $CTcalc/ CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/ CT_{99.9}$) values together to determine (Σ ($CTcalc/CT_{99.9}$)).	§141.709(d)(1)(ii)		
Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/ CT_{99.9}$) value of each segment and ($\Sigma(CTcalc/CT_{99.9})$) must be calculated using the method in paragraph (d)(1)(ii) of this section.	§141.709(d)(2)		
The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (d)(1) or (d)(2) of this section by 3.0.	§141.709(d)(3)		
Systems must calculate the log of inactivation for viruses using a protocol approved by the state.	§141.709(d)(4)		

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Systems must use the procedures specified in paragraphs (e)(1) and (2) of this section to calculate a disinfection benchmark.	§141.709(e)		
For each year of profiling data collected and calculated under paragraphs (a) through (d) of this section, systems must determine the lowest mean monthly level of both *Giardia lamblia* and virus inactivation. Systems must determine the mean *Giardia lamblia* and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly *Giardia lamblia* and virus log inactivation by the number of values calculated for that month.	§141.709(e)(1)		
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 lamblia* and virus log inactivation in each year of profiling data.	§141.709(e)(2)		
§141.710 BIN CLASSIFICATION FOR FILTERED SYSTEMS			
Following completion of the initial round of source water monitoring required under § 141.701(a), filtered systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results reported under § 141.701(a) and must follow the procedures in paragraphs (b)(1) through (5) of this section.	§141.710(a)		

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For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations	§141.710(b)(1)		
For systems that collect a total of 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.	§141.710(b)(2)		
For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.	§141.710(b)(3)		
For systems with plants operating only part of the year that monitor fewer than 12 months per year under § 141.701(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.	§141.710(b)(4)		
If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in paragraphs (b)(1) through (4) of this section.	§141.710(b)(5)		

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Filtered systems must determine their initial bin classification from the table in this section and using the *Cryptosporidium* bin concentration calculated under paragraphs (a)-(b) of this section.	§141.710(c)		
Following completion of the second round of source water monitoring required under § 141.701(b), filtered systems must recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported under § 141.701(b) and following the procedures in paragraphs (b)(1) through (4) of this section. Systems must then redetermine their bin classification using this bin concentration and the table in paragraph (c) of this section.	§141.710(d)		
Filtered systems must report their initial bin classification under paragraph (c) of this section to the state for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in § 141.701(c).	§141.710(e)(1)		
Systems must report their bin classification under paragraph (d) of this section to the state for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in § 141.701(c).	§141.710(e)(2)		
The bin classification report to the state must include a summary of source water monitoring data and the calculation procedure used to determine bin classification.	§141.710(e)(3)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Failure to comply with the conditions of paragraph (e) of this section is a violation of the treatment technique requirement.	§141.710(f)		
§141.711 FILTERED SYSTEM ADDITIONAL *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS			
Filtered systems must provide the level of additional treatment for *Cryptosporidium* specified in this paragraph based on their bin classification as determined under § 141.710 and according to the schedule in § 141.713.	§141.711(a)		
Filtered systems must use one or more of the treatment and management options listed in § 141.715, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in paragraph (a) of this section.	§141.711(b)(1)		
Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under paragraph (a) of this section using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in §§ 141.716 through 141.720.	§141.711(b)(2)		
Failure by a system in any month to achieve treatment credit by meeting criteria in §§ 141.716 through 141.720 for microbial toolbox options that is at least equal to the level of treatment required in paragraph (a) of this section is a violation of the treatment technique requirement.	§141.711(c)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
If the state determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under § 141.701(a) or § 141.701(b), significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the state to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in § 141.715.	§141.711(d)		
§141.712 UNFILTERED SYSTEM *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS			
Determination of mean Cryptosporidium level.	§141.712(a)		
Following completion of the initial source water monitoring required under § 141.701(a), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under § 141.701(a). Systems must report this value to the state for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in § 141.701(c).	§141.712(a)(1)		
Following completion of the second round of source water monitoring required under § 141.701(b), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under § 141.701(b). Systems must report this value to the state for approval no later than 6 months after the month the system is required to complete the second round of source water monitoring based on the schedule in § 141.701(c).	§141.712(a)(2)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level in paragraphs (a)(1) or (2) of this section.	§141.712(a)(3)		
The report to the state of the mean *Cryptosporidium* levels calculated under paragraphs (a)(1) and (2) of this section must include a summary of the source water monitoring data used for the calculation.	§141.712(a)(4)		
Failure to comply with the conditions of paragraph (a) of this section is a violation of the treatment technique requirement.	§141.712(a)(5)		
Cryptosporidium inactivation requirements. Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in this paragraph, based on their mean *Cryptosporidium* levels as determined under paragraph (a) of this section and according to the schedule in § 141.713.	§141.712(b)		
Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.	§141.712(b)(1)		
Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3- log *Cryptosporidium* inactivation.	§141.712(b)(2)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Inactivation treatment technology requirements. Unfiltered systems must use chlorine dioxide, ozone, or UV as described in § 141.720 to meet the *Cryptosporidium* inactivation requirements of this section.	§141.712(c)		
Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section on more than one day in the calendar month are in violation of the treatment technique requirement.	§141.712(c)(1)		
Systems that use UV light and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section by meeting the criteria in § 141.720(d)(3)(ii) are in violation of the treatment technique requirement.	§141.712(c)(2)		
Use of two disinfectants. Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of this section and *Giardia lamblia* and virus inactivation requirements of § 141.72(a) using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either *Cryptosporidium, Giardia lamblia,* or viruses.	§141.712(d)		
§141.713 SCHEDULE FOR COMPLIANCE WITH *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS			
Following initial bin classification under § 141.710(c), filtered systems must provide the level of treatment for *Cryptosporidium* required under § 141.711 according to the schedule in paragraph (c) of this section.	§141.713(a)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Following initial determination of the mean *Cryptosporidium* level under § 141.712(a)(1), unfiltered systems must provide the level of treatment for *Cryptosporidium* required under § 141.712 according to the schedule in paragraph (c) of this section.	§141.713(b)		
Cryptosporidium treatment compliance dates. The table in this section presents treatment compliance dates for four system size categories.	§141.713(c)		
If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under § 141.710(d), the system must provide the level of treatment for *Cryptosporidium* required under § 141.711 on a schedule the state approves.	§141.713(d)		
If the mean *Cryptosporidium* level for an unfiltered system changes following the second round of monitoring, as determined under § 141.712(a)(2), and if the system must provide a different level of *Cryptosporidium* treatment under § 141.712 due to this change, the system must meet this treatment requirement on a schedule the state approves.	§141.713(e)		
§141.714 REQUIREMENTS FOR UNCOVERED FINISHED WATER STORAGE FACILITIES			
Systems using uncovered finished water storage facilities must comply with the conditions of this section.	§141.714(a)		
Systems must notify the state of the use of each uncovered finished water storage facility no later than April 1, 2008.	§141.714(b)		

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Systems must meet the conditions of paragraph (c)(1) or (2) of this section for each uncovered finished water storage facility or be in compliance with a state-approved schedule to meet these conditions no later than April 1, 2009.	§141.714(c)		
Systems must cover any uncovered finished water storage facility.	§141.714(c)(1)		
Systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium* using a protocol approved by the state.	§141.714(c)(2)		
Failure to comply with the requirements of this section is a violation of the treatment technique requirement.	§141.714(d)		
§141.715 MICROBIAL TOOLBOX OPTIONS FOR MEETING *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS			
Systems receive the treatment credits listed in the table in Systems receive the treatment credits listed in the table in paragraph (b) of this section by meeting the conditions for microbial toolbox options described in §§ 141.716 through 141.720. Systems apply these treatment credits to meet the treatment requirements in § 141.711 or § 141.712, as applicable.	§141.715(a)(1)		
Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in § 141.720 only.	§141.715(a)(2)		
The table in this section presents microbial toolbox options, treatment credits, and criteria.	§141.715(b)		

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§141.716 MICROBIAL TOOLBOX OPTIONS FOR MEETING *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS			
Watershed control program. Systems receive 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of this section.	§141.716(a)		
Systems that intend to apply for the watershed control program credit must notify the state of this intent no later than two years prior to the treatment compliance date applicable to the system in § 141.713.	§141.716(a)(1)		
Systems must submit to the state a proposed watershed control plan no later than one year before the applicable treatment compliance date in § 141.713. The state must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the elements in paragraphs (a)(2)(i) through (iv) of this section.	§141.716(a)(2)		
Identification of an "area of influence" outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under paragraph (a)(5)(ii) of this section.	§141.716(a)(2)(i)		
Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system's source water quality.	§141.716(a)(2)(ii)		

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An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system's source water.	§141.716(a)(2)(iii)		
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 their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.	§141.716(a)(2)(iv)		
Systems with existing watershed control programs (i.e., programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in paragraph (a)(2) of this section and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.	§141.716(a)(3)		
If the state does not respond to a system regarding approval of a watershed control plan submitted under this section and the system meets the other requirements of this section, the watershed control program will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded unless and until the state subsequently withdraws such approval.	§141.716(a)(4)		
Systems must complete the actions in paragraphs (a)(5)(i) through (iii) of this section to maintain the 0.5-log credit.	§141.716(a)(5)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Submit an annual watershed control program status report to the state. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the state or as the result of the watershed survey conducted under paragraph (a)(5)(ii) of this section. It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the state prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.	§141.716(a)(5)(i)		
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 the state. The survey must be conducted according to state guidelines and by persons the state approves.	§141.716(a)(5)(ii)		
The watershed sanitary survey must meet the following criteria: encompass the region identified in the state-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.	§141.716(a)(5)(ii)(A)		

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If the state determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the state requires, which may be earlier than the regular date in paragraph (a)(5)(ii) of this section.	§141.716(a)(5)(ii)(B)		
The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The state may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.	§141.716(a)(5)(iii)		
If the state determines that a system is not carrying out the approved watershed control plan, the state may withdraw the watershed control program treatment credit.	§141.716(a)(6)		
Alternative source. A system 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 (alternative source monitoring). If the state approves, a system may determine its bin classification under § 141.710 based on the alternative source monitoring results.	§141.716(b)(1)		

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If systems conduct alternative source monitoring under paragraph (b)(1) of this section, systems must also monitor their current plant intake concurrently as described in § 141.701.	§141.716(b)(2)		
Alternative source monitoring under paragraph (b)(1) of this section must meet the requirements for source monitoring to determine bin classification, as described in §§ 141.701 through 141.706. Systems must report the alternative source monitoring results to the state, along with supporting information documenting the operating conditions under which the samples were collected.	§141.716(b)(3)		
If a system determines its bin classification under § 141.710 using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in § 141.713. § 141.717 Pre-filtration treatment toolbox components.	§141.716(b)(4)		
§141.717 PRE-FILTRATION TREATMENT TOOLBOX COMPONENTS			
Presedimentation. Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.	§141.717(a)		
The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or GWUDI source.	§141.717(a)(1)		

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The system must continuously add a coagulant to the presedimentation basin.	§141.717(a)(2)		
The presedimentation basin must achieve the performance criteria in paragraph (3)(i) or (ii) of this section.	§141.717(a)(3)		
Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\log_{10}$(monthly mean of daily influent turbidity) - $\log_{10}$(monthly mean of daily effluent turbidity).	§141.717(a)(3)(i)		
Complies with state-approved performance criteria that demonstrate at least 0.5-log mean removal of micron- sized particulate material through the presedimentation process.	§141.717(a)(3)(ii)		
Two-stage lime softening. Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.	§141.717(b)		
Bank filtration. Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring under § 141.701(a) must collect samples as described in § 141.703(d) and are not eligible for this credit.	§141.717(c)		

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Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in paragraph (c)(4) of this section.	§141.717(c)(1)		
Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.	§141.717(c)(2)		
Only horizontal and vertical wells are eligible for treatment credit.	§141.717(c)(3)		
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 or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.	§141.717(c)(4)		
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 levels, based on daily maximum values in the well, exceed 1 NTU, the	§141.717(c)(5)		

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system must report this result to the state and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the state determines that microbial removal has been compromised, the state may revoke treatment credit until the system implements corrective actions approved by the state to remediate the problem.			
Springs and infiltration galleries are not eligible for treatment credit under this section, but are eligible for credit under § 141.718(c).	§141.717(c)(6)		
Bank filtration demonstration of performance. The state may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in paragraphs (c)(1)-(5) of this section.	§141.717(c)(7)		
The study must follow a state- approved protocol and must involve the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.	§141.717(c)(7)(i)		
The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).	§141.717(c)(7)(ii)		

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§141.718 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 system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in § 141.74(a) and (c).	§141.718(a)		
Individual filter performance. Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be in addition to the 0.5-log credit under paragraph (a) of this section, during any month the system meets the criteria in this paragraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in § 141.174 or § 141.560, as applicable.	§141.718(b)		
The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.	§141.718(b)(1)		
No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.	§141.718(b)(2)		

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Any system that has received treatment credit for individual filter performance and fails to meet the requirements of paragraph (b)(1) or (2) of this section during any month does not receive a treatment technique violation under § 141.711(c) if the state determines the following:	§141.718(b)(3)		
The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.	§141.718(b)(3)(i)		
The system has experienced no more than two such failures in any calendar year.	§141.718(b)(3)(ii)		
Demonstration of performance. The state may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in § 141.711 or §§ 141.717 through 141.720 and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.	§141.718(c)		
Systems cannot receive the prescribed treatment credit for any toolbox box option in §§ 141.717 through 141.720 if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.	§141.718(c)(1)		

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The demonstration of performance study must follow a state-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.	§141.718(c)(2)		
Approval by the state must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The state may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.	§141.718(c)(3)		
§141.719 ADDITIONAL FILTRATION TOOLBOX COMPONENTS			
Bag and cartridge filters. Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in paragraphs (a)(1) through (10) of this section. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of paragraphs (a)(2) through (9) of this section to the state. The filters must treat the entire plant flow taken from a subpart H source.	§141.719(a)		
The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in paragraphs (a)(2) through (a)(9) of this section. A factor of safety equal to 1-log for	§141.719(a)(1)		

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individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria specified in paragraphs (a)(2) through (9) of this section.			
Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium*. Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.	§141.719(a)(2)		
Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium*. The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.	§141.719(a)(3)		

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The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation: Maximum Feed Concentration = $1 \times 10^4 \times$ (Filtrate Detection Limit)	§141.719(a)(4)		
Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.	§141.719(a)(5)		
Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this subpart.	§141.719(a)(6)		
Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation: $LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$ where LRV = log removal value demonstrated during challenge testing; C_f = the feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p must be set equal to the detection limit.	§141.719(a)(7)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV_{filter}) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.	§141.719(a)(8)		
If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest LRV_{filter} among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of LRV_{filter} values for the various filters tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.	§141.719(a)(9)		
If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the state.	§141.719(a)(10)		
Membrane filtration.	§141.719(b)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in § 141.2 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under paragraph (b)(1)(i) and (ii) of this section.	§141.719(b)(1)		
The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (b)(2) of this section.	§141.719(b)(1)(i)		
The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in paragraph (b)(3) of this section.	§141.719(b)(1)(ii)		
Challenge Testing. The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the state. Challenge testing must be conducted according to the criteria in paragraphs (b)(2)(i) through (vii) of this section. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in paragraphs (b)(2)(i) through (vii) of this section.	§141.719(b)(2)		
Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale	§141.719(b)(2)(i)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.			
Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.	§141.719(b)(2)(ii)		
The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation: Maximum Feed Concentration = $3.16 \times 10^6 \times$ (Filtrate Detection Limit)	§141.719(b)(2)(iii)		
Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (i.e., backwashing).	§141.719(b)(2)(iv)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation: $LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$ Where: LRV = log removal value demonstrated during the challenge test; Cf = the feed concentration measured during the challenge test; and Cp = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term Cp is set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.	§141.719(b)(2)(v)		
The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($LRV_{C\text{-}Test}$). If fewer than 20 modules are tested, then $LRV_{C\text{-}Test}$ is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then LRVC-Test is equal to the 10th percentile of the representative LRVs among the modules tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.	§141.719(b)(2)(vi)		
The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order	§141.719(b)(2)(vii)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.			
If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the state.	§141.719(b)(2)(viii)		
Direct integrity testing. Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and meets the requirements described in paragraphs (b)(3)(i) through (vi) of this section. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (i.e., one or more leaks that could result in contamination of the filtrate).	§141.719(b)(3)		
The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.	§141.719(b)(3)(i)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
The direct integrity method must have a resolution of 3 micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.	§141.719(b)(3)(ii)		
The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the state, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either paragraph (b)(3)(iii)(A) or (B) of this section as applicable to the type of direct integrity test the system uses.	§141.719(b)(3)(iii)		
For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation: $LRV_{DIT} = LOG_{10}(Q_p / (VCF \times Q_{breach}))$ Where: LRVDIT = the sensitivity of the direct integrity test; Q_p = total design filtrate flow from the membrane unit; Q_{breach} = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.	§141.719(b)(3)(iii)(A)		
For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation: $LRV_{DIT} = LOG_{10}(C_f) - LOG_{10}(C_p)$ Where: LRV_{DIT} = the sensitivity of the direct integrity test;	§141.719(b)(3)(iii)(B)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
C_f = the typical feed concentration of the marker used in the test; and C_p = the filtrate concentration of the marker from an integral membrane unit.			
Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the state.	§141.719(b)(3)(iv)		
If the result of a direct integrity test exceeds the control limit established under paragraph (b)(3)(iv) of this section, the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.	§141.719(b)(3)(v)		
Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The state may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.	§141.719(b)(3)(vi)		
Indirect integrity monitoring. Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in paragraphs (b)(4)(i) through (v) of this section. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in paragraphs (b)(3)(i) through (v) of this section is not	§141.719(b)(4)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the state summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.			
Unless the state approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.	§141.719(b)(4)(i)		
Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.	§141.719(b)(4)(ii)		
Continuous monitoring must be separately conducted on each membrane unit.	§141.719(b)(4)(iii)		
If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (i.e., two consecutive 15-minute readings above 0.15 NTU), direct integrity testing must immediately be performed on the associated membrane unit as specified in paragraphs (b)(3)(i) through (v) of this section.	§141.719(b)(4)(iv)		
If indirect integrity monitoring includes a state-approved alternative parameter and if the alternative parameter exceeds a state-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in paragraphs (b)(3)(i) through (v) of this section.	§141.719(b)(4)(v)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Second stage filtration. Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the state approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The state must approve the treatment credit based on an assessment of the design characteristics of the filtration process.	§141.719(c)		
Slow sand filtration (as secondary filter). Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The state must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.	§141.719(d)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
§141.720 INACTIVATION TOOLBOX COMPONENTS			
Calculation of CT values. CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under paragraph (b) or (c) of this section must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in §§ 141.74(a) through (b).	§141.720(a)(1)		
Systems with several 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.	§141.720(a)(2)		
CT values for chlorine dioxide and ozone.	§141.720(b)		
CT values for chlorine dioxide and ozone. (1) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in paragraph (a) of this section.	§141.720(b)(1)		
Systems receive the *Cryptosporidium* treatment credit listed in the table presented in this section by meeting the corresponding ozone CT values for the applicable water temperature, as described in paragraph (a) of this section.	§141.720(b)(2)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
Site-specific study. The state may approve alternative chlorine dioxide or ozone CT values to those listed in paragraph (b) of this section on a site- specific basis. The state must base this approval on a site-specific study a system conducts that follows a state-approved protocol.	§141.720(c)		
UV. Systems receive *Cryptosporidium*, *Giardia lamblia*, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in paragraph (d)(1) of this section. Systems must validate and monitor UV reactors as described in paragraphs (d)(2) and (3) of this section to demonstrate that they are achieving a particular UV dose value for treatment credit.	§141.720(d)		
UV dose table. The treatment credits listed in this table are for UV light at a wavelength of 254 nm as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing, as described in paragraph (d)(2) of this section. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.	§141.720(d)(1)		
Reactor validation testing. Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in paragraph (d)(1) of this section (i.e., validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.	§141.720(d)(2)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
When determining validated operating conditions, systems must account for the following factors: 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; and inlet and outlet piping or channel configurations of the UV reactor.	§141.720(d)(2)(i)		
Validation testing must include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.	§141.720(d)(2)(ii)		
The state may approve an alternative approach to validation testing.	§141.720(d)(2)(iii)		
Reactor monitoring. Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under paragraph (d)(2) of this section. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the state designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the state approves.	§141.720(d)(3)(i)		
To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as described	§141.720(d)(3)(ii)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
in paragraphs (d)(1) and (2) of this section. Systems must demonstrate compliance with this condition by the monitoring required under paragraph (d)(3)(i) of this section.			
§141.721 REPORTING REQUIREMENTS			
Systems must report sampling schedules under § 141.702 and source water monitoring results under § 141.706 unless they notify the state that they will not conduct source water monitoring due to meeting the criteria of § 141.701(d).	§141.721(a)		
Systems must report the use of uncovered finished water storage facilities to the state as described in § 141.714.	§141.721(b)		
Filtered systems must report their *Cryptosporidium* bin classification as described in § 141.710.	§141.721(c)		
Unfiltered systems must report their mean source water *Cryptosporidium* level as described in § 141.712.	§141.721(d)		
Systems must report disinfection profiles and benchmarks to the state as described in §§ 141.708 through 141.709 prior to making a significant change in disinfection practice.	§141.721(e)		
Systems must report to the state in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under § 141.711 or § 141.712. Alternatively, the state may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.	§141.721(f)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
§141.722 RECORDKEEPING REQUIREMENTS			
Systems must keep results from the initial round of source water monitoring under § 141.701(a) and the second round of source water monitoring under § 141.701(b) until 3 years after bin classification under § 141.710 for filtered systems or determination of the mean *Cryptosporidium* level under § 141.710 for unfiltered systems for the particular round of monitoring.	§141.722(a)		
Systems must keep any notification to the state that they will not conduct source water monitoring due to meeting the criteria of § 141.701(d) for 3 years.	§141.722(b)		
Systems must keep the results of treatment monitoring associated with microbial toolbox options under §§ 141.716 through 141.720 and with uncovered finished water reservoirs under § 141.714, as applicable, for 3 years.	§141.722(c)		
§141.723 REQUIREMENTS TO RESPOND TO SIGNIFICANT DEFICIENCIES IDENTIFIED IN SANITARY SURVEYS PERFORMED BY EPA			
A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.	§141.723(a)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? (EXPLAIN ON SEPARATE SHEET)
For the purposes of this section, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that EPA determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.	§141.723(b)		
For sanitary surveys performed by EPA, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.	§141.723(c)		
Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by EPA, or if there is no approved schedule, according to the schedule reported under paragraph (c) of this section if such deficiencies are within the control of the system.	§141.723(d)		

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	EXPLANATION OF STATE POLICIES AND PROCEDURES
PART 142–NPDWR IMPLEMENTATION		
§142.14 RECORDS KEPT BY STATES		
Any decisions made pursuant to the provisions of part 141, subpart W of this chapter.	§142.14(a)(9)	
Results of source water *E. coli* and *Cryptosporidium* monitoring.	§142.14(a)(9)(i)	
The bin classification after the initial and after the second round of source water monitoring for each filtered system, as described in §141.710 of this chapter.	§142.14(a)(9)(ii)	
Any change in treatment requirements for filtered systems due to watershed assessment during sanitary surveys, as described in §141.711(d) of this chapter.	§142.14(a)(9)(iii)	
The determination of whether the mean *Cryptosporidium* level is greater than 0.01 oocysts/L after the initial and after the second round of source water monitoring for each unfiltered system, as described in §141.712(a) of this chapter.	§142.14(a)(9)(iv)	
The treatment processes or control measures that systems use to meet their *Cryptosporidium* treatment requirements under §141.711 or §141.712 of this chapter.	§142.14(a)(9)(v)	
A list of systems required to cover or treat the effluent of an uncovered finished water storage facility, as specified in §141.714 of this chapter.	§142.14(a)(9)(vi)	

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	EXPLANATION OF STATE POLICIES AND PROCEDURES
§142.15 REPORTS BY STATES		
Subpart W. The bin classification after the initial and after the second round of source water monitoring for each filtered system, as described in §141.710 of this chapter.	§142.15(c)(6)(i)	
Any change in treatment requirements for these systems due to watershed assessment during sanitary surveys, as described in §141.711(d) of this chapter.	§142.15(c)(6)(ii)	
The determination of whether the mean *Cryptosporidium* level is greater than 0.01 oocysts/L both after the initial and after the second round of source water monitoring for each unfiltered system, as described in §141.712(a) of this chapter.	§142.15(c)(6)(iii)	
§142.16 SPECIAL PRIMACY CONDITIONS		
Requirements for states to adopt 40 CFR part 141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as Federal requirements, an application for approval of a state program revision that adopts 40 CFR part 141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs.	§142.16(n)	
Approve an alternative to the *E. Coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people, as described in § 141.701(a)(5).	§142.16(n)(1)	
Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action for systems, as described in § 141.711(d) of this chapter.	§142.16(n)(2)	

SUMMARY OF FEDERAL REQUIREMENT	FEDERAL CITATION	EXPLANATION OF STATE POLICIES AND PROCEDURES
Approve watershed control programs for the 0.5-log treatment credit in the microbial toolbox, as described in § 141.716(a) of this chapter.	§142.16(n)(3)	
Approve protocols for demonstration of performance treatment credits in the microbial toolbox, as allowed under § 141.718(c) of this chapter.	§142.16(n)(4)	
Approve protocols for alternative ozone and chlorine dioxide CT values in the microbial toolbox, as allowed under § 141.720(c) of this chapter.	§142.16(n)(5)	
Approve an alternative approach to UV reactor validation testing in the microbial toolbox, as allowed under § 141.720(d)(2)(iii) of this chapter.	§142.16(n)(6)	

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Appendix B
Rule Requirements

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Enhanced Surface Water Treatment Rule; Final Rule. Federal Register. January 14, 2002. 67 FR 1812. EPA 815-Z-02-001.
USEPA. 2002b. Process for Designing a Watershed Initiative. 67 FR 36172, May 23, 2002.
USEPA. 2002c. Method 1103.1: Escherichia coli (E. coli) In Water By Membrane Filtration Using membrane-Thermotolerant Escherichia coli Agar (mTEC). U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-821-R-02-020.
USEPA. 2002d. Laboratory Quality Assurance Evaluation Program for Analysis of Cryptosporidium Under the Safe Drinking Water Act; Agency Information Collection: Proposed Collection; Comment Request. Federal Register: March 4, 2002. 67 FR 9731.
USEPA. 2003a. National Primary Drinking Water Regulations: Long Term 2 Enhanced Surface Water Treatment Rule; Proposed Rule. 68 FR 47640, August 11, 2003.
USEPA. 2003b. Guidelines Establishing Test Procedures for the Analysis of Pollutants; Analytical Methods for Biological Pollutants in Ambient Water. 68 FR 43272, July 21, 2003.
USEPA. 2005a. Economic Analysis for the Long Term 2 Enhanced Surface Water Treatment Rule. U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-821-R-06-001.
USEPA. 2005b. Occurrence and Exposure Assessment for the Long Term 2 Enhanced Surface Water Treatment Rule. U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-821-R-06-002.
USEPA. 2005c. Method 1622: Cryptosporidium in Water by Filtration/IMS/FA. EPA 815-R-05-001.
USEPA. 2005d. Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA. EPA 815-R-05-002.
USEPA. 2005e. Valuing Time Losses Due to Illness under the 1996 Amendments to the Safe Drinking Water Act. EPA Office of Water. Prepared by IEC Consultants.
Wang, J., R. Song, and S. Hubbs. 2001. Particle removal through riverbank filtration process, in W. Julich and J. Schubert, eds., Proceedings of the Internation Riverbank Filtration Conference. November 2-4, 2000, Dusseldorf, Germany, Internationale Arbeitsgemeinschaft der Wasserwork im Rheineinzugsgebiet.
Ware and Schaefer. 2005. The effects of time and temperature on flow cytometry enumerated live Cryptosporidium parvum oocysts. Letters in Applied Microbiology 41:385-389.
Yang, S., S.K. Benson, C. Du, and M.C. Healey. 2000. Infection of immunosuppressed C57BL/6N adult mice with a single oocyst of Cryptosporidium parvum. J Parasitol. 86(4):884-7.
Yates, R., K. Scott, J. Green, J. Bruno, and R. De Leon. 1998. Using Aerobic Spores to Evaluate Treatment Plant Performance. Proceedings, Annual Conference of the American Water Works Association, Denver, CO.

List of Subjects

40 CFR Part 9

Reporting and recordkeeping.

40 CFR Part 141

Environmental protection, Chemicals, Indians-lands, Incorporation by reference, Intergovernmental relations, Radiation protection, Reporting and recordkeeping requirements, Water supply.

40 CFR Part 142

Environmental protection, Administrative practice and procedure, Chemicals, Indians-lands, Radiation protection, Reporting and recordkeeping requirements, Water supply.

Dated: December 15, 2005.

Stephen L. Johnson,

Administrator.

■ For the reasons set forth in the preamble, title 40 chapter I of the Code of Federal Regulations is amended as follows:

PART 9—[AMENDED]

■ 1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318, 1321, 1326, 1330, 1342, 1344, 1345 (d) and (e), 1361; Executive Order 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

■ 2. In § 9.1 the table is amended as follows:

■ a. Under the heading "National Primary Drinking Water Regulations Implementation" by adding entries in numerical order for "§ 141.706–141.710, 141.713–141.714, 141.716–141.723".

■ b. Under the heading "National Primary Drinking Water Regulations Implementation" by removing entries § 142.15(c), 142.15(c)(6)–(7) and adding entries in numerical order for "142.14(a)(9), 142.15(c)(6), and 142.16(n)" as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * * * *	
National Primary Drinking Water Regulations	
* * * * * * *	
141.706–141.710	2040–0266
141.713–141.714	2040–0266
141.716–141.723	2040–0266
National Primary Drinking Water Regulations Implementation	
* * * * * * *	
142.14(a)(9)	2040–0266
* * * * * * *	
142.15(c)(6)	2040–0266
* * * * * * *	
142.16(n)	2040–0266
* * * * * * *	

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

■ 3. The authority citation for Part 141 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, 300j–9, and 300j–11.

■ 4. Section 141.2 is amended by adding, in alphabetical order, definitions for "Bag filters", "Bank filtration", "Cartridge filters", "Flowing stream", "Lake/reservoir", "Membrane filtration", "Plant intake", "Presedimentation", and "Two-stage lime softening", and revising the definition for "Uncovered finished water storage facility" to read as follows:

§ 141.2 Definitions.

* * * * *

Bag filters are pressure-driven separation devices that remove particulate matter larger than 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 is 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 are pressure-driven separation devices that remove particulate matter larger than 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 is a course of running water flowing in a definite channel.

* * * * *

Lake/reservoir refers to 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 is a pressure or vacuum driven separation process in which particulate matter larger than 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 refers to 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 is 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 is 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 is a tank, reservoir, or other facility used to store water that will undergo no further treatment to reduce microbial pathogens except residual disinfection and is directly open to the atmosphere.

* * * * *

■ 5. Subpart Q of part 141 is amended by adding § 141.211 to read as follows:

§ 141.211 Special notice for repeated failure to conduct monitoring of the source water for *Cryptosporidium* and for failure to determine bin classification or mean *Cryptosporidium* level.

(a) *When is the special notice for repeated failure to monitor to be given?* The owner or operator of a community or non-community water system that is required to monitor source water under § 141.701 must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any 3 months of monitoring as specified in § 141.701(c). The notice must be repeated as specified in § 141.203(b).

(b) *When is the special notice for failure to determine bin classification or mean* Cryptosporidium *level to be given?* The owner or operator of a community or non-community water system that is required to determine a bin classification under § 141.710, or to determine mean *Cryptosporidium* level under § 141.712, must notify persons served by the water system that the determination has not been made as required no later than 30 days after the system has failed report the determination as specified in § 141.710(e) or § 141.712(a), respectively. The notice must be repeated as specified in § 141.203(b). The notice is not required if the system is complying with a State-approved schedule to address the violation.

(c) *What is the form and manner of the special notice?* The form and manner of the public notice must follow the requirements for a Tier 2 public notice prescribed in § 141.203(c). The public notice must be presented as required in § 141.205(c).

(d) *What mandatory language must be contained in the special notice?* The notice must contain the following language, including the language necessary to fill in the blanks.

(1) The special notice for repeated failure to conduct monitoring must contain the following language:

We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at the (treatment plant name) is sufficient to adequately remove *Cryptosporidium* from your drinking water. We are required to complete this monitoring and make this determination by (required bin determination date). We "did not monitor or test" or "did not complete all monitoring or testing" on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate *Cryptosporidium* removal. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, (date).

For more information, please call (name of water system contact) of (name of water system) at (phone number).

(2) The special notice for failure to determine bin classification or mean Cryptosporidium level must contain the following language:

We are required to monitor the source of your drinking water for Cryptosporidium in order to determine by (date) whether water treatment at the (treatment plant name) is sufficient to adequately remove Cryptosporidium from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of (date). For more information, please call (name of water system contact) of (name of water system) at (phone number).

(3) Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

■ 6. Appendix A to Subpart Q of part 141 is amended by adding entry number 10 under I.A. to read as follows:

Subpart Q—Public Notification of Drinking Water Violations

APPENDIX A TO SUBPART Q OF PART 141—NPDWR VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE [1]

Contaminant	MCL/MRDL/TT violations [2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
I. Violations of National Primary Drinking Water Regulations (NPDWR): [3]				
A. Microbiological Contaminants				
* * *	*	*	*	* *
10. LT2ESWTR violations	2	141.710–141.720	[22] 2, 3	141.701–141.705 and 141.708–141.709.
* * *	*	*	*	* *

[1] Violations and other situations not listed in this table (e.g., failure to prepare Consumer Confidence Reports) do not require notice, unless otherwise determined by the primary agency. Primacy agencies may, at their option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under § 141.202(a) and § 141.203(a).

[2] MCL—Maximum contaminant level, MRDL—Maximum residual disinfectant level, TT—Treatment technique.

[3] The term Violations of National Primary Drinking Water Regulations (NPDWR) is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.

* * * * * * *

[22] Failure to collect three or more samples for Cryptosporidium analysis is a Tier 2 violation requiring special notice as specified in § 141.211. All other monitoring and testing procedure violations are Tier 3.

■ 7. Part 141 is amended by adding a new subpart W to read as follows:

Subpart W—Enhanced Treatment for *Cryptosporidium*

General Requirements

Sec.

141.700 General requirements.

Source Water Monitoring Requirements

141.701 Source water monitoring.
141.702 Sampling schedules.
141.703 Sampling locations.
141.704 Analytical methods.
141.705 Approved laboratories.
141.706 Reporting source water monitoring results.
141.707 Grandfathering previously collected data.

Disinfection Profiling and Benchmarking Requirements

141.708 Requirements when making a significant change in disinfection practice.
141.709 Developing the disinfection profile and benchmark.

Treatment Technique Requirements

141.710 Bin classification for filtered systems.
141.711 Filtered system additional *Cryptosporidium* treatment requirements.
141.712 Unfiltered system *Cryptosporidium* treatment requirements.
141.713 Schedule for compliance with *Cryptosporidium* treatment requirements.
141.714 Requirements for uncovered finished water storage facilities.

Requirements for Microbial Toolbox Components

141.715 Microbial toolbox options for meeting *Cryptosporidium* treatment requirements.
141.716 Source toolbox components.
141.717 Pre-filtration treatment toolbox components.
141.718 Treatment performance toolbox components.
141.719 Additional filtration toolbox components.
141.720 Inactivation toolbox components.

Reporting and Recordkeeping Requirements

141.721 Reporting requirements.
141.722 Recordkeeping requirements.

Requirements for Sanitary Surveys Performed by EPA

141.723 Requirements to respond to significant deficiencies identified in sanitary surveys performed by EPA.

Subpart W—Enhanced Treatment for *Cryptosporidium*

General Requirements

§ 141.700 General requirements.

(a) The requirements of this subpart W are national primary drinking water regulations. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium*. These requirements are in addition to requirements for filtration and disinfection in subparts H, P, and T of this part.

(b) *Applicability.* The requirements of this subpart apply to all subpart H systems, which are public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water.

(1) Wholesale systems, as defined in § 141.2, must comply with the requirements of this subpart based on the population of the largest system in the combined distribution system.

(2) The requirements of this subpart for filtered systems apply to systems required by National Primary Drinking Water Regulations to provide filtration treatment, whether or not the system is currently operating a filtration system.

(3) The requirements of this subpart for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in subparts H, P, and T of this part, as applicable.

(c) *Requirements.* Systems subject to this subpart must comply with the following requirements:

(1) Systems must 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*, and turbidity as described in §§ 141.701 through 141.706, to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.

(2) Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in §§ 141.708 through 141.709.

(3) Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in § 141.710 and provide additional treatment for *Cryptosporidium*, if required, as described in § 141.711. All unfiltered systems must provide treatment for *Cryptosporidium* as described in § 141.712. Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in § 141.713.

(4) Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility or treat the discharge from the facility as described in § 141.714.

(5) Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in §§ 141.715 through 141.720.

(6) Systems must comply with the applicable recordkeeping and reporting requirements described in §§ 141.721 through 141.722.

(7) Systems must address significant deficiencies identified in sanitary surveys performed by EPA as described in § 141.723.

Source Water Monitoring Requirements

§ 141.701 Source water monitoring.

(a) *Initial round of source water monitoring.* Systems must conduct the following monitoring on the schedule in paragraph (c) of this section unless they meet the monitoring exemption criteria in paragraph (d) of this section.

(1) Filtered systems serving at least 10,000 people must sample their source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for 24 months.

(2) Unfiltered systems serving at least 10,000 people must sample their source water for *Cryptosporidium* at least monthly for 24 months.

(3)(i) Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months.

(ii) A filtered system serving fewer than 10,000 people may avoid *E. coli* monitoring if the system notifies the State that it will monitor for *Cryptosporidium* as described in paragraph (a)(4) of this section. The system must notify the State no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring under § 141.701(c).

(4) Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under paragraph (a)(3) of this section:

(i) For systems using lake/reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/100 mL.

(ii) For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/100 mL.

(iii) The system does not conduct *E. coli* monitoring as described in paragraph (a)(3) of this section.

(iv) Systems using ground water under the direct influence of surface water (GWUDI) must comply with the requirements of paragraph (a)(4) of this section based on the *E. coli* level that applies to the nearest surface water body. If no surface water body is nearby, the system must comply based on the requirements that apply to systems using lake/reservoir sources.

(5) For filtered systems serving fewer than 10,000 people, the State may approve monitoring for an indicator other than *E. coli* under paragraph (a)(3) of this section. The State also may approve an alternative to the *E. coli* concentration in paragraph (a)(4)(i), (ii) or (iv) of this section to trigger *Cryptosporidium* monitoring. This approval by the State must be provided to the system in writing and must include the basis for the State's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in § 141.710.

(6) Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.

(7) Systems may sample more frequently than required under this section if the sampling frequency is evenly spaced throughout the monitoring period.

(b) *Second round of source water monitoring.* Systems must conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in paragraph (a) of this section, unless they meet the monitoring exemption criteria in paragraph (d) of this section. Systems must conduct this monitoring on the schedule in paragraph (c) of this section.

(c) *Monitoring schedule.* Systems must begin the monitoring required in paragraphs (a) and (b) of this section no later than the month beginning with the date listed in this table:

SOURCE WATER MONITORING STARTING DATES TABLE

Systems that serve . . .	Must begin the first round of source water monitoring no later than the month beginning . . .	And must begin the second round of source water monitoring no later than the month beginning . . .
(1) At least 100,000 people	(i) October 1, 2006	(ii) April 1, 2015.
(2) From 50,000 to 99,999 people	(i) April 1, 2007	(ii) October 1, 2015.
(3) From 10,000 to 49,999 people	(i) April 1, 2008	(ii) October 1, 2016.
(4) Fewer than 10,000 and monitor for *E. coli*[a]	(i) October 1, 2008	(ii) October 1, 2017.
(5) Fewer than 10,000 and monitor for *Cryptosporidium*[b].	(i) April 1, 2010	(ii) April 1, 2019.

[a] Applies only to filtered systems.
[b] Applies to filtered systems that meet the conditions of paragraph (a)(4) of this section and unfiltered systems.

(d) *Monitoring avoidance.* (1) Filtered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in § 141.711.

(2) Unfiltered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 3-log *Cryptosporidium* inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L in § 141.712.

(3) If a system chooses to provide the level of treatment in paragraph (d)(1) or (2) of this section, as applicable, rather than start source water monitoring, the system must notify the State in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under § 141.702. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the State in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the

applicable treatment compliance date in § 141.713.

(e) *Plants operating only part of the year.* Systems with subpart H plants that operate for only part of the year must conduct source water monitoring in accordance with this subpart, but with the following modifications:

(1) Systems must sample their source water only during the months that the plant operates unless the State specifies another monitoring period based on plant operating practices.

(2) Systems with plants that operate less than six months per year and that monitor for *Cryptosporidium* must collect at least six *Cryptosporidium* samples per year during each of two years of monitoring. Samples must be evenly spaced throughout the period the plant operates.

(f)(1) *New sources.* A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under paragraph (c) of this section must monitor the new source on a schedule the State approves. Source water monitoring must meet the requirements of this subpart. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of §§ 141.710 and 141.711 or § 141.712, as applicable, for the new source on a schedule the State approves.

(2) The requirements of § 141.701(f) apply to subpart H systems that begin operation after the monitoring start date applicable to the system's size under paragraph (c) of this section.

(3) The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under § 141.710 or determination of the mean *Cryptosporidium* level under § 141.712, as applicable.

(g) Failure to collect any source water sample required under this section in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of §§ 141.702 through 141.706 is a monitoring violation.

(h) *Grandfathering monitoring data.* Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in paragraph (c) of this section to meet the initial source water monitoring requirements in paragraph (a) of this section. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in § 141.707.

§ 141.702 Sampling schedules.

(a) Systems required to conduct source water monitoring under § 141.701 must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

(1) Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in § 141.701(c) for each round of required monitoring.

(2)(i) Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under § 141.701(a) to EPA electronically at *https://intranet.epa.gov/lt2/.*

(ii) If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that EPA approves.

(3) Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring § 141.701(a) to the State.

(4) Systems must submit sampling schedules for the second round of source water monitoring § 141.701(b) to the State.

(5) If EPA or the State does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.

(b) Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (i.e., within a five-day period around the schedule date) unless one of the conditions of paragraph (b)(1) or (2) of this section applies.

(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 must sample as close to the scheduled date as is feasible unless the State approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the State concurrent with the shipment of the sample to the laboratory.

(2)(i) If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in § 141.704, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

(ii) The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the State approves an alternative resampling date. The system must submit an explanation for the delayed sampling date to the State concurrent with the shipment of the sample to the laboratory.

(c) Systems that fail to meet the criteria of paragraph (b) of this section for any source water sample required under § 141.701 must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the State for approval prior to when the system begins collecting the missed samples.

§ 141.703 Sampling locations.

(a) Systems required to conduct source water monitoring under § 141.701 must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the State may approve one set of monitoring results to be used to satisfy the requirements of § 141.701 for all plants.

(b)(1) Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of paragraph (b)(2) of this section.

(2) The State may approve a system to collect a source water sample after chemical treatment. To grant this approval, the State must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

(c) Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.

(d) *Bank filtration.* (1) Systems that receive *Cryptosporidium* treatment credit for bank filtration under § 141.173(b) or § 141.552(a), as applicable, must collect source water samples in the surface water prior to bank filtration.

(2) Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (i.e., after bank filtration). Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under § 141.717(c).

(e) *Multiple sources.* Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in paragraph (e)(1) or (2) of this section. The use of multiple sources during monitoring must be consistent with routine operational practice.

(1) If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.

(2) If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either paragraph (e)(2)(i) or (ii) of this section for sample analysis.

(i) Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.

(ii) Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

(f) *Additional Requirements.* Systems must submit a description of their sampling location(s) to the State at the same time as the sampling schedule required under § 141.702. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the State does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).

§ 141.704 Analytical methods.

(a) *Cryptosporidium.* Systems must analyze for *Cryptosporidium* using *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA,* 2005, United States Environmental Protection Agency, EPA–815-R–05–002 or *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA,* 2005, United States Environmental Protection Agency, EPA–815–R–05–001, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods online from *http://www.epa.gov/safewater/disinfection/lt2* or from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave., NW, Washington, DC 20460 (Telephone: 800–426–4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202–566–2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

(1) Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL as generated by the methods listed in paragraph (a) of this section. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in paragraph (a) of this section, up to a packed pellet volume of at least 2 mL.

(2)(i) Matrix spike (MS) samples, as required by the methods in paragraph (a) of this section, must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under § 141.705.

(ii) If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

(3) Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.

(b) *E. coli.* Systems must use methods for enumeration of E. coli in source water approved in § 136.3(a) of this title.

(1) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of paragraph (b)(2) of this section.

(2) The State may approve on a case-by-case basis the holding of an *E. coli* sample for up to 48 hours between sample collection and initiation of analysis if the State determines that analyzing an *E. coli* sample within 30 hours is not feasible. *E. coli* samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in § 136.3(a) of this title.

(3) Systems must maintain samples between 0°C and 10°C during storage and transit to the laboratory.

(c) *Turbidity.* Systems must use methods for turbidity measurement approved in § 141.74(a)(1).

§ 141.705 Approved laboratories.

(a) *Cryptosporidium.* Systems must have *Cryptosporidium* samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of *Cryptosporidium* in Water or a laboratory that has been certified for *Cryptosporidium* analysis by an equivalent State laboratory certification program.

(b) *E. coli.* Any laboratory certified by the EPA, the National Environmental Laboratory Accreditation Conference or the State for total coliform or fecal coliform analysis under § 141.74 is approved for *E. coli* analysis under this subpart when the laboratory uses the same technique for *E. coli* that the laboratory uses for § 141.74.

(c) *Turbidity.* Measurements of turbidity must be made by a party approved by the State.

§ 141.706 Reporting source water monitoring results.

(a) Systems must report results from the source water monitoring required under § 141.701 no later than 10 days after the end of the first month following the month when the sample is collected.

(b)(1) All systems serving at least 10,000 people must report the results from the initial source water monitoring required under § 141.701(a) to EPA electronically at *https://intranet.epa.gov/lt2/.*

(2) If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that EPA approves.

(c) Systems serving fewer than 10,000 people must report results from the initial source water monitoring required under § 141.701(a) to the State.

(d) All systems must report results from the second round of source water monitoring required under § 141.701(b) to the State.

(e) Systems must report the applicable information in paragraphs (e)(1) and (2) of this section for the source water monitoring required under § 141.701.

(1) Systems must report the following data elements for each *Cryptosporidium* analysis:

Data element.
1. PWS ID.
2. Facility ID.

Data element.
3. Sample collection date.
4. Sample type (field or matrix spike).
5. Sample volume filtered (L), to nearest ¼ L.
6. Was 100% of filtered volume examined.
7. Number of oocysts counted.

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

(ii) 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.

(iii) For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.

(2) Systems must report the following data elements for each *E. coli* analysis:

Data element.
1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Analytical method number.
5. Method type.
6. Source type (flowing stream, lake/reservoir, GWUDI).
7. *E. coli*/100 mL.
8. Turbidity.[1]

[1] Systems serving fewer than 10,000 people that are not required to monitor for turbidity under § 141.701 are not required to report turbidity with their *E. coli* results.

§ 141.707 Grandfathering previously collected data.

(a)(1) Systems may comply with the initial source water monitoring requirements of § 141.701(a) by grandfathering sample results collected before the system is required to begin monitoring (i.e., previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in this section and the State must approve.

(2) A filtered system may grandfather *Cryptosporidium* samples to meet the requirements of § 141.701(a) when the system does not have corresponding *E. coli* and turbidity samples. A system that grandfathers *Cryptosporidium* samples without *E. coli* and turbidity samples is not required to collect *E. coli* and turbidity samples when the system completes the requirements for *Cryptosporidium* monitoring under § 141.701(a).

(b) *E. coli sample analysis.* The analysis of *E. coli* samples must meet the analytical method and approved laboratory requirements of §§ 141.704 through 141.705.

(c) *Cryptosporidium sample analysis.* The analysis of *Cryptosporidium* samples must meet the criteria in this paragraph.

(1) Laboratories analyzed *Cryptosporidium* samples using one of the analytical methods in paragraphs (c)(1)(i) through (vi) of this section, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods on-line from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave, NW, Washington, DC 20460 (Telephone: 800–426–4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202–566–2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

(i) *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA,* 2005, United States Environmental Protection Agency, EPA–815–R–05–002.

(ii) *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA,* 2005, United States Environmental Protection Agency, EPA–815–R–05–001.

(iii) *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA,* 2001, United States Environmental Protection Agency, EPA–821–R–01–025.

(iv) *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA,* 2001, United States Environmental Protection Agency, EPA–821–R–01–026.

(v) *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA,* 1999, United States Environmental Protection Agency, EPA–821–R–99–006.

(vi) *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA,* 1999, United States Environmental Protection Agency, EPA–821–R–99–001.

(2) For each *Cryptosporidium* sample, the laboratory analyzed at least 10 L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods listed in paragraph (c)(1) of this section.

(d) *Sampling location.* The sampling location must meet the conditions in § 141.703.

(e) *Sampling frequency. Cryptosporidium* samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in § 141.702(b)(1) and (2) if the system provides documentation of the condition when reporting monitoring results.

(1) The State may approve grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the State specifies to ensure that the data used to comply with the initial source water monitoring requirements of § 141.701(a) are seasonally representative and unbiased.

(2) Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems must follow the monthly averaging procedure in § 141.710(b)(5) or § 141.712(a)(3), as applicable, when calculating the bin classification for filtered systems or the mean *Cryptosporidium* concentration for unfiltered systems.

(f) *Reporting monitoring results for grandfathering.* Systems that request to grandfather previously collected monitoring results must report the following information by the applicable dates listed in this paragraph. Systems serving at least 10,000 people must report this information to EPA unless the State approves reporting to the State rather than EPA. Systems serving fewer than 10,000 people must report this information to the State.

(1) Systems must report that they intend to submit previously collected monitoring results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of § 141.701(a). Systems must report this information no later than the date the sampling schedule under § 141.702 is required.

(2) Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in paragraphs (f)(2)(i) through (iv) of this section, no later than two months after the applicable date listed in § 141.701(c).

(i) For each sample result, systems must report the applicable data elements in § 141.706.

(ii) Systems must certify that the reported monitoring results include all results the system generated during the time period beginning with the first reported result and ending with the final reported result. This applies to samples that were collected from the

sampling location specified for source water monitoring under this subpart, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in this section.

(iii) Systems must certify that the samples were representative of a plant's source water(s) and the source water(s) have not changed. Systems must report a description of the sampling location(s), which must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.

(iv) For *Cryptosporidium* samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (c)(1) of this section were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.

(g) If the State determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the State may disapprove the data. Alternatively, the State may approve the previously collected data if the system reports additional source water monitoring data, as determined by the State, to ensure that the data set used under § 141.710 or § 141.712 represents average source water conditions for the system.

(h) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring under § 141.701(a) and some of the data are rejected due to not meeting the requirements of this section, systems must conduct additional monitoring to replace rejected data on a schedule the State approves. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

Disinfection Profiling and Benchmarking Requirements

§ 141.708 Requirements when making a significant change in disinfection practice.

(a) Following the completion of initial source water monitoring under § 141.701(a), a system that plans to make a significant change to its disinfection practice, as defined in paragraph (b) of this section, must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in § 141.709. Prior to changing the disinfection practice, the system must notify the State and must include in this notice the information in paragraphs (a)(1) through (3) of this section.

(1) A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in § 141.709.

(2) A description of the proposed change in disinfection practice.

(3) An analysis of how the proposed change will affect the current level of disinfection.

(b) Significant changes to disinfection practice are defined as follows:

(1) Changes to the point of disinfection;

(2) Changes to the disinfectant(s) used in the treatment plant;

(3) Changes to the disinfection process; or

(4) Any other modification identified by the State as a significant change to disinfection practice.

§ 141.709 Developing the disinfection profile and benchmark.

(a) Systems required to develop disinfection profiles under § 141.708 must follow the requirements of this section. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire plant, based on $CT_{99.9}$ values in Tables 1.1 through 1.6, 2.1 and 3.1 of § 141.74(b) as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the State.

(b) Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in paragraphs (b)(1) through (4) of this section. Systems with more than one point of disinfectant application must conduct the monitoring in paragraphs (b)(1) through (4) of this section for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in § 141.74(a).

(1) For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the State.

(2) For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the State.

(3) The disinfectant contact time(s) (t) must be determined during peak hourly flow.

(4) The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.

(c) In lieu of conducting new monitoring under paragraph (b) of this section, systems may elect to meet the requirements of paragraphs (c)(1) or (2) of this section.

(1) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of paragraph (b) of this section may use these data to develop disinfection profiles as specified in this section if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

(2) Systems may use disinfection profile(s) developed under § 141.172 or §§ 141.530 through 141.536 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under § 141.172 or §§ 141.530 through 141.536 must develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.

(d) Systems must calculate the total inactivation ratio for *Giardia lamblia* as specified in paragraphs (d)(1) through (3) of this section.

(1) Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (d)(1)(i) or (ii) of this section.

(i) Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.

(ii) Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system must

calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine ($\Sigma(CTcalc/CT_{99.9})$).

(2) Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and ($\Sigma(CTcalc/CT_{99.9})$) must be calculated using the method in paragraph (d)(1)(ii) of this section.

(3) The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (d)(1) or (d)(2) of this section by 3.0.

(4) Systems must calculate the log of inactivation for viruses using a protocol approved by the State.

(e) Systems must use the procedures specified in paragraphs (e)(1) and (2) of this section to calculate a disinfection benchmark.

(1) For each year of profiling data collected and calculated under paragraphs (a) through (d) of this section, systems must determine the lowest mean monthly level of both *Giardia lamblia* and virus inactivation. Systems must determine the mean *Giardia lamblia* and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly *Giardia lamblia* and virus log inactivation by the number of values calculated for that month.

(2) 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 lamblia* and virus log inactivation in each year of profiling data.

Treatment Technique Requirements

§ 141.710 Bin classification for filtered systems.

(a) Following completion of the initial round of source water monitoring required under § 141.701(a), filtered systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results reported under § 141.701(a) and must follow the procedures in paragraphs (b)(1) through (5) of this section.

(b)(1) For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.

(2) For systems that collect a total of 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.

(3) For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.

(4) For systems with plants operating only part of the year that monitor fewer than 12 months per year under § 141.701(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

(5) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in paragraphs (b)(1) through (4) of this section.

(c) Filtered systems must determine their initial bin classification from the following table and using the *Cryptosporidium* bin concentration calculated under paragraphs (a)–(b) of this section:

BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS

For systems that are:	With a *Cryptosporidium* bin concentration of . . .[1]	The bin classification is . . .
. . . required to monitor for *Cryptosporidium* under § 141.701.	*Cryptosporidium* <0.075 oocyst/L	Bin 1.
	0.075 oocysts/L ≤*Cryptosporidium* <1.0 oocysts/L	Bin 2.
	1.0 oocysts/L ≤*Cryptosporidium* <3.0 oocysts/L	Bin 3.
	Cryptosporidium ≥3.0 oocysts/L	Bin 4.
. . . serving fewer than 10,000 people and NOT required to monitor for *Cryptosporidium* under § 141.701(a)(4).	NA	Bin 1.

[1] Based on calculations in paragraph (a) or (d) of this section, as applicable.

(d) Following completion of the second round of source water monitoring required under § 141.701(b), filtered systems must recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported under § 141.701(b) and following the procedures in paragraphs (b)(1) through (4) of this section. Systems must then redetermine their bin classification using this bin concentration and the table in paragraph (c) of this section.

(e)(1) Filtered systems must report their initial bin classification under paragraph (c) of this section to the State for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in § 141.701(c).

(2) Systems must report their bin classification under paragraph (d) of this section to the State for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in § 141.701(c).

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

(f) Failure to comply with the conditions of paragraph (e) of this section is a violation of the treatment technique requirement.

§ 141.711 Filtered system additional *Cryptosporidium* treatment requirements.

(a) Filtered systems must provide the level of additional treatment for *Cryptosporidium* specified in this paragraph based on their bin classification as determined under § 141.710 and according to the schedule in § 141.713.

If the system bin classification is . . .	And the system uses the following filtration treatment in full compliance with subparts H, P, and T of this part (as applicable), then the additional *Cryptosporidium* treatment requirements are . . .			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment.
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	[1]
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	[2]
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	[3]

[1] As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
[2] As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
[3] As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

(b)(1) Filtered systems must use one or more of the treatment and management options listed in § 141.715, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in paragraph (a) of this section.

(2) Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under paragraph (a) of this section using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in §§ 141.716 through 141.720.

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in §§ 141.716 through 141.720 for microbial toolbox options that is at least equal to the level of treatment required in paragraph (a) of this section is a violation of the treatment technique requirement.

(d) If the State determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under § 141.701(a) or § 141.701(b), significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the State to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in § 141.715.

§ 141.712 Unfiltered system *Cryptosporidium* treatment requirements.

(a) *Determination of mean Cryptosporidium level.* (1) Following completion of the initial source water monitoring required under § 141.701(a), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under § 141.701(a). Systems must report this value to the State for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in § 141.701(c).

(2) Following completion of the second round of source water monitoring required under § 141.701(b), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under § 141.701(b). Systems must report this value to the State for approval no later than 6 months after the month the system is required to complete the second round of source water monitoring based on the schedule in § 141.701(c).

(3) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level in paragraphs (a)(1) or (2) of this section.

(4) The report to the State of the mean *Cryptosporidium* levels calculated under paragraphs (a)(1) and (2) of this section must include a summary of the source water monitoring data used for the calculation.

(5) Failure to comply with the conditions of paragraph (a) of this section is a violation of the treatment technique requirement.

(b) *Cryptosporidium inactivation requirements.* Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in this paragraph, based on their mean *Cryptosporidium* levels as determined under paragraph (a) of this section and according to the schedule in § 141.713.

(1) Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.

(2) Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3-log *Cryptosporidium* inactivation.

(c) *Inactivation treatment technology requirements.* Unfiltered systems must use chlorine dioxide, ozone, or UV as described in § 141.720 to meet the *Cryptosporidium* inactivation requirements of this section.

(1) Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section on more than one day in the calendar month are in violation of the treatment technique requirement.

(2) Systems that use UV light and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section by meeting the criteria in § 141.720(d)(3)(ii) are in violation of the treatment technique requirement.

(d) *Use of two disinfectants.* Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of this section and *Giardia lamblia* and virus inactivation requirements of § 141.72(a) using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either *Cryptosporidium*, *Giardia lamblia*, or viruses.

§ 141.713 Schedule for compliance with *Cryptosporidium* treatment requirements.

(a) Following initial bin classification under § 141.710(c), filtered systems must provide the level of treatment for *Cryptosporidium* required under § 141.711 according to the schedule in paragraph (c) of this section.

(b) Following initial determination of the mean *Cryptosporidium* level under § 141.712(a)(1), unfiltered systems must provide the level of treatment for *Cryptosporidium* required under § 141.712 according to the schedule in paragraph (c) of this section.

(c) *Cryptosporidium treatment compliance dates.*

CRYPTOSPORIDIUM TREATMENT COMPLIANCE DATES TABLE

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

[a] States may allow up to an additional two years for complying with the treatment requirement for systems making capital improvements.

(d) If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under § 141.710(d), the system must provide the level of treatment for *Cryptosporidium* required under § 141.711 on a schedule the State approves.

(e) If the mean *Cryptosporidium* level for an unfiltered system changes following the second round of monitoring, as determined under § 141.712(a)(2), and if the system must provide a different level of *Cryptosporidium* treatment under § 141.712 due to this change, the system must meet this treatment requirement on a schedule the State approves.

§ 141.714 Requirements for uncovered finished water storage facilities.

(a) Systems using uncovered finished water storage facilities must comply with the conditions of this section.

(b) Systems must notify the State of the use of each uncovered finished water storage facility no later than April 1, 2008.

(c) Systems must meet the conditions of paragraph (c)(1) or (2) of this section for each uncovered finished water storage facility or be in compliance with a State-approved schedule to meet these conditions no later than April 1, 2009.

(1) Systems must cover any uncovered finished water storage facility.

(2) Systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium* using a protocol approved by the State.

(d) Failure to comply with the requirements of this section is a violation of the treatment technique requirement.

Requirements for Microbial Toolbox Components

§ 141.715 Microbial toolbox options for meeting *Cryptosporidium* treatment requirements.

(a)(1) Systems receive the treatment credits listed in the table in paragraph (b) of this section by meeting the conditions for microbial toolbox options described in §§ 141.716 through 141.720. Systems apply these treatment credits to meet the treatment requirements in § 141.711 or § 141.712, as applicable.

(2) Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in § 141.720 only.

(b) The following table summarizes options in the microbial toolbox:

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
(1) Watershed control program	0.5-log credit for State-approved program comprising required elements, annual program status report to State, and regular watershed survey. Unfiltered systems are not eligible for credit. Specific criteria are in § 141.716(a).
(2) Alternative source/intake management	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in § 141.716(b).
Pre Filtration Toolbox Options	
(3) Presedimentation basin with coagulation	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative State-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through basins. Specific criteria are in § 141.717(a).
(4) Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in § 141.717(b).
(5) Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in § 141.717(c).
Treatment Performance Toolbox Options	
(6) Combined filter performance	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria are in § 141.718(a).
(7) Individual filter performance	0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in § 141.718(b).
(8) Demonstration of performance	Credit awarded to unit process or treatment train based on a demonstration to the State with a State- approved protocol. Specific criteria are in § 141.718(c).

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA—Continued

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Additional Filtration Toolbox Options	
(9) Bag or cartridge filters (individual filters)	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in § 141.719(a).
(10) Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in § 141.719(a).
(11) Membrane filtration	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in § 141.719(b).
(12) Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in § 141.719(c)
(13) Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in § 141.719(d).
Inactivation Toolbox Options	
(14) Chlorine dioxide	Log credit based on measured CT in relation to CT table. Specific criteria in § 141.720(b)
(15) Ozone	Log credit based on measured CT in relation to CT table. Specific criteria in § 141.720(b).
(16) UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in § 141.720(d).

§ 141.716 Source toolbox components.

(a) *Watershed control program.* Systems receive 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of this section.

(1) Systems that intend to apply for the watershed control program credit must notify the State of this intent no later than two years prior to the treatment compliance date applicable to the system in § 141.713.

(2) Systems must submit to the State a proposed watershed control plan no later than one year before the applicable treatment compliance date in § 141.713. The State must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the elements in paragraphs (a)(2)(i) through (iv) of this section.

(i) Identification of an "area of influence" outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under paragraph (a)(5)(ii) of this section.

(ii) Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system's source water quality.

(iii) An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system's source water.

(iv) 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 their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

(3) Systems with existing watershed control programs (*i.e.*, programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in paragraph (a)(2) of this section and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

(4) If the State does not respond to a system regarding approval of a watershed control plan submitted under this section and the system meets the other requirements of this section, the watershed control program will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded unless and until the State subsequently withdraws such approval.

(5) Systems must complete the actions in paragraphs (a)(5)(i) through (iii) of this section to maintain the 0.5-log credit.

(i) Submit an annual watershed control program status report to the State. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the State or as the result of the watershed survey conducted under paragraph (a)(5)(ii) of this section. It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the State prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

(ii) 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 the State. The survey must be conducted according to State guidelines and by persons the State approves.

(A) The watershed sanitary survey must meet the following criteria: encompass the region identified in the State-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.

(B) If the State determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the State requires, which may be earlier than the regular date in paragraph (a)(5)(ii) of this section.

(iii) The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon

request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The State may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.

(6) If the State determines that a system is not carrying out the approved watershed control plan, the State may withdraw the watershed control program treatment credit.

(b) *Alternative source.* (1) A system 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 (alternative source monitoring). If the State approves, a system may determine its bin classification under § 141.710 based on the alternative source monitoring results.

(2) If systems conduct alternative source monitoring under paragraph (b)(1) of this section, systems must also monitor their current plant intake concurrently as described in § 141.701.

(3) Alternative source monitoring under paragraph (b)(1) of this section must meet the requirements for source monitoring to determine bin classification, as described in §§ 141.701 through 141.706. Systems must report the alternative source monitoring results to the State, along with supporting information documenting the operating conditions under which the samples were collected.

(4) If a system determines its bin classification under § 141.710 using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in § 141.713.

§ 141.717 Pre-filtration treatment toolbox components.

(a) *Presedimentation.* Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.

(1) The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or GWUDI source.

(2) The system must continuously add a coagulant to the presedimentation basin.

(3) The presedimentation basin must achieve the performance criteria in paragraph (3)(i) or (ii) of this section.

(i) Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\log_{10}$(monthly mean of daily influent turbidity) – $\log_{10}$(monthly mean of daily effluent turbidity).

(ii) Complies with State-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

(b) *Two-stage lime softening.* Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.

(c) *Bank filtration.* Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring under § 141.701(a) must collect samples as described in § 141.703(d) and are not eligible for this credit.

(1) Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in paragraph (c)(4) of this section.

(2) Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.

(3) Only horizontal and vertical wells are eligible for treatment credit.

(4) 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 or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

(5) 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 levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the State and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the State determines that microbial removal has been compromised, the State may revoke treatment credit until the system implements corrective actions approved by the State to remediate the problem.

(6) Springs and infiltration galleries are not eligible for treatment credit under this section, but are eligible for credit under § 141.718(c).

(7) *Bank filtration demonstration of performance.* The State may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in paragraphs (c)(1)–(5) of this section.

(i) The study must follow a State-approved protocol and must involve the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.

(ii) The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

§ 141.718 Treatment performance toolbox components.

(a) *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 system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in § 141.74(a) and (c).

(b) *Individual filter performance.* Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be in

addition to the 0.5-log credit under paragraph (a) of this section, during any month the system meets the criteria in this paragraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in § 141.174 or § 141.560, as applicable.

(1) The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.

(2) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

(3) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of paragraph (b)(1) or (2) of this section during any month does not receive a treatment technique violation under § 141.711(c) if the State determines the following:

(i) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.

(ii) The system has experienced no more than two such failures in any calendar year.

(c) *Demonstration of performance.* The State may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in § 141.711 or §§ 141.717 through 141.720 and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(1) Systems cannot receive the prescribed treatment credit for any toolbox box option in §§ 141.717 through 141.720 if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

(2) The demonstration of performance study must follow a State-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

(3) Approval by the State must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The State may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

§ 141.719 Additional filtration toolbox components.

(a) *Bag and cartridge filters.* Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in paragraphs (a)(1) through (10) of this section. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of paragraphs (a)(2) through (9) of this section to the State. The filters must treat the entire plant flow taken from a subpart H source.

(1) The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in paragraphs (a)(2) through (a)(9) of this section. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria specified in paragraphs (a)(2) through (9) of this section.

(2) Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium.* Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(3) Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium.* The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.

(4) The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation:

$$\text{Maximum Feed Concentration} = 1 \times 10^4 \times (\text{Filtrate Detection Limit})$$

(5) Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

(6) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this subpart.

(7) Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$$LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$$

Where:

LRV = log removal value demonstrated during challenge testing; C_f = the feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p must be set equal to the detection limit.

(8) Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV_{filter}) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

(9) If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest LRV_{filter} among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of LRV_{filter} values for the various filters tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(10) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of

the modified filter must be conducted and submitted to the State.

(b) *Membrane filtration.* (1) Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in § 141.2 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under paragraph (b)(1)(i) and (ii) of this section.

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (b)(2) of this section.

(ii) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in paragraph (b)(3) of this section.

(2) *Challenge Testing.* The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the State. Challenge testing must be conducted according to the criteria in paragraphs (b)(2)(i) through (vii) of this section. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in paragraphs (b)(2)(i) through (vii) of this section.

(i) Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

(ii) Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.

(iii) The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation:

$$\text{Maximum Feed Concentration} = 3.16 \times 10^6 \times (\text{Filtrate Detection Limit})$$

(iv) Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (*i.e.*, backwashing).

(v) Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation:

$$LRV = LOG_{10}(C_f) \times LOG_{10}(C_p)$$

Where:

LRV = log removal value demonstrated during the challenge test; C_f = the feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term C_p is set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

(vi) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($LRV_{C\text{-}Test}$). If fewer than 20 modules are tested, then $LRV_{C\text{-}Test}$ is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then $LRV_{C\text{-}Test}$ is equal to the 10th percentile of the representative LRVs among the modules tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(vii) The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

(viii) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the State.

(3) *Direct integrity testing.* Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and meets the requirements described in paragraphs (b)(3)(i) through (vi) of this section. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (*i.e.*, one or more leaks that could result in contamination of the filtrate).

(i) The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.

(ii) The direct integrity method must have a resolution of 3 micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.

(iii) The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the State, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either paragraph (b)(3)(iii)(A) or (B) of this section as applicable to the type of direct integrity test the system uses.

(A) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

$$LRV_{DIT} = LOG_{10}(Q_p / (VCF \times Q_{breach}))$$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test; Q_p = total design filtrate flow from the membrane unit; Q_{breach} = flow of water from an

integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

(B) For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

$$LRV_{DIT} = LOG_{10}(C_f) - LOG_{10}(C_p)$$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test; C_f = the typical feed concentration of the marker used in the test; and C_p = the filtrate concentration of the marker from an integral membrane unit.

(iv) Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the State.

(v) If the result of a direct integrity test exceeds the control limit established under paragraph (b)(3)(iv) of this section, the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.

(vi) Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The State may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.

(4) *Indirect integrity monitoring.* Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in paragraphs (b)(4)(i) through (v) of this section. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in paragraphs (b)(3)(i) through (v) of this section is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the State summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

(i) Unless the State approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

(ii) Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.

(iii) Continuous monitoring must be separately conducted on each membrane unit.

(iv) If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (i.e., two consecutive 15-minute readings above 0.15 NTU), direct integrity testing must immediately be performed on the associated membrane unit as specified in paragraphs (b)(3)(i) through (v) of this section.

(v) If indirect integrity monitoring includes a State-approved alternative parameter and if the alternative parameter exceeds a State-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in paragraphs (b)(3)(i) through (v) of this section.

(c) *Second stage filtration.* Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the State approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The State must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

(d) *Slow sand filtration (as secondary filter).* Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The State must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

§ 141.720 Inactivation toolbox components.

(a) *Calculation of CT values.* (1) CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under paragraph (b) or (c) of this section must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in §§ 141.74(a) through (b).

(2) Systems with several 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.

(b) *CT values for chlorine dioxide and ozone.* (1) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in paragraph (a) of this section.

CT VALUES (MG-MIN/L) FOR *Cryptosporidium* INACTIVATION BY CHLORINE DIOXIDE [1]

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25	159	153	140	128	107	90	69	45	29	19	12
(ii) 0.5	319	305	279	256	214	180	138	89	58	38	24
(iii) 1.0	637	610	558	511	429	360	277	179	116	75	49
(iv) 1.5	956	915	838	767	643	539	415	268	174	113	73
(v) 2.0	1275	1220	1117	1023	858	719	553	357	232	150	98
(vi) 2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122

CT VALUES (MG·MIN/L) FOR *Cryptosporidium* INACTIVATION BY CHLORINE DIOXIDE [1]—Continued

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(vii) 3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = $(0.001506 \times (1.09116)^{Temp}) \times CT$.

(2) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in paragraph (a) of this section.

CT VALUES (MG·MIN/L) FOR *Cryptosporidium* INACTIVATION BY OZONE [1]

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
(ii) 0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
(iii) 1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
(iv) 1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
(v) 2.0	48	46	42	38	32	26	20	12	7.8	4.9	3.1
(vi) 2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
(vii) 3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = $(0.0397 \times (1.09757)^{Temp}) \times CT$.

(c) *Site-specific study.* The State may approve alternative chlorine dioxide or ozone CT values to those listed in paragraph (b) of this section on a site-specific basis. The State must base this approval on a site-specific study a system conducts that follows a State-approved protocol.

(d) *Ultraviolet light.* Systems receive *Cryptosporidium, Giardia lamblia,* and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in paragraph (d)(1) of this section. Systems must validate and monitor UV reactors as described in paragraphs (d)(2) and (3) of this section to demonstrate that they are achieving a particular UV dose value for treatment credit.

(1) *UV dose table.* The treatment credits listed in this table are for UV light at a wavelength of 254 nm as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing, as described in paragraph (d)(2) of this section. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.

UV DOSE TABLE FOR *Cryptosporidium, Giardia lamblia,* AND VIRUS INACTIVATION CREDIT

Log credit	*Cryptosporidium* UV dose (mJ/cm^2)	*Giardia lamblia* UV dose (mJ/cm^2)	Virus UV dose (mJ/cm^2)
(i) 0.5	1.6	1.5	39
(ii) 1.0	2.5	2.1	58
(iii) 1.5	3.9	3.0	79
(iv) 2.0	5.8	5.2	100
(v) 2.5	8.5	7.7	121
(vi) 3.0	12	11	143
(vii) 3.5	15	15	163
(viii) 4.0	22	22	186

(2) *Reactor validation testing.* Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in paragraph (d)(1) of this section (*i.e.*, validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

(i) When determining validated operating conditions, systems must account for the following factors: 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; and inlet and outlet piping or channel configurations of the UV reactor.

(ii) Validation testing must include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.

(iii) The State may approve an alternative approach to validation testing.

(3) *Reactor monitoring.* (i) Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under paragraph (d)(2) of this section. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the State designates

based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the State approves.

(ii) To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as described in paragraphs (d)(1) and (2) of this section. Systems must demonstrate compliance with this condition by the monitoring required under paragraph (d)(3)(i) of this section.

Reporting and Recordkeeping Requirements

§ 141.721 Reporting requirements.

(a) Systems must report sampling schedules under § 141.702 and source water monitoring results under § 141.706 unless they notify the State that they will not conduct source water monitoring due to meeting the criteria of § 141.701(d).

(b) Systems must report the use of uncovered finished water storage facilities to the State as described in § 141.714.

(c) Filtered systems must report their *Cryptosporidium* bin classification as described in § 141.710.

(d) Unfiltered systems must report their mean source water *Cryptosporidium* level as described in § 141.712.

(e) Systems must report disinfection profiles and benchmarks to the State as described in §§ 141.708 through 141.709 prior to making a significant change in disinfection practice.

(f) Systems must report to the State in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under § 141.711 or § 141.712. Alternatively, the State may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox option	Systems must submit the following information	On the following schedule
(1) Watershed control program (WCP).	(i) Notice of intention to develop a new or continue an existing watershed control program.	No later than two years before the applicable treatment compliance date in § 141.713
	(ii) Watershed control plan	No later than one year before the applicable treatment compliance date in § 141.713.
	(iii) Annual watershed control program status report	Every 12 months, beginning one year after the applicable treatment compliance date in § 141.713.
	(iv) Watershed sanitary survey report	For community water systems, every three years beginning three years after the applicable treatment compliance date in § 141.713. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in § 141.713.
(2) Alternative source/intake management.	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date in § 141.713.
(3) Presedimentation	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.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(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 plant flow.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(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).	No later than the applicable treatment compliance date in § 141.713.
	(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..	Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(6) Combined filter performance.	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(7) Individual filter performance.	Monthly verification of the following: (i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.]
(8) Demonstration of performance.	(i) Results from testing following a State approved protocol.	No later than the applicable treatment compliance date in § 141.713.
	(ii) As required by the State, monthly verification of operation within conditions of State approval for demonstration of performance credit.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS—Continued

Toolbox option	Systems must submit the following information	On the following schedule
(9) Bag filters 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.	No later than the applicable treatment compliance date in § 141.713.
	(ii) Monthly verification that 100% of plant flow was filtered.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(10) Membrane filtration	(i) Results of verification testing demonstrating the following: (A) Removal efficiency established through challenge testing that meets criteria in this subpart; (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.	No later than the applicable treatment compliance date in § 141.713.
	(ii) Monthly report summarizing the following: (A) All direct integrity tests above the control limit; (B) If applicable, any turbidity or alternative state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(11) 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 monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(12) 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 monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(13) Chlorine dioxide	Summary of CT values for each day as described in § 141.720..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(14) Ozone	Summary of CT values for each day as described in § 141.720..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(15) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose.	No later than the applicable treatment compliance date in § 141.713.
	(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 as specified in 141.720(d)..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.

§ 141.722 Recordkeeping requirements.

(a) Systems must keep results from the initial round of source water monitoring under § 141.701(a) and the second round of source water monitoring under § 141.701(b) until 3 years after bin classification under § 141.710 for filtered systems or determination of the mean *Cryptosporidium* level under § 141.710 for unfiltered systems for the particular round of monitoring.

(b) Systems must keep any notification to the State that they will not conduct source water monitoring due to meeting the criteria of § 141.701(d) for 3 years.

(c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under §§ 141.716 through 141.720 and with uncovered finished water reservoirs under § 141.714, as applicable, for 3 years.

Requirements for Sanitary Surveys Performed by EPA

§ 141.723 Requirements to respond to significant deficiencies identified in sanitary surveys performed by EPA.

(a) A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.

(b) For the purposes of this section, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that EPA determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

(c) For sanitary surveys performed by EPA, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.

(d) Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by EPA, or if there is no approved schedule, according to the schedule reported under paragraph (c) of this section if such deficiencies are within the control of the system.

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

■ 8. The authority citation for part 142 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-4, 300j-9 and 300j-11.

■ 9. Section 142.14 is amended by adding paragraph (a)(9) to read as follows:

§ 142.14 Records kept by States.

* * * * *

(a) * * *

(9) Any decisions made pursuant to the provisions of part 141, subpart W of this chapter.

(i) Results of source water *E. coli* and *Cryptosporidium* monitoring.

(ii) The bin classification after the initial and after the second round of source water monitoring for each filtered system, as described in § 141.710 of this chapter.

(iii) Any change in treatment requirements for filtered systems due to watershed assessment during sanitary surveys, as described in § 141.711(d) of this chapter.

(iv) The determination of whether the mean *Cryptosporidium* level is greater than 0.01 oocysts/L after the initial and after the second round of source water monitoring for each unfiltered system, as described in § 141.712(a) of this chapter.

(v) The treatment processes or control measures that systems use to meet their *Cryptosporidium* treatment requirements under § 141.711 or § 141.712 of this chapter.

(vi) A list of systems required to cover or treat the effluent of an uncovered finished water storage facility, as specified in § 141.714 of this chapter.

* * * * *

■ 10. Section 142.15 is amended by adding paragraph (c)(6) to read as follows:

§ 142.15 Reports by States.

(c) * * *

(6) *Subpart W.* (i) The bin classification after the initial and after the second round of source water monitoring for each filtered system, as described in § 141.710 of this chapter.

(ii) Any change in treatment requirements for these systems due to watershed assessment during sanitary surveys, as described in § 141.711(d) of this chapter.

(iii) The determination of whether the mean *Cryptosporidium* level is greater than 0.01 oocysts/L both after the initial and after the second round of source water monitoring for each unfiltered system, as described in § 141.712(a) of this chapter.

* * * * *

■ 11. Section 142.16 is amended by adding paragraph (n) to read as follows:

§ 142.16 Special primacy conditions.

* * * * *

(n) *Requirements for States to adopt 40 CFR part 141, subpart W.* In addition to the general primacy requirements elsewhere in this part, including the requirements that State regulations be at least as stringent as Federal requirements, an application for approval of a State program revision that adopts 40 CFR part 141, subpart W, must contain a description of how the State will accomplish the following program requirements where allowed in State programs.

(1) Approve an alternative to the *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people, as described in § 141.701(a)(5).

(2) Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action for systems, as described in § 141.711(d) of this chapter.

(3) Approve watershed control programs for the 0.5-log treatment credit in the microbial toolbox, as described in § 141.716(a) of this chapter.

(4) Approve protocols for demonstration of performance treatment credits in the microbial toolbox, as allowed under § 141.718(c) of this chapter.

(5) Approve protocols for alternative ozone and chlorine dioxide CT values in the microbial toolbox, as allowed under § 141.720(c) of this chapter.

(6) Approve an alternative approach to UV reactor validation testing in the microbial toolbox, as allowed under § 141.720(d)(2)(iii) of this chapter.

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Appendix C

Rule Fact Sheets/Quick Reference Guides

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LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet

WHAT IS THE LT2ESWTR?

The U.S. Environmental Protection Agency (EPA) published the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) on January 5, 2006. The LT2ESWTR improves control of microbial pathogens. The LT2ESWTR requires source water monitoring at public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI) (i.e., Subpart H PWSs). Based on system size and filtration type, systems need to monitor for *Cryptosporidium*, *E. coli*, and turbidity.

WHAT IS THE PURPOSE OF SOURCE WATER MONITORING?

Source water monitoring data will be used to categorize the source water *Cryptosporidium* concentration into one of four "bin" classifications that have associated treatment requirements. The LT2ESWTR provides other options for systems to comply with the **initial** source water monitoring requirements:

- Submit data from *Cryptosporidium* samples collected before the system must begin source water monitoring (i.e., Grandfathered), and the data must meets certain requirements.

- Filtered systems may skip source water monitoring and commit to provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirement of Bin 4. Unfiltered systems skip source water monitoring and commit to provide a total of at least 3-log *Cryptosporidium* inactivation, which is equal to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L. Systems that decide to skip monitoring and provide maximum treatment must notify the state in writing.

A **second round** of source water monitoring will follow 6 years after the system makes its initial bin determination. Grandfathering is not available for the second round of source water monitoring.

Note: *E. coli* and turbidity data may not be grandfathered unless the system is also grandfathering corresponding *Cryptosporidium* data.

WHAT ARE THE INITIAL SOURCE WATER MONITORING REQUIREMENTS?

The source water monitoring requirements of the LT2ESWTR apply to all Subpart H PWSs. You are subject to initial source water monitoring requirements if you do not have existing monitoring data that meets grandfathering requirements. For more information on source water monitoring requirements, see EPA's *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (EPA 815-R06-005 February 2006), available at www.epa.gov/safewater/disinfection/lt2/compliance.html.

Prior to beginning initial source water monitoring, you must submit a sampling schedule that specifies the calendar dates when you will collect the required source water samples. The samples must be evenly spaced throughout the monitoring period (e.g., monthly on the 15th of each month). However, the schedule may be altered to take into account holidays, weekends, or other events. All the samples must be taken within a 5-day window (i.e., you can take the sample up to 2 days before or 2 days after

the date indicated in the schedule). In addition, you must submit a description of the intended sampling location in relation to the source and any treatment processes, as well as a description of any points of chemical addition, and filter backwash recycle.

- **FILTERED SYSTEMS SERVING AT LEAST 10,000 PEOPLE** - You must collect *Cryptosporidium*, *E. coli* and turbidity samples at least monthly for 24 months.

- **UNFILTERED SYSTEMS SERVING AT LEAST 10,000 PEOPLE** - You must sample for *Cryptosporidium* at least monthly for 24 months.

Alternately, you may notify the EPA or the state that you elect not to conduct source water monitoring and commit to providing the maximum treatment of 5.5 log removal or inactivation for filtered systems or 3-log inactivation for unfiltered systems.

WHEN MUST I COMPLY WITH THE MONITORING REQUIREMENTS?

The system compliance schedule is based on the population served by your system. **A PWS must conduct monitoring based on the requirements of the largest system in the combined distribution system.** The interconnected wholesale/consecutive systems relationships have been determined by the state.

Systems that serve...	≥ 100,000 people (Schedule 1) [1]	50,000 to 99,999 people (Schedule 2) [1]	10,000 to 49,999 people (Schedule 3) [1]
Submit: Sample Schedule and Sample Location Description	July 1, 2006	January 1, 2007	January 1, 2008
Must begin the first round of source water monitoring by...	October 2006	April 2007	April 2008
Submit Grandfathered Data (if applicable)	December 1, 2006	June 1, 2007	June 1, 2008
Submit Bin Classification (Filtered) or Mean *Cryptosporidium* Level (Unfiltered)	March 2009	September 2009	September 2010
Comply with additional LT2ESWTR treatment technique requirements[2]	April 1, 2012	October 1, 2012	October 1, 2013
Must begin the second round of source water monitoring by...	April 2015	October 2015	October 2016

[1] Your schedule is defined by the largest system in your combined distribution system.

[2] State may allow up to an additional 2 years for capital improvements to comply with the treatment technique.

WHAT IS A BIN CLASSIFICATION?

FILTERED SYSTEMS SERVING AT LEAST 10,000 PEOPLE - You will be classified into a "bin" based on the results of your source water monitoring. Your bin classification determines whether further treatment for *Cryptosporidium* is required. A second round of source water monitoring is required 6 years after your initial bin classification and may affect your bin classification.

For systems that are:	Mean *Cryptosporidium* Concentration[1]	Bin Classification
...required to monitor for *Cryptosporidium*	< 0.075 oocysts/L	Bin 1
	from 0.075 to < 1.0 oocysts/L	Bin 2
	from 1.0 to < 3.0 oocysts/L	Bin 3
	≥ 3.0 oocysts/L	Bin 4

[1] Samples must be analyzed by an approved laboratory and use EPA method 1622 or 1623.

ADDITIONAL TREATMENT REQUIREMENTS FOR FILTERED SYSTEMS - Additional treatment is required if the bin classification is a 2, 3, or 4. Refer to the table below for the additional *Cryptosporidium* treatment requirements.

Bin Classification	If the system uses the following filtration treatment in full compliance with existing requirements, then the additional *Cryptosporidium* treatment requirements are...			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	(1)
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	(2)
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	(3)

(1) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
(2) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
(3) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

For information on the toolbox options that can be used to achieve additional log removal requirements, see the *Long Term 2 Enhanced Surface Water Treatment Rule Toolbox Guidance Manual* (draft version anticipated late 2006).

UNFILTERED SYSTEMS SERVING AT LEAST 10,000 PEOPLE - You must calculate an arithmetic mean of all *Cryptosporidium* samples concentrations required. Following completion of the second round of source water monitoring, you must provide a level of inactivation for *Cryptosporidium* based on the arithmetic mean of your *Cryptosporidium* sample concentrations.

For systems that are:	Mean *Cryptosporidium* Concentration[1]	*Cryptosporidium* inactivation
Unfiltered	≤ 0.01 oocysts/L	2-log
	> 0.01 oocysts/L	3-log

[1] Samples must be analyzed by an approved laboratory and use EPA method 1622 or 1623.

ARE YOU CONSIDERING MAKING A CHANGE TO YOUR DISINFECTION PRACTICES?

After completing the initial round of source water monitoring, systems that plan to make a significant change to their disinfection practice must notify the state, develop disinfection profiles, and calculate disinfection benchmarks for *Giardia lamblia* and viruses. To develop a profile and benchmark, PWSs must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. The disinfection benchmark is an indicator of disinfection effectiveness and depends upon the inactivation of *Giardia lamblia* or viruses. The benchmark is determined by calculating the average daily inactivation value for each of 12 consecutive months. The lowest monthly average becomes the disinfection benchmark. If the PWS has data from more than 1 year, the benchmark is the average of the lowest monthly average value for each of the years. A PWS may use grandfathered data that is substantially equivalent to develop the disinfection profiles for *Giardia lamblia* and viruses. The Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) Disinfection Profiling and Benchmarking Technical Guidance Manual (EPA 816-R-03-004, May 2003), provides guidance for developing a disinfection profile and benchmark. EPA has developed two tools for systems to determine their disinfection profile and calculate the benchmark at the following website: http://www.epa.gov/safewater/mdbp/lt1eswtr.html.

ADDITIONAL GUIDANCE MATERIALS

The following guidance document addresses the source water monitoring requirements for the LT2ESWTR:

- *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (EPA 815-R06-005 February 2006) - Provides surface water systems, laboratories, states, and Tribes with a review of the source water monitoring provisions. The source water monitoring guidance manual provides direction to the systems on how, where and when to monitor, how to report the data, how to submit "grandfathered" data (e.g., previously collected data), and how the data can be evaluated and used to determine risk bin classification.

For additional guidance on implementing the LT2ESWTR, you may refer to the following existing and future EPA materials:

- LT2ESWTR Quick Reference Guides (Schedules 1 - 3)
- On-line Microscopy Training Module
- On-line Sample Collection Module
- *Microbial Laboratory Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (EPA 815-R06-006 February 2006)
- *Membrane Filtration Guidance Manual* (EPA 815-R-06-009 November 2005)
- Membrane Filtration Guidance Manual: Overview and Summary Factsheet (www.epa.gov/safewater/disinfection/lt2/pdfs/guide_lt2_membranefiltration_fs_final.pdf)
- *Ultraviolet Disinfection Guidance Manual and Workbook* (final version anticipated mid-2006)
- *Simultaneous Compliance Guidance Manual for Stage 2 Rules* (draft version anticipated mid-2006)
- *Long Term 2 Enhanced Surface Water Treatment Rule Toolbox Guidance Manual* (draft version anticipated late 2006)

For additional information, please contact the Safe Drinking Water Hotline at 1-800-426-4791, send an email to stage2mdbp@epa.gov, or visit www.epa.gov/safewater/disinfection/lt2.

LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet

WHAT IS THE LT2ESWTR?

The U.S. Environmental Protection Agency (EPA) published the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) on January 5, 2006. The LT2ESWTR improves control of microbial pathogens. The LT2ESWTR requires source water monitoring at public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI) (i.e., Subpart H PWSs). Based on system size and filtration type, systems need to monitor for *Cryptosporidium*, *E. coli*, and turbidity. This factsheet is for systems that serve less than 10,000 people. **Note, if you sell water to a system that serves greater than 10,000 people or are part of a combined distribution system and one of the consecutive systems has a population greater than 10,000 people, please refer to the *LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet* (EPA 816-F-06-017).**

WHAT IS THE PURPOSE OF SOURCE WATER MONITORING?

Source water monitoring data will be used to categorize the source water *Cryptosporidium* concentration in to one of four "bin" classifications that have associated treatment requirements. The LT2ESWTR provides other options for systems to comply with the **initial** source water monitoring requirements:

- Submit data from *Cryptosporidium* samples collected before the system must begin source water monitoring and the data must meets certain requirements.

- Filtered systems may skip source water monitoring and commit to provide a total of at least 5.5 log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirement of Bin 4. Unfiltered systems skip source water monitoring and commit to provide a total of at least 3-log *Cryptosporidium* inactivation, which is equal to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L. Systems that decide to skip monitoring and provide maximum treatment must notify the state in writing.

A **second round** of source water monitoring will follow 6 years after the system makes its initial bin determination. Grandfathering is not available for the second round of source water monitoring.

WHAT ARE THE INITIAL SOURCE WATER MONITORING REQUIREMENTS?

The source water monitoring requirements of LT2ESWTR apply to all Subpart H PWSs. You are subject to initial source water monitoring requirements if you do not have prior monitoring data that meets grandfathering requirements. For more information on source water monitoring requirements see EPA's *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (EPA 815-R06-005 February 2006), available at www.epa.gov/safewater/disinfection/lt2/compliance.html.

Two options systems serving less than 10,000 people have to comply with the source water monitoring requirements are:

- Conduct *E. coli* monitoring first and based on those results, the system may or may not need to conduct *Cryptosporidium* monitoring, or
- Systems may go directly to *Cryptosporidium* monitoring.

Prior to beginning initial source water monitoring, you must submit a sampling schedule that specifies the calendar dates when you will collect the required source water samples. The samples must be evenly spaced throughout the monitoring period (e.g., monthly on the 15th of each month). However, the schedule may be altered to take into account holidays, weekends, or other events. All the samples must be taken within a 5-day window (i.e., you can take the sample up to 2 days before or 2 days after the date indicated in the schedule). In addition, you

must submit a description of the intended sampling location in relation to the source and any treatment processes, as well as a description of any points of chemical addition, and filter backwash recycle.

FILTERED SYSTEMS SERVING LESS THAN 10,000 PEOPLE - You should collect *E. coli* samples at least once every 2 weeks for 12 months. You will then be required to monitor for *Cryptosporidium* at least twice per month for 12 months, or at least once per month for 24 months, if either of the following conditions are met:

- For systems using lakes or reservoirs, if the mean annual *E. coli* concentration is greater than 10 *E. coli*/100 mL. This also applies to GWUDI systems if the nearest surface water body is a lake or reservoir.
- For systems using flowing stream sources, if the mean annual *E. coli* concentration is greater than 50 *E. coli*/100 mL. This also applies to GWUDI systems if the nearest surface water body is a flowing stream, or if there is no nearby surface water.

A system may choose to notify EPA or the state it will not collect the *E. coli* samples, but you will collect *Cryptosporidium* samples at least twice per month for 12 months, or at least once per month for 24 months.

UNFILTERED SYSTEMS SERVING LESS THAN 10,000 PEOPLE - You must sample for *Cryptosporidium* at least twice per month for 12 months, or at least once per month for 24 months.

WHEN MUST I COMPLY WITH THE MONITORING REQUIREMENTS?

The system compliance schedule is based on the population served by your system. **A PWS must conduct monitoring based on the requirements of the largest system in the combined distribution system.** The interconnected wholesale/consecutive systems relationships have been determined by the state.

Systems that serve...	< 10,000 and monitor for *E. coli* [1]	< 10,000 and monitor for *Cryptosporidium* [2]
Submit: Sample Schedule and Sample Location Description	July 1, 2008	January 1, 2010
Must begin the first round of source water monitoring by...	October 2008	April 2010
Submit Grandfathered Data (if applicable)	December 1, 2008	June 1, 2010
Submit Bin Classification (Filtered) or Mean *Cryptosporidium* Level (Unfiltered)		September 2012
Comply with additional LT2ESWTR treatment technique requirements[3]		October 1, 2014
Must begin the second round of source water monitoring by...	October 1, 2017	April 1, 2019

[1] Applies only to filtered systems.

[2] Applies to filtered systems that exceed the *E. coli* trigger or do not monitor for *E. coli* and to unfiltered systems.

[3] State may allow up to an additional 2 years for capital improvements to comply with the treatment technique.

WHAT IS A BIN CLASSIFICATION?

FILTERED SYSTEMS SERVING LESS THAN 10,000 PEOPLE - You will be classified into a "bin" based on the results of your source water monitoring. Your bin classification determines whether further treatment for *Cryptosporidium* is required. A second round of source water monitoring is required 6 years after your initial bin classification and may affect your bin classification.

For systems that are:	Mean *Cryptosporidium* Concentration[1]	Bin Classification
...required to monitor for *Cryptosporidium*	< 0.075 oocysts/L	Bin 1
	from 0.075 to < 1.0 oocysts/L	Bin 2
	from 1.0 to < 3.0 oocysts/L	Bin 3
	≥ 3.0 oocysts/L	Bin 4
... not required to monitor for *Cryptosporidium* [2]	N/A	Bin 1

[1] Samples must be analyzed by an approved laboratory and use EPA method 1622 or 1623.

[2] Only for systems that do not exceed the *E. coli* trigger level.

ADDITIONAL TREATMENT REQUIREMENTS FOR FILTERED SYSTEMS - Additional treatment may be required based on your bin classification. Refer to the table below for the additional *Cryptosporidium* treatment requirements.

Bin Classification	If the system uses the following filtration treatment in full compliance with existing requirements, then the additional *Cryptosporidium* treatment requirements are...			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	(1)
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	(2)
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	(3)

(1) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.

(2) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.

(3) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

For information on the toolbox options that can be used to achieve additional log removal requirements, see the *Long Term 2 Enhanced Surface Water Treatment Rule Toolbox Guidance Manual* (draft version anticipated late 2006).

UNFILTERED SYSTEMS SERVING LESS THAN 10,000 PEOPLE - You must calculate an arithmetic mean of all *Cryptosporidium* samples concentrations required. Following completion of the second round of source water monitoring, you must provide a level of inactivation for *Cryptosporidium* based on the arithmetic mean of your *Cryptosporidium* sample concentrations.

For systems that are:	Mean *Cryptosporidium* Concentration[1]	*Cryptosporidium* inactivation
Unfiltered	≤ 0.01 oocysts/L	2-log
	> 0.01 oocysts/L	3-log

[1] Samples must be analyzed by an approved laboratory and use EPA method 1622 or 1623.

ARE YOU CONSIDERING MAKING A CHANGE TO YOUR DISINFECTION PRACTICES?

After completing the initial round of source water monitoring, systems that plan to make a significant change to their disinfection practice must notify the state, develop disinfection profiles, and calculate disinfection benchmarks for *Giardia lamblia* and viruses. To develop a profile and benchmark, PWSs must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. The disinfection benchmark is an indicator of disinfection effectiveness based on the inactivation of *Giardia lamblia* or viruses. The benchmark is determined by calculating the average daily inactivation value for each of 12 consecutive months. The lowest monthly average becomes the disinfection benchmark. If the PWS has data from more than 1 year, the benchmark is the average of the lowest monthly average value for each of the years. The Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) Disinfection Profiling and Benchmarking Technical Guidance Manual (EPA 816-R-03-004, May 2003), provides guidance for developing a disinfection profile and benchmark. EPA has developed two tools for systems to determine their disinfection profile and calculate the benchmark at the following website: www.epa.gov/safewater/mdbp/lt1eswtr.html.

ADDITIONAL GUIDANCE MATERIALS

The following guidance document addresses the source water monitoring requirements for the LT2ESWTR:

- *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (EPA 815-R06-005 February 2006) - Provides surface water systems, laboratories, states, and Tribes with a review of the source water monitoring provisions. The source water monitoring guidance manual provides direction to the systems on how, where and when to monitor, how to report the data, how to submit "grandfathered" data (e.g., previously collected data), and how the data can be evaluated and used to determine risk bin classification.

For additional guidance on implementing the LT2ESWTR, you may refer to the following existing and future EPA materials:

- LT2ESWTR Quick Reference Guides (Schedule 4)
- On-line Microscopy Training Module
- On-line Sample Collection Module
- *Microbial Laboratory Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (EPA 815-R06-006 February 2006)
- *Membrane Filtration Guidance Manual* (EPA 815-R-06-009 November 2005)
- Membrane Filtration Guidance Manual: Overview and Summary Factsheet (www.epa.gov/safewater/disinfection/lt2/pdfs/guide_lt2_membranefiltration_fs_final.pdf)
- *Ultraviolet Disinfection Guidance Manual and Workbook* (final version anticipated mid-2006)
- *Simultaneous Compliance Guidance Manual for Stage 2 Rules* (draft version anticipated mid-2006)
- *Small Entity Compliance Guidance* (draft version anticipated mid-2006)
- *Long Term 2 Enhanced Surface Water Treatment Rule Toolbox Guidance Manual* (draft version anticipated late 2006)

For additional information, please contact the Safe Drinking Water Hotline at 1-800-426-4791, send an email to stage2mdbp@epa.gov, or visit www.epa.gov/safewater/disinfection/lt2.

LT2ESWTR Data Collection and Tracking System Factsheet

What Is The LT2ESWTR?

The U.S. Environmental Protection Agency (EPA) published the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) on January 5, 2006. The LT2ESWTR requires EPA, states, public water systems (PWSs), and laboratories to work together collecting source water monitoring data soon after the rule is finalized.

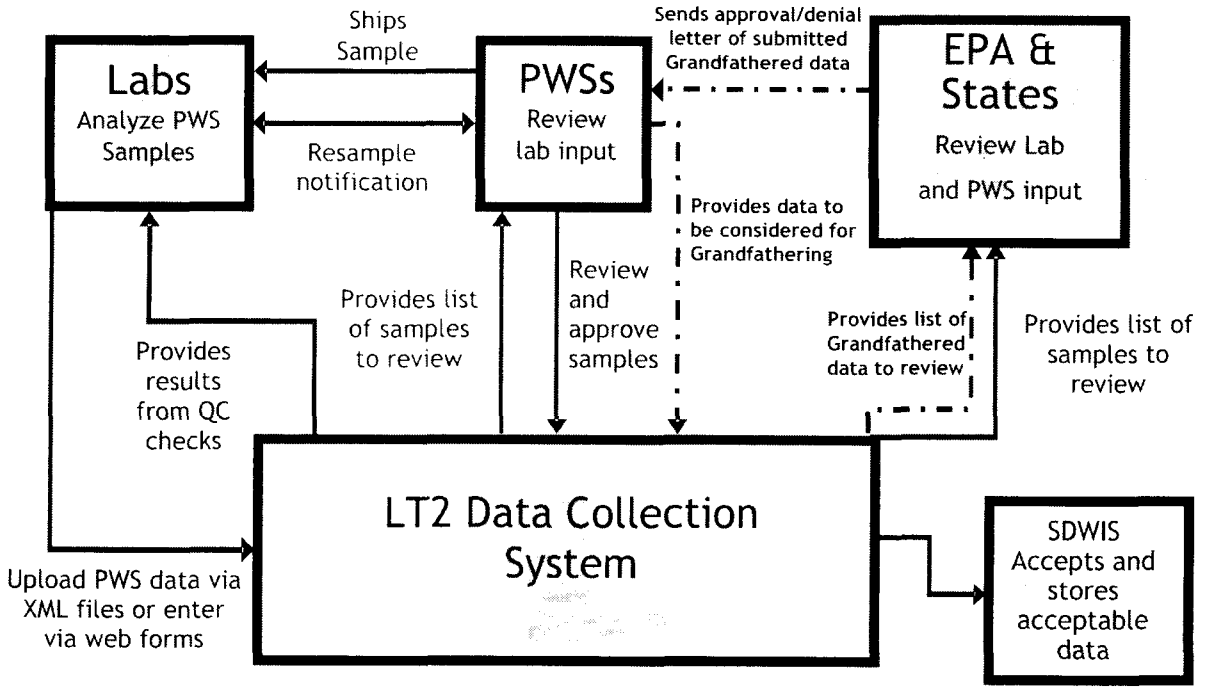
What Are The IPMC And DCTS?

EPA developed the Information Processing and Management Center (IPMC) and Data Collection & Tracking System (DCTS) to help manage data submissions and notifications associated with rule implementation. The IPMC is a processing center that manages electronic and hard copy submittals, the DCTS, and sends notification letters. The DCTS ensures that PWSs can review and approve laboratory-reported data before EPA or the state may access the data. The laboratories can enter data using data collection forms or upload data in XML format. The LT2 Data Collection System automatically calculates final analytical results to reduce the potential for human error.

The IPMC and DCTS have been designed to help EPA and states save time and money by serving as a central processing center that enables real-time tracking, enhances collaboration between states and EPA, and streamlines recordkeeping. Technical assistance is available for IPMC and DCTS users. The DCTS will enable EPA and state reviewers to share notifications, PWS and state contacts, PWS profiles, and data generated for the LT2ESWTR.

Who Should Use The DCTS?

The DCTS allows states, PWSs, laboratories, and EPA to upload, review, and/or download information. Specifically, the DCTS allows laboratories to upload *Cryptosporidium* and *E. coli* sampling results. In addition, PWSs can use the DCTS to upload sampling schedules and turbidity sampling results and to review and approve or contest their sampling results uploaded by the laboratory. EPA and states will use the DCTS to track PWSs' progress through compliance with the LT2SWTR source water monitoring requirements. For example EPA and states will review sampling schedules and sampling results. The following schematic summarizes the information flow between labs, PWSs, EPA, and states within the DCTS.



How Does The DCTS Work?

The DCTS is a Web-based application that allows for both manual entry and batch uploads. The system is password protected and accessible only by approved EPA, state drinking water staff, PWSs, and laboratories. Submissions to the DCTS are not considered confidential business information (CBI) and are subject to the Freedom of Information Act (FOIA).

PWSs can create their sampling schedules in the DCTS by entering individual dates, generating a recurrence pattern, or copying a previously entered schedule from another facility. Throughout monitoring, the DCTS compares monitoring dates to scheduled dates to verify compliance. A PWS can also submit data through the DCTS that they want EPA or the state to consider allowing them to use as grandfathered data.

After PWSs collect *Cryptosporidium*, *E. coli*, and turbidity samples and submit them to a laboratory for analysis, the laboratory posts the analytical results to the DCTS. When the laboratory approves and releases the sampling results for PWS review, the PWS can logon to the DCTS to review the data. The PWS must electronically approve the data within 10 days of the end of month following the month the sample was collected. [Note: If the PWS does not approve their posted data in that time period, the database will automatically process the data as submitted by the laboratory with a flag to indicate the PWS did not approve the data.] When *Cryptosporidium* monitoring is complete, the PWS uses the sampling data to calculate the mean *Cryptosporidium* concentration. DCTS can keep a running calculation of the mean *Cryptosporidium* concentration for the PWS, but a final calculation and bin determination will need to be submitted by the PWS to EPA or the state.

All PWSs serving at least 10,000 people must report results from the initial source water monitoring to EPA electronically at www.epa.gov/safewater/disinfection/tools/tools-dcts.html. A PWS that is **unable** to report monitoring results electronically may use an EPA or state approved alternative approach for reporting. PWSs serving less than 10,000 people must report results from the initial source water monitoring to the state. EPA encourages all systems to submit their source water monitoring results electronically. The following table summarizes options available to labs and systems for submitting data to the DCTS.

Options for Meeting LT2ESWTR Submission Requirements to the DCTS [1]

Option 1	Option 2	Option 3 [2]
Upload sampling schedule or sampling data directly to the Web site [2]	With EPA or state approval, mail paper copies to: US EPA-IPMC P.O. Box 98 Dayton, OH 45401	With EPA or state approval, e-mail electronic submissions as attachments to: stage2mdbp@epa.gov

[1] PWSs and labs must use one of these three options to submit information to the DCTS. In addition, PWSs can send copies of submissions to the state, but this is not required.

[2] Go to EPA's Web site at www.epa.gov/safewater/disinfection/tools/tools-dcts.html to submit information (e.g., sampling schedule, monitoring data, or intent to provide maximum treatment) and for a list of acceptable file formats.

Will The DCTS Integrate Into Other Database Systems?

Although the database design is independent of EPA's Safe Drinking Water Information System (SDWIS), the DCTS is built to easily integrate with EPA's Office of Water's data systems (i.e., Central Data Exchange (CDX), and SDWIS). For example, a state can download an XML file (e.g., inventory, laboratory, or violation schema) from the DCTS and then have the option to upload the file to SDWIS/State or other state databases.

How Can The DCTS Be Accessed?

The DCTS is available on the Web, but requires a username and password. The site is located at www.epa.gov/safewater/disinfection/tools/tools-dcts.html. Each laboratory and PWS that is registered with the DCTS has an Administrative User. The Administrative User is responsible for the initial registration of the entire lab or PWS.

For additional information, please contact the Safe Drinking Water Hotline at 1-800-426-4791, send an email to stage2mdbp@epa.gov, or visit www.epa.gov/safewater/disinfection/lt2.

LT2ESWTR Laboratory Factsheet

WHAT IS THE LT2ESWTR?

The U.S. Environmental Protection Agency (EPA) published the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) on January 5, 2006. The goal of the LT2ESWTR is to improve control of microbial pathogens by identifying water systems whose source water is vulnerable to contamination by *Cryptosporidium* and requiring those systems to treat for that greater risk. Key provisions of the LT2ESWTR include:

- Source water monitoring at public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI).
- Monitoring for *Cryptosporidium*, *E. coli*, and turbidity based on system size and filtration type.
- Using Surface water or GWUDI source water monitoring data to categorize the sources according to four "bin" classifications that have associated treatment requirements. Systems that avoid filtration will be placed into one of two categories based on source water monitoring, and will have to meet specified inactivation requirements.
- Using grandfathered data collected before the system must begin *Cryptosporidium* source water monitoring, if the data meet rule requirements. Systems may use this data instead of conducting source water monitoring.

For detailed information regarding source water monitoring, including sampling and shipping procedures, systems should consult the *Source Water Monitoring Guidance Manual For Public Water Systems For The Final Long Term 2 Enhanced Surface Water Treatment Rule* [EPA 815-R06-005 February 2006]), at www.epa.gov/safewater/disinfection/lt2.

WHICH LABORATORIES MUST SYSTEMS USE?

PWSs must use laboratories or personnel approved for source water monitoring analyses required by the rule (i.e., *Cryptosporidium*, *E. coli*, and turbidity sampling).

- *Cryptosporidium* analysis: EPA approves laboratories through the Laboratory Quality Assurance Evaluation Program (the Lab QA Program) to analyze *Cryptosporidium*. The purpose of the Lab QA Program is to identify laboratories that can reliably measure the presence of *Cryptosporidium* in surface water using the EPA Method 1622 or 1623. A list of commercial, government, PWS, and university laboratories approved or pending approval to analyze *Cryptosporidium* is located at www.epa.gov/safewater/disinfection/lt2/lab_aprvlabs.html.
- *E. coli* analysis: Laboratories must be certified by EPA, the National Environmental Laboratory Accreditation Conference, or the state to analyze *E. coli*.
- Turbidity analysis: Analysis must be conducted by a party approved by the state, which usually means a state-certified operator or a professional engineer. You should consult with your state for specific state requirements.

Commercial laboratories and other laboratories that accept samples from an outside party may charge varying rates. Systems may consider contacting multiple laboratories to compare costs. For detailed information on contracting laboratory services, consult the *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule [EPA 815-R06-005 February 2006]*, or go online at www.epa.gov/safewater/disinfection/lt2.

WHAT METHODS MUST LABORATORIES USE?

Laboratories and personnel must use methods approved by EPA for *Cryptosporidium*, *E. coli*, and turbidity, as presented in the following tables.

Approved Methods for *E. coli*	Approved Methods for Turbidity
■ Standard Methods 9223B (Colilert/Colilert-18)® ■ Standard Methods 9221B/9221F (LTB-EC-MUG) ■ Standard Methods 9222D/9222G (mFC-NA-MUG) ■ Standard Methods 9213D/ EPA Method 1103.1 (mTEC) ■ EPA Method 1603 Modified mTEC ■ EPA Method 1604 MI medium ■ m-ColiBlue24Broth ■ Standard Methods 9222B/9222G (mEndo/LES-Endo-NA-MUG)	■ Method 2130 B ■ Revised Method 180.1 ■ Great Lakes Instrument (GLI) Method 2

Approved Methods for *Cryptosporidium*
■ Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, United States Environmental Protection Agency, EPA-815-R-05-002. 2005.
■ Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, United States Environmental Protection Agency, EPA-815-R-05-001. 2005.

WHEN SHOULD SYSTEMS CONTACT LABORATORIES?

PWSs should contact laboratories to discuss contracts and sampling dates as soon as possible. The number of samples processed each day will impact the laboratory's capacity. The PWS and the laboratory must agree on calendar dates for monthly, or more frequent, sample analysis because the PWS must submit a monitoring schedule no later than 3 months before monitoring begins. Monitoring start dates are summarized in the following table.

Systems that serve...	Must begin the first round of source water monitoring...
At least 100,000 people or part of a combined distribution system serving at least 100,000 people	October 2006
50,000 to 99,999 people or part of a combined distribution system serving at least 50,000 to 99,999 people	April 2007
10,000 to 49,999 people or part of a combined distribution system serving at least 10,000 to 49,999 people	April 2008
Less than 10,000 or part of a combined distribution system serving less than 10,000 people, and are filtered and monitoring for *E. coli*	October 2008
Less than 10,000 or part of a combined distribution system serving less than 10,000 people, and are monitoring for *Cryptosporidium*[1]	April 2010

[1]Applies to filtered systems that exceed the *E. coli* trigger or decide not to monitor for *E. coli*, and to unfiltered systems.

For additional information, please contact the Safe Drinking Water Hotline at 1-800-426-4791, send an email to stage2mdbp@epa.gov, or visit www.epa.gov/safewater/disinfection/lt2.

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Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 1 Systems

Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 1 systems include PWSs serving 100,000 or more people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves 100,000 or more people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered and unfiltered systems must conduct 24 months of source water monitoring for *Cryptosporidium*. Filtered systems must also record source water *E. coli* and turbidity levels. Filtered systems will be classified into one of four "Bins" based on the results of their source water monitoring. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Systems may also use previously collected data (i.e., Grandfathered data). Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1	No additional treatment required	No additional treatment required	No additional treatment required	No additional treatment required
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

Critical Deadlines and Requirements

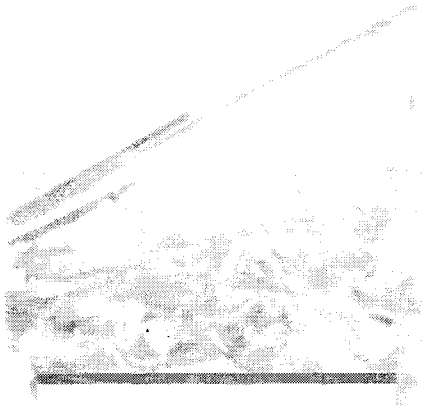
For Drinking Water Systems (Schedule 1)

July 1, 2006	Systems must submit their: ▸ Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring to EPA electronically; or ▸ Notify EPA or the state of the systems intent to submit results for grandfathering data; or ▸ Notify EPA or the state of the systems intent to provide at least 5.5 log of treatment for *Cryptosporidium*. Systems should consult with EPA or their state prior to submitting this notice.
October 2006	No later than this month systems must begin 24 months of source water monitoring.
December 10, 2006	System submit results for first month of source water monitoring.
December 1, 2006	No later than this date, systems must submit monitoring results for data that they want to have grandfathered.
April 1, 2008	No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.
September 2008	No later than this month, systems must complete their inital round of source water monitoring.
March 2009	No later than this month, filtered systems must report their initial bin classification to the EPA or the state for approval.
March 2009	No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.
April 1, 2009	No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.
March 31, 2012	Systems must install and operate additional treatment in accordance with their bin classification.†
January 1, 2015	Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of source water monitoring to the state.
April 1, 2015	▸ Systems are required to begin conducting a second round of source water monitoring. ▸ Based on the results, systems must re-determine their bin classification and provide additional *Cryptosporidium* treatment, if necessary.

For States

January - June 2006	States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.
April 1, 2007	States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.
October 5, 2007	States are encouraged to submit final primacy applications or extension requests to EPA.
January 5, 2008	Final primacy applications must be submitted to EPA, unless granted an extension.
June 30, 2008	States should begin awarding *Cryptosporidium* treatment credit for primary treatments in place.
January 5, 2010	Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.
December 31, 2012	States should award *Cryptosporidium* treatment credit for toolbox option implementation.

† States may allow up to an additional 24 months for compliance for systems making capital improvements.



For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater/disinfection/lt2; or contact your State drinking water representative.

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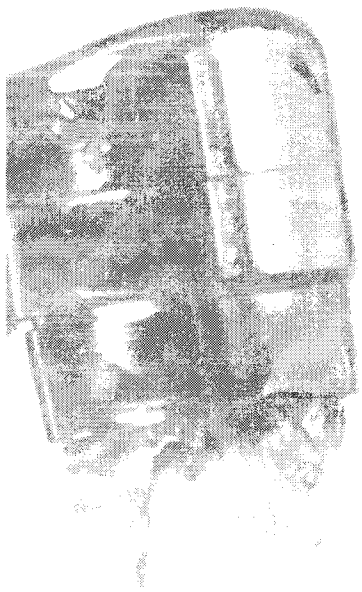
Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 2 Systems



Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 2 systems include PWSs serving 50,000 to 99,999 people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves 50,000 to 99,999 people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered and unfiltered systems must conduct 24 months of source water monitoring for *Cryptosporidium*. Filtered systems must also record source water *E. coli* and turbidity levels. Filtered systems will be classified into one of four "Bins" based on the results of their source water monitoring. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Systems may also use previously collected data (i.e., Grandfathered data). Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1	No additional treatment required	No additional treatment required	No additional treatment required	No additional treatment required
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

Critical Deadlines and Requirements

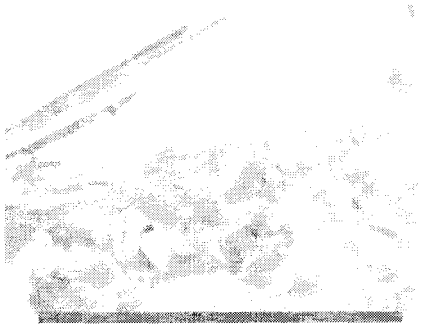
For Drinking Water Systems (Schedule 2)

January 1, 2007	Systems must submit their: ▸ Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring to EPA electronically; or ▸ Notify EPA or the state of the systems intent to submit results for grandfathering data; or ▸ Notify EPA or the state of the systems intent to provide at least 5.5 log of treatment for *Cryptosporidium*. Systems should consult with EPA or their state prior to submitting this notice.
April 2007	No later than this month, systems must begin 24 months of source water monitoring.
June 10, 2007	System submit results for first month of source water monitoring.
June 1, 2007	No later than this date, systems must submit monitoring results for data that they want to have grandfathered.
April 1, 2008	No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.
March 2009	No later than this month, systems must complete their inital round of source water monitoring.
April 1, 2009	No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.
September 2009	No later than this month, filtered systems must report their initial bin classification to the EPA or the state for approval.
September 2009	No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.
September 30, 2012	Systems must install and operate additional treatment in accordance with their bin classification.†
July 1, 2015	Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of source water monitoring to the state.
Ocotber 1, 2015	▸ Systems are required to begin conducting a second round of source water monitoring. ▸ Based on the results, systems must re-determine their bin classification and provide additional *Cryptosporidium* treatment, if necessary.

For States

January - June 2006	States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.
April 1, 2007	States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.
October 5, 2007	States are encouraged to submit final primacy applications or extension requests to EPA.
January 5, 2008	Final primacy applications must be submitted to EPA, unless granted an extension.
December 31, 2008	States should begin awarding *Cryptosporidium* treatment credit for primary treatments in place.
January 5, 2010	Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.
June 30, 2013	States should award *Cryptosporidium* treatment credit for toolbox option implementation.

† States may allow up to an additional 24 months for compliance for systems making capital improvements.



For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater; or contact your State drinking water representative.

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Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 3 Systems

Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 3 systems include PWSs serving 10,000 to 49,999 people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves 10,000 to 49,999 people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered and unfiltered systems must conduct 24 months of source water monitoring for *Cryptosporidium*. Filtered systems must also record source water *E. coli* and turbidity levels. Filtered systems will be classified into one of four "Bins" based on the results of their source water monitoring. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Systems may also use previously collected data (i.e., Grandfathered data). Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1	No additional treatment required	No additional treatment required	No additional treatment required	No additional treatment required
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

Critical Deadlines and Requirements

For Drinking Water Systems (Schedule 3)

January 1, 2008	Systems must submit their: ▸ Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring to EPA electronically; or ▸ Notice to EPA or the state of the system's intent to submit results for grandfathering data; or ▸ Notice to EPA or the state of the system's intent to provide at least 5.5-log of treatment for *Cryptosporidium* for filtered systems or 3-log of treatment for unfiltered systems. Systems should consult with EPA or their state prior to submitting this notice.
April 2008	No later than this month, systems must begin 24 months of source water monitoring.
April 1, 2008	No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.
June 10, 2008	Systems submit results for first month of source water monitoring.
June 1, 2008	No later than this date, systems must submit monitoring results for data that they want to have grandfathered.
April 1, 2009	No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.
March 2010	No later than this month, systems must complete their inital round of source water monitoring.
September 2010	No later than this month, filtered systems must report their initial bin classification to the EPA or the state for approval.
September 2010	No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.
September 30, 2013	Systems must install and operate additional treatment in accordance with their bin classification (filtered systems) or mean *Cryptosporidium* level (unfiltered systems).†
July 1, 2016	Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of source water monitoring to the state.
Ocotber 1, 2016	▸ Systems are required to begin conducting a second round of source water monitoring. ▸ Based on the results, systems must re-determine their bin classification (filtered systems) or mean *Cryptosporidium* level (unfiltered systems) and provide additional *Cryptosporidium* treatment, if necessary.

For States

July - December 2006	States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.
April 1, 2007	States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.
October 5, 2007	States are encouraged to submit final primacy applications or extension requests to EPA.
January 5, 2008	Final primacy applications must be submitted to EPA, unless granted an extension.
December 31, 2009	States should begin determining *Cryptosporidium* treatment credit for primary treatments already in place.
January 5, 2010	Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.
June 30, 2014	States should award *Cryptosporidium* treatment credit for toolbox option implementation.

† States may allow up to an additional 24 months for compliance for systems making capital improvements.

For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater/disinfection/lt2; or contact your state drinking water representative.

EPA
United States
Environmental Protection
Agency

Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 4 Systems

Overview of the Rule

Title	Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No. 3
Purposes	Improve public health protection through the control of microbial contaminants by focusing on systems with elevated *Cryptosporidium* risk. Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR).
General Description	The LT2ESWTR requires systems to monitor their source water, calculate an average *Cryptosporidium* concentration, and use those results to determine if their source is vulnerable to contamination and may require additional treatment. Filtered systems serving fewer than 10,000 may be eligible to conduct *E. Coli* source water monitoring in lieu of *Cryptosporidium* monitoring.
Utilities Covered	▸ Public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI). ▸ Schedule 4 systems include PWSs serving fewer than 10,000 people OR wholesale PWSs that are part of a combined distribution system in which the largest system serves less than 10,000 people.

Major Provisions

Control of *Cryptosporidium*

Source Water Monitoring	Filtered systems must conduct 12 months of source water monitoring for *E. coli* . If the *E. coli* trigger level is exceeded, the system must conduct an additional 12 to 24 months of source water monitoring for *Cryptosporidium*. Systems may also use previously collected data (i.e., Grandfathered data). Unfiltered systems must sample their source water for *Cryptosporidium* at least twice per month for 12 months or once per month for 24 months. Unfiltered systems will calculate a mean *Cryptosporidium* level to determine treatment requirements. Filtered systems providing at least 5.5 log of treatment for *Cryptosporidium* and unfiltered systems providing at least 3-log of treatment for *Cryptosporidium* and those systems that intend to install this level of treatment are not required to conduct source water monitoring.
Installation of Additional Treatment	Filtered systems must provide additional treatment for *Cryptosporidium* based on their bin classification (average source water *Cryptosporidium* concentration), using treatment options from the "microbial toolbox." Unfiltered systems must provide additional treatment for *Cryptosporidium* using chlorine dioxide, ozone, or UV.
Uncovered Finished Water Storage Facility	Systems with an uncovered finished water storage facility must either: ▸ Cover the uncovered finished water storage facility; or, ▸ Treat the discharge to achieve inactivation and/or removal of at least 4-log for viruses, 3-log for *Giardia lamblia*, and 2-log for *Cryptosporidium*.

Disinfection Profiling and Benchmarking

After completing the initial round of source water monitoring any system that plans on making a significant change to their disinfection practices must:

- Create disinfection profiles for *Giardia lamblia* and viruses;
- Calculate a disinfection benchmark; and,
- Consult with the state prior to making a significant change in disinfection practice.

Bin Classification For Filtered Systems

Cryptosporidium Concentration (oocysts/L)	Bin Classification	Additional *Cryptosporidium* Treatment Required			Alternative Filtration
		Conventional Filtration	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	
< 0.075	Bin 1††	No additional treatment required			
0.075 to < 1.0	Bin 2	1 log	1.5 log	1 log	(1)
1.0 to < 3.0	Bin 3	2 log	2.5 log	2 log	(2)
≥ 3.0	Bin 4	2.5 log	3 log	2.5 log	(3)

†† Systems serving < 10,000 people that are not required to monitor for *Cryptosporidium* are placed in Bin 1.
(1) As determined by the state (or other primacy agency) such that the total removal/inactivation > 4.0-log.
(2) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.0-log.
(3) As determined by the state (or other primacy agency) such that the total removal/inactivation > 5.5-log.

Inactivation Requirements for Unfiltered Systems

Cryptosporidium Concentration (oocysts/L)	Required *Cryptosporidium* Inactivation
≤ 0.01	2-log
> 0.01	3-log

For additional information on the LT2ESWTR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA web site at www.epa.gov/safewater/disinfection/lt2; or contact your state drinking water representative.

Critical Deadlines and Requirements

For Drinking Water Systems (Schedule 4)

July 1, 2008	Systems must submit their: ▸ Sampling schedule that specifies the dates of sample collection and location of sampling for initial source water monitoring; or ▸ Notice to EPA or the state of the system's intent to submit results for grandfathering data; or ▸ Notice to EPA or the state of the system's intent to provide at least 5.5-log of treatment for *Cryptosporidium* for filtered systems or 3-log of treatment for unfiltered systems. Systems should consult with EPA or their state prior to submitting this notice. ▸ Notice to EPA or the state of the system's intent to conduct *Cryptosporidium* monitoring instead of *E. coli* monitoring.
October 2008	No later than this month, filtered systems must begin 12 months of bi-weekly source water monitoring for *E. coli.*
December 1, 2008	No later than this date, systems must submit *E. coli* monitoring results for data that they want to have grandfathered.
December 10, 2008	Systems submit results for first month of *E. coli* source water monitoring.
April 1, 2008	No later than this date, systems must notify the EPA or the state of all uncovered treated water storage facilities.
April 1, 2009	No later than this date, uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system, or the system must be in compliance with a state approved schedule.
September 2009	No later than this month, systems that were required to monitor their source water for *E. coli* complete their inital round of source water monitoring.
January 1, 2010	Filtered systems required to monitor for *Cryptosporidium* must submit their sampling schedule that specifies the dates of sample collection and location of sampling for source water monitoring.
April 2010	No later than this month, systems required to conduct *Cryptosporidium* monitoring must begin 12 or 24 months of source water monitoring.
June 1, 2010	No later than this date, systems must submit *Cryptosporidium* monitoring results for data that they want to have grandfathered.
June 10, 2010	Systems submit results for first month of *Cryptosporidium* source water monitoring.
March 2012	No later than this month, systems that were required to monitor their source water for *Cryptosporidium* complete their inital round of source water monitoring
September 2012	No later than this month, filtered systems that were required to monitor their source water for *Cryptosporidium* must report their initial bin classification to the EPA or the state for approval.
September 2012	No later than this month, unfiltered systems must report the mean of all *Cryptosporidium* sample results to the EPA or the state.
September 30, 2014	Systems must install and operate additional treatment in accordance with their bin classification or mean *Cryptosporidium* level.†
July 1, 2017	Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of *E. coli* source water monitoring to the state.
October 1, 2017	Systems are required to begin conducting a second round of *E. coli* source water monitoring. Based on the results, systems must re-determine their bin classification and provide additional treatment, if necessary.
January 1, 2019	Systems must submit their sampling schedule that specifies the dates of sample collection and location of sampling for second round of *Cryptosporidium* source water monitoring to the state.
April 1, 2019	Systems are required to begin conducting a second round of *Cryptosporidium* source water monitoring. Based on the results, systems must re-determine their bin classification (filtered systems) or mean *Cryptosporidium* level (unfiltered systems) and provide additional treatment, if necessary.

For States

July - December 2006	States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.
April 1, 2007	States are encouraged to communicate LT2ESWTR requirements related to treatment, uncovered finished water reservoirs, and disinfection profiling to affected systems.
October 5, 2007	States are encouraged to submit final primacy applications or extension requests to EPA.
January 5, 2008	Final primacy applications must be submitted to EPA, unless granted an extension.
June 30, 2010	States should begin determining *Cryptosporidium* treatment credit for primary treatments already in place.
January 5, 2010	Final primacy revision applications from states with approved 2-year extensions agreements must be submitted to EPA.
June 30, 2015	States should award *Cryptosporidium* treatment credit for toolbox option implementation.

† States may allow up to an additional 24 months for compliance for systems making capital improvements.

Appendix D

Flowcharts

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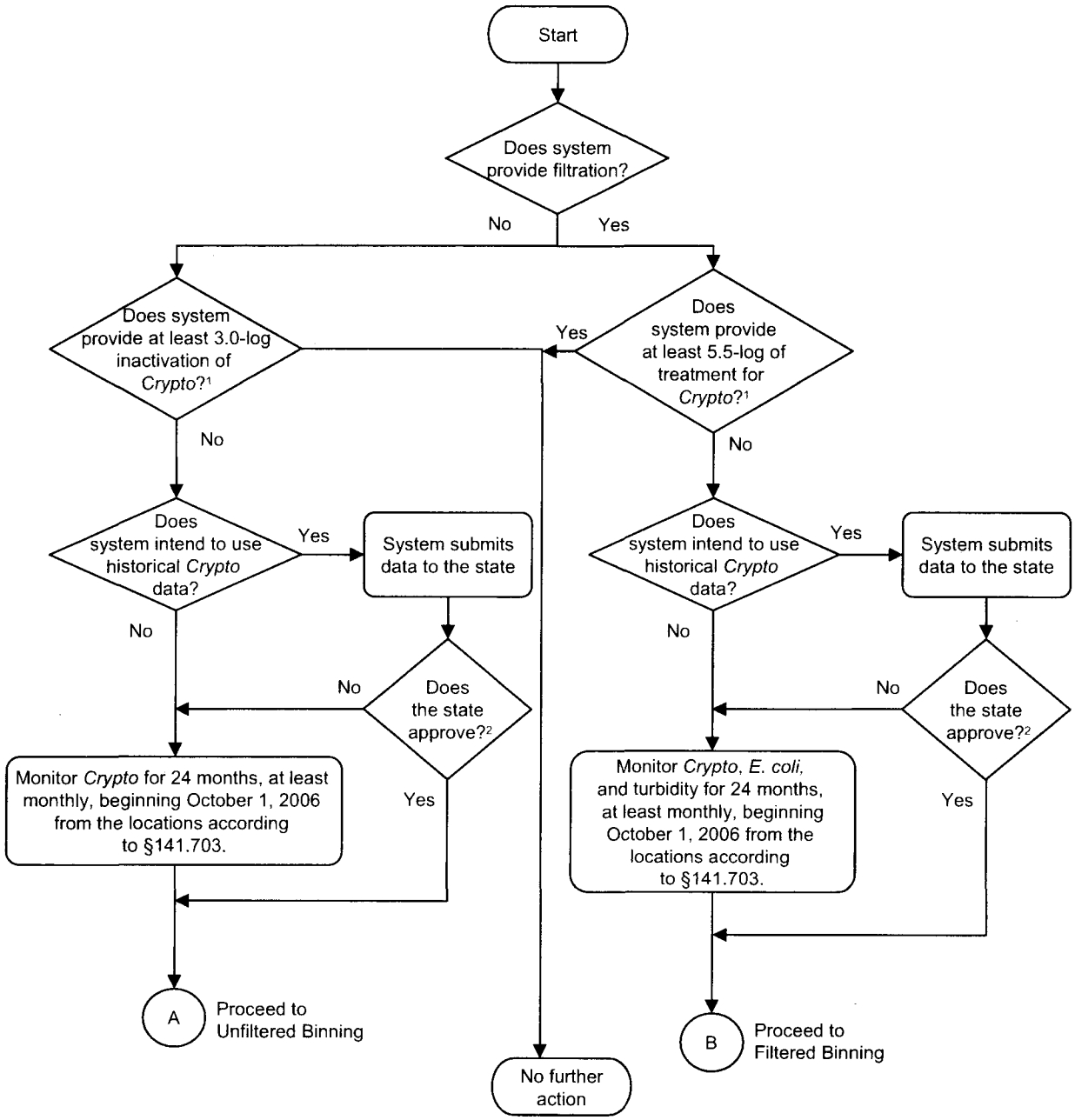
Schedule 1 Systems

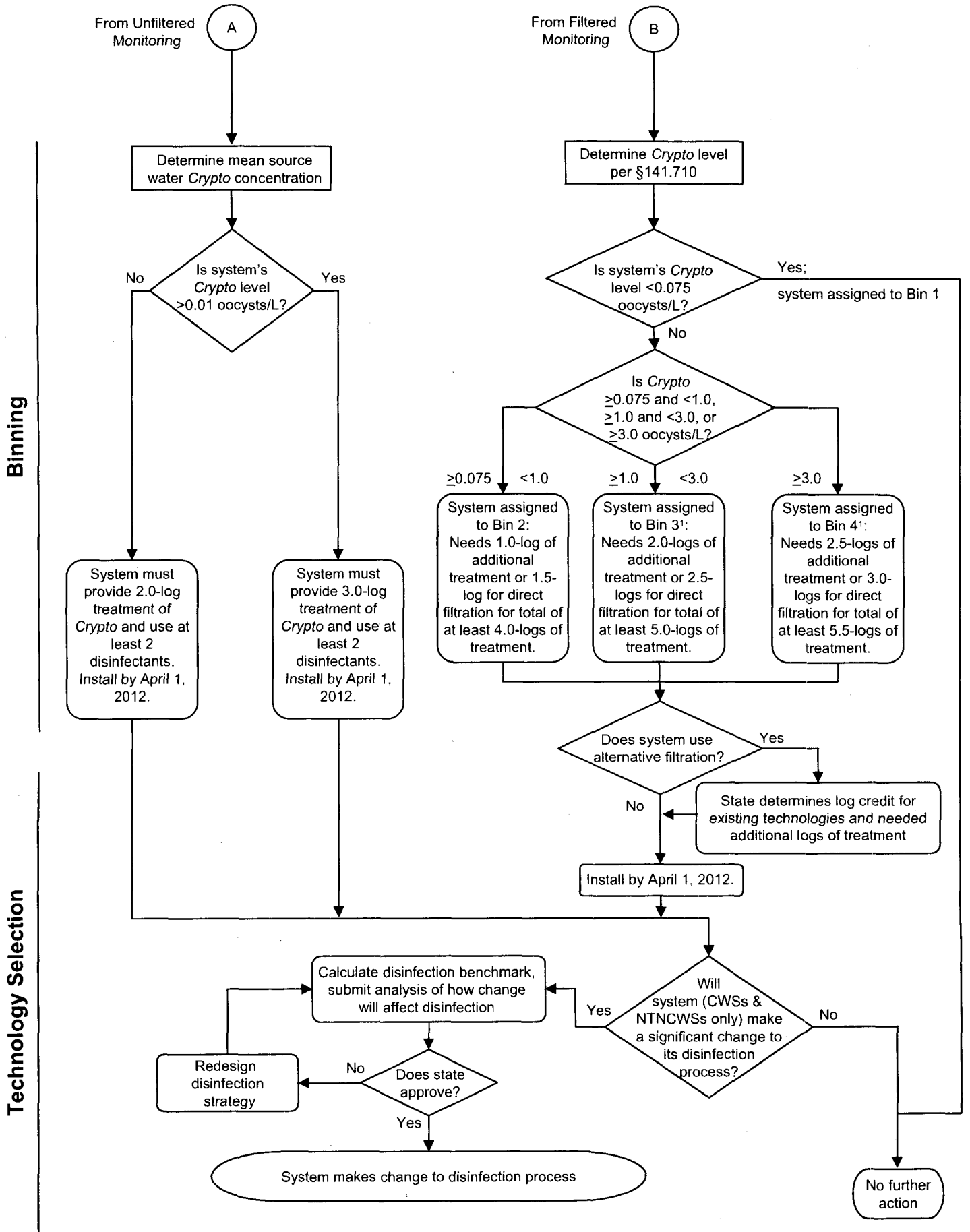
All Subpart H systems serving ≥100,000 persons must:
1) Determine whether and to what extent additional treatment for *Crypto* is necessary, and
2) If necessary, provide additional required treatment



Monitoring

[1] Or will it install such treatment by April 1, 2012 (§141.713)?

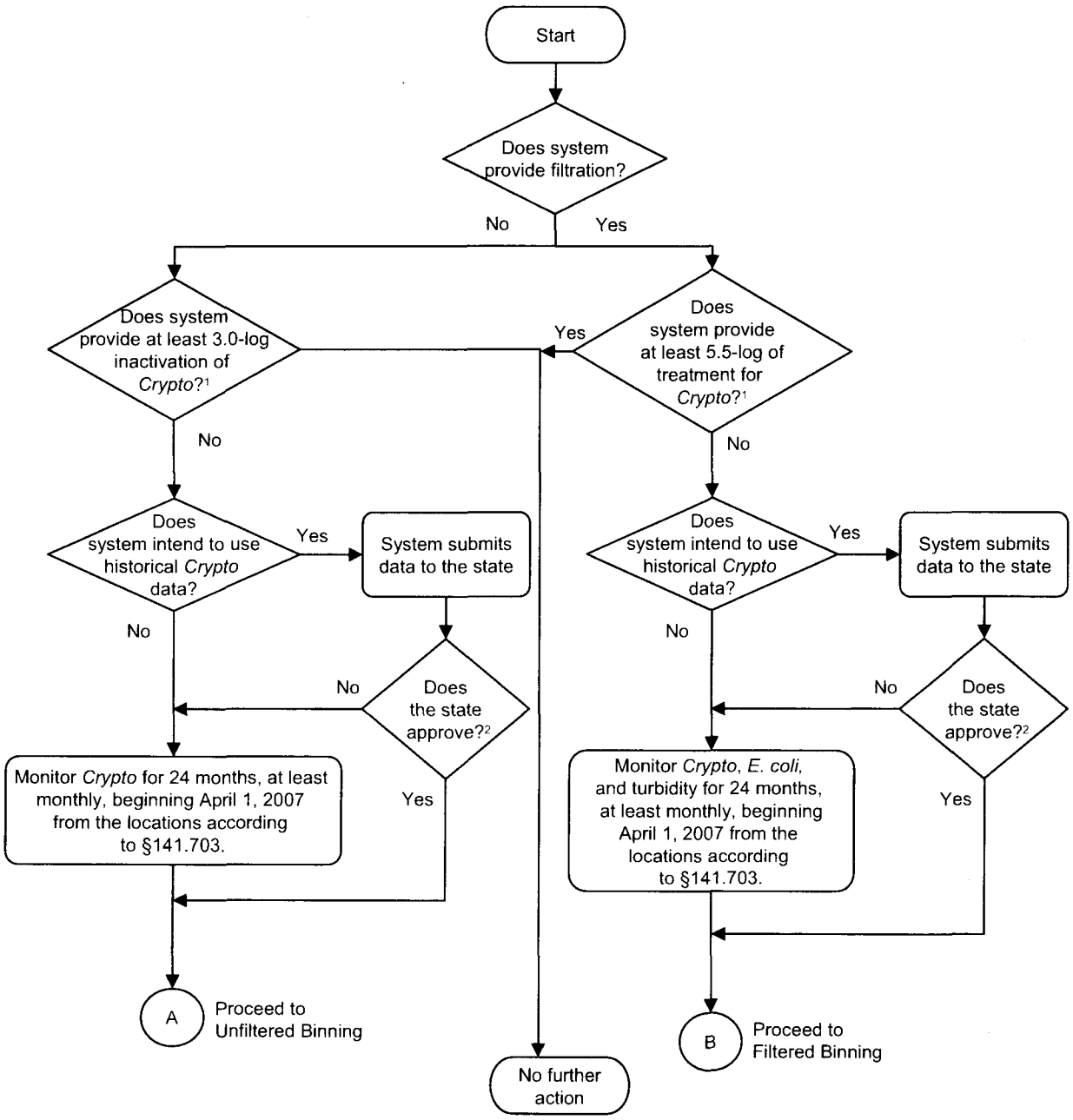
[2] Actual monitoring requirements depend on whether 2 full years of historical *Cryptosporidium* data are available and approved by the state. If 2 years of data are available and approved, the system follows the process in the flow chart. If less than 2 years of data are available, systems must monitor *Cryptosporidium*, *E. coli*, and turbidity until the state determines that the new and historical data, when combined, are sufficient.



[1] At least 1 log of additional treatment must use a disinfectant or filtration process from an approved list (§141.716 through §141.720).

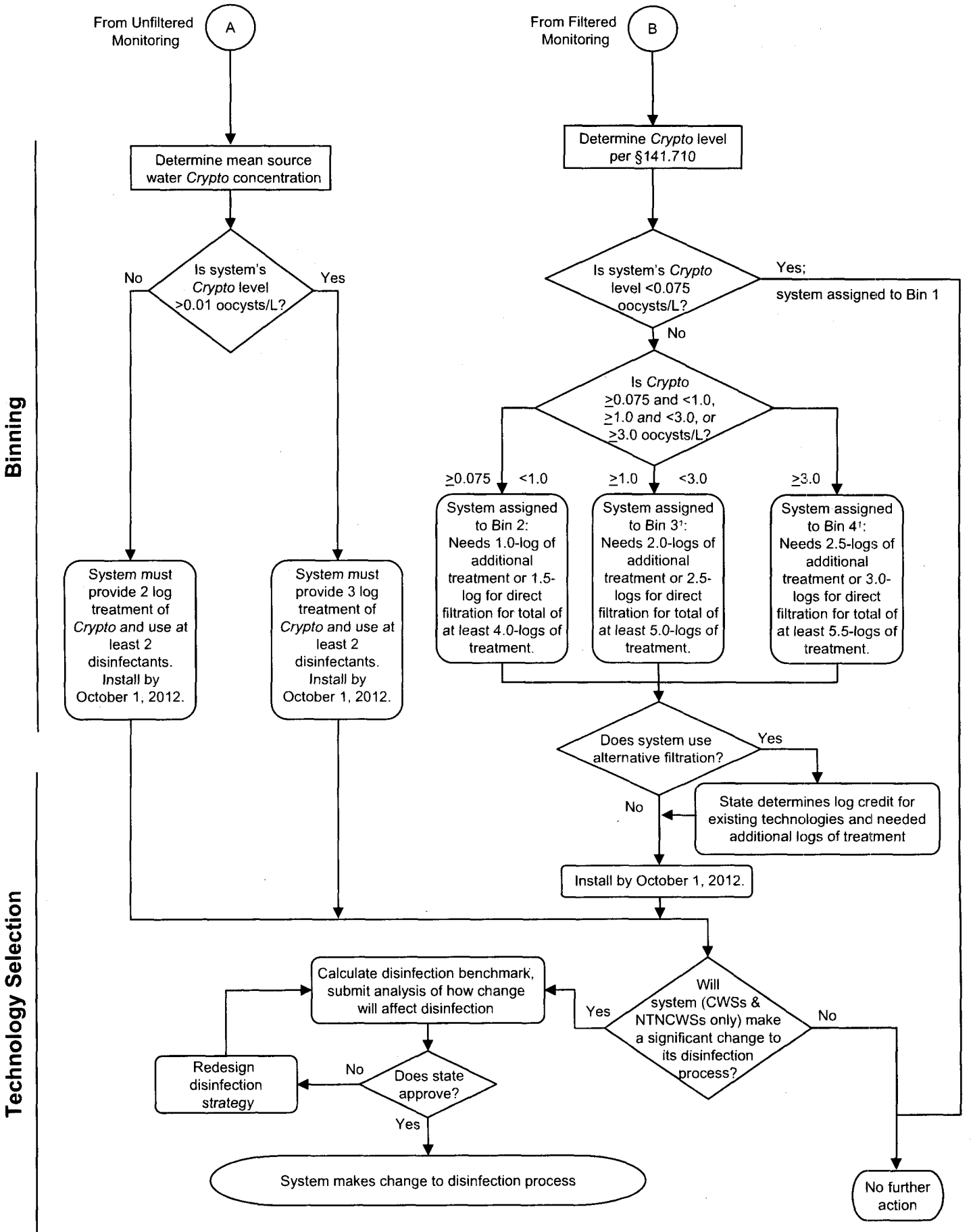
Schedule 2 Systems

All Subpart H systems serving 50,000 to 99,999 persons must:
1) Determine whether and to what extent additional treatment for *Crypto* is necessary, and
2) If necessary, provide additional required treatment



[1] Or will it install such treatment by October 1, 2012 (§141.713)?

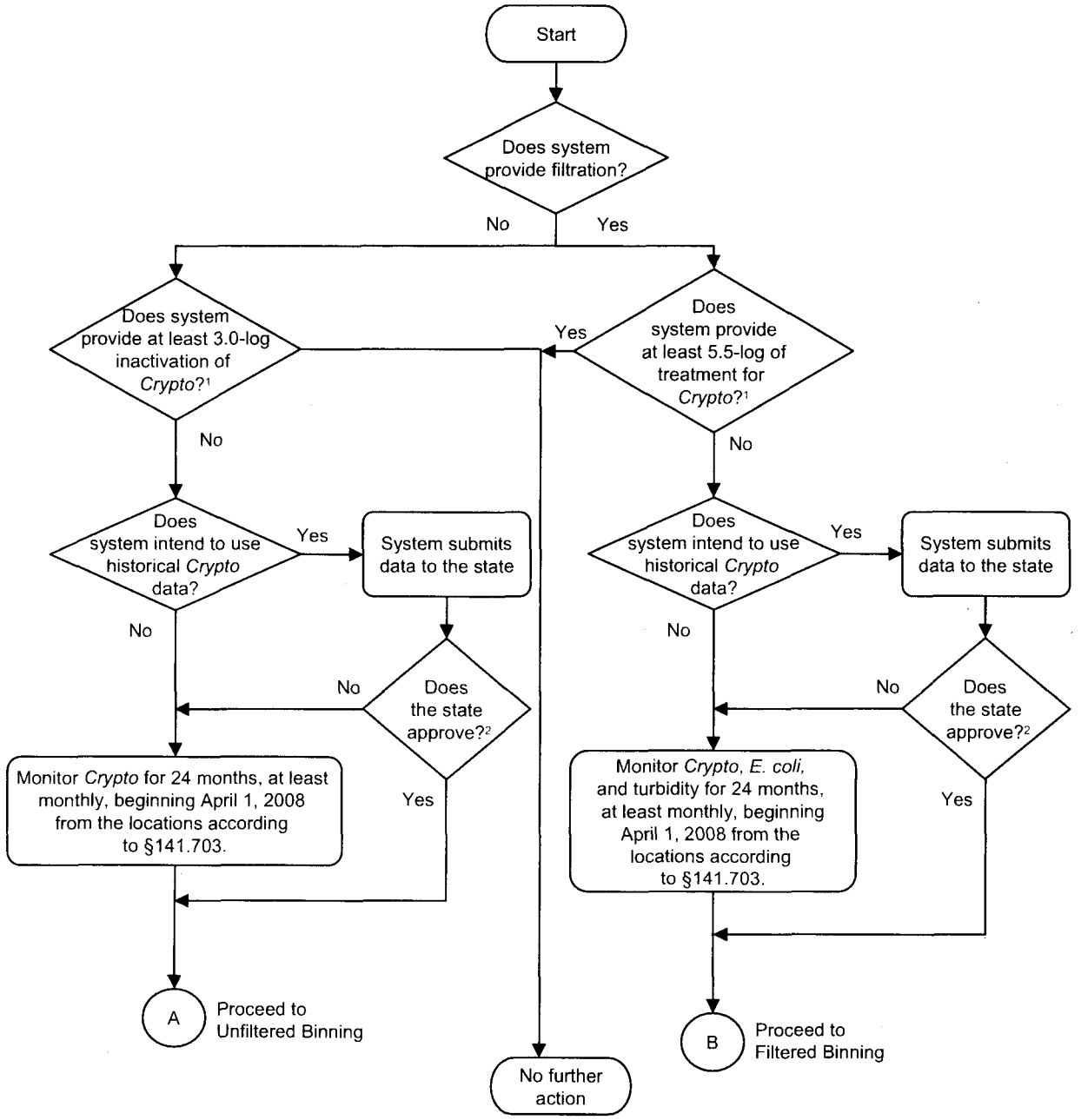
[2] Actual monitoring requirements depend on whether 2 full years of historical *Cryptosporidium* data are available and approved by the state. If 2 years of data are available and approved, the system follows the process in the flow chart. If less than 2 years of data are available, systems must monitor *Cryptosporidium*, *E. coli*, and turbidity until the state determines that the new and historical data, when combined, are sufficient.



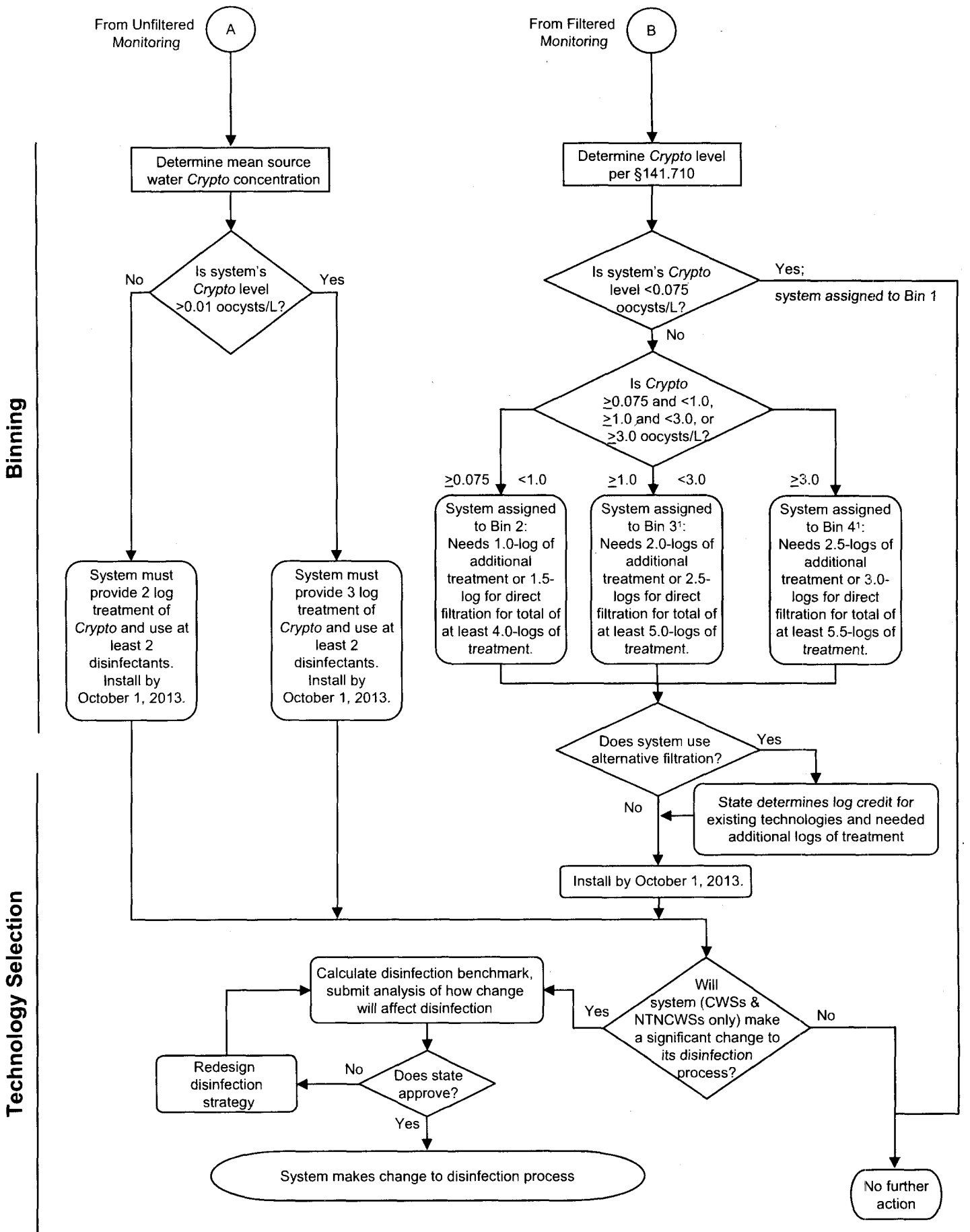
[1] At least 1 log of additional treatment must use a disinfectant or filtration process from an approved list (§141.716 through §141.720).

Schedule 3 Systems

All Subpart H systems serving 10,000 to 49,999 persons must:
1) Determine whether and to what extent additional treatment for *Crypto* is necessary, and
2) If necessary, provide additional required treatment



[1] Or will it install such treatment by October 1, 2013 (§141.713)?
[2] Actual monitoring requirements depend on whether 2 full years of historical *Cryptosporidium* data are available and approved by the state. If 2 years of data are available and approved, the system follows the process in the flow chart. If less than 2 years of data are available, systems must monitor *Cryptosporidium*, *E. coli*, and turbidity until the state determines that the new and historical data, when combined, are sufficient.

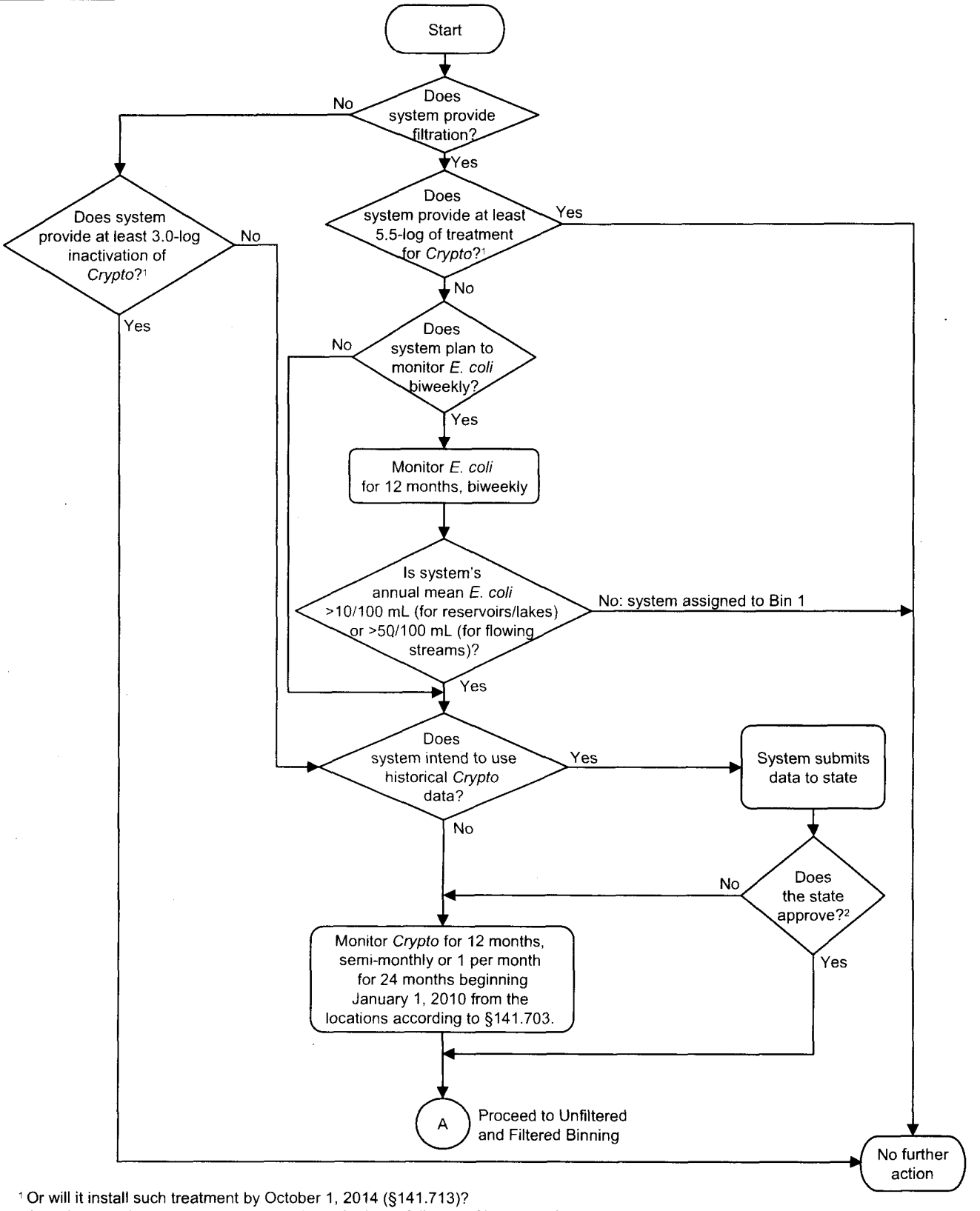


[1] At least 1 log of additional treatment must use a disinfectant or filtration process from an approved list (§141.716 through §141.720).

Schedule 4 Systems

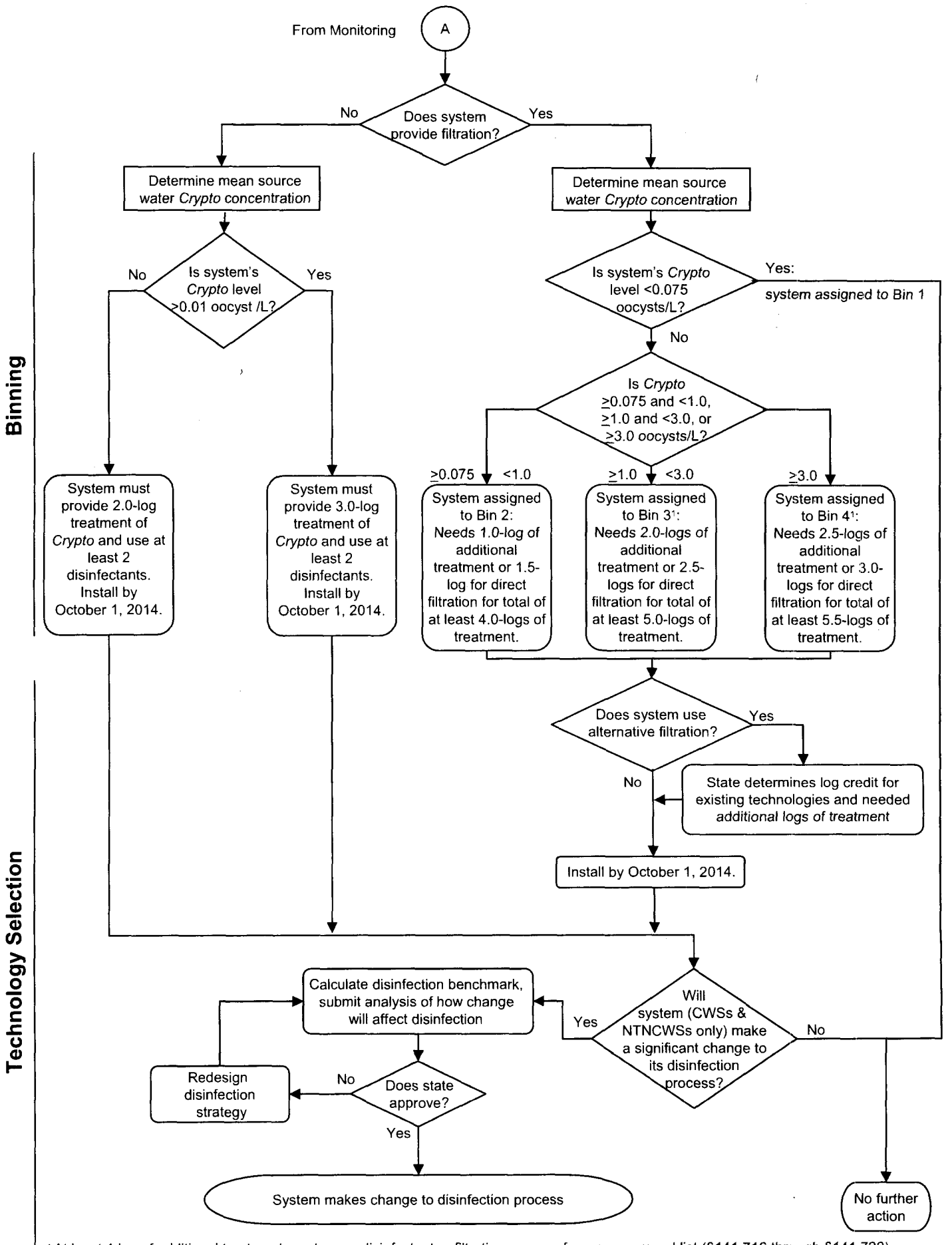
All Subpart H systems serving <10,000 persons must:
1) Determine whether and to what extent additional treatment for *Crypto* is necessary, and
2) If necessary, provide additional treatment

Monitoring



[1] Or will it install such treatment by October 1, 2014 (§141.713)?

[2] Actual monitoring requirements depend on whether 1 full year of historical *Cryptosporidium* data (24 samples) is available and approved by EPA. If the full amount of data is available and approved, the system follows the process in the chart. If less than 1 year of data is available, systems must monitor *Cryptosporidium* until EPA determines that data are sufficient.



[1] At least 1 log of additional treatment must use a disinfectant or filtration process from an approved list (§141.716 through §141.720).

Appendix E
Template Letters

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Template Letters

The following template letters have been developed as guidance. These templates are not a required format for communicating between EPA or states and the affected systems. However, they will ensure that system receives a formal notice of the issue and documentation for their own records and that EPA or the state has hard-copy documentation of the correspondence with the system.

Written notification may include:

1. Summary of the issue.

2. Appropriate contact if questions arise.

3. Fact sheet or other summary materials (optional). EPA has developed the following fact sheets for the LT2ESWTR:

   - LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet (EPA816-F-06-018 June 2006).

   - LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet (EPA816-F-06-017 June 2006).

   - LT2ESWTR Data Collection and Tracking System Factsheet (EPA816-F-06-019 June 2006).

   - LT2ESWTR Laboratory Factsheet (EPA816-F-06-020 June 2006).

These additional materials can be found on EPA's LT2ESWTR Web site at http://www.epa.gov/safewater/disinfection/lt2.

The following LT2ESWTR template letters include:

- Status of Grandfathered Source Water Data Submission.
- Acknowledging Receipt of a System's Intent to Submit Grandfathered Data.
- Acknowledging Receipt of a System's Intent to Provide Full Treatment.
- Informing the System of Re-sampling Requirements Because of Missing Sample(s).
- Informing the System of Re-sampling Requirements Because of a Laboratory Error.
- Approving Source Water Monitoring Plan.

Text highlighted should be changed as appropriate to provide accurate information to the system, highlighting should be removed.

Letterhead

Contact Name
System Name
Address
City, State 12345

PWSID: XX1234567

RE: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
Status of Grandfathered Source Water Data Submission

Dear Mr./Mrs./Ms._____:

On [insert date], this office received a letter from [insert name of system] containing [insert type of data received, *Cryptosporidium*, *E. coli*, turbidity] data from [insert timeframe]. It is understood that [insert name of system] submitted this data in lieu of collecting source water monitoring data required to comply with the LT2ESWTR. This letter is to confirm that the data submitted has been reviewed and approved by this office for the purpose of grandfathering. Your system is still required to collect monthly [insert type of source water data this system will need to collect, *Cryptosporidium*, *E. coli*, turbidity] samples through [insert date this system will need to collect data through before they can use the grandfathered data]. The previous collected data will be added to the end of the 2-year period. Once all required source water monitoring samples are collected, a bin classification will need to be determined for your system. Your bin classification determines whether further treatment for *Cryptosporidium* is required.

A second round of source water monitoring is required as part of the LT2ESWTR. Your bin classification may change based on the results of the second round of monitoring. Grandfathering data will not be accepted for the second round of monitoring.

Additional reference information is attached for your use. If you have questions regarding this letter, please contact us by sending an e-mail to stage2mdbp@epa.gov. For more information regarding this rule visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2.

Enclosures:
LT2ESWTR Quick Reference Guide
LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet
LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet
[list other enclosures]

Letterhead

Contact Name
System Name
Address
City, State 12345

PWSID: XX1234567

RE: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
Acknowledging Receipt of a System's Intent to Submit Grandfathered Data

Dear Mr./Mrs./Ms._____:

On [insert date], this office received a letter from the [insert name of system] containing an intent to grandfather submission. This letter is to confirm that the intent to grandfather submitted has been reviewed and approved by this office. Your system is still required to submit the actual grandfather data by [insert compliance date for submitting grandfather data] for review.

A second round of source water monitoring is required as part of the LT2ESWTR. Grandfathering data will not be accepted for the second round of monitoring.

Additional reference information is attached for your use. If you have questions regarding this letter, please contact us by sending an e-mail to stage2mdbp@epa.gov. For more information regarding this rule visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2.

Enclosures:
LT2ESWTR Quick Reference Guide
LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet
LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet
[list other enclosures]

Letterhead

Contact Name
System Name
Address
City, State 12345

PWSID: XX1234567

RE: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
Acknowledging Receipt of a System's Intent to Provide Full Treatment

Dear Mr./Mrs./Ms._____:

On [insert date] this office received notice from [insert name of system] of their intent to provide at least [insert either 5.5-log or 3.0-log] treatment for *Cryptosporidium* in lieu of source water monitoring as required by LT2ESWTR. Your system is required to install and operate treatment technologies to provide at least [insert either 5.5-log or 3.0-log] treatment for *Cryptosporidium* by [insert compliance date].

Additional reference information is attached for your use. If you have questions regarding this letter, please contact us by sending an e-mail to stage2mdbp@epa.gov. For more information regarding this rule visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2.

Enclosures:
LT2ESWTR Quick Reference Guide
LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet
LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet
[list other enclosures]

Letterhead

Contact Name
System Name
Address
City, State 12345

PWSID: XX1234567

RE: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
Re-sampling Requirements Because of Missing Sample(s)

Dear Mr./Mrs./Ms._____:

The LT2ESWTR requires systems to sample once per month for [insert what the system must sample for, *Cryptosporidium*, *E. coli*, Turbidity] in their source water. According to our records the results of your source water samples for [Enter month] were due by [Enter date results due]. These results have not been received. Failure to take your source water samples in compliance with your approved sample schedule is a monitoring violation. Your system is required to provide notice to the public for failure to take the required samples. This public notice must be provided by [Enter date 1-year from violation].

The LT2ESWTR requires systems to collect 24 samples in order to determine the appropriate bin classification. If your system misses 3 or more samples your system will be required to provide special public notice to explain the missed samples. Also your system may not have enough information to make a bin determination. Therefore you system is required to submit a revised sampling schedule that addresses how your system will collect the missed samples. This revised sampling schedule must be submitted by [enter date]. This schedule must be approved by this office prior to your system collecting the missed sample. In addition, your system must continue collect your monthly samples in accordance with your original sampling schedule.

It is required that your system notifies this office immediately with a reason why the sample was missed. Below is a list of possible reasons why the sample was missed:

- An extreme condition or situation existed that posed a danger to the sample collector.
- An extreme condition or situation existed that could not be avoided and caused your system to be unable to sample in the 5-day period.
- The valid analytical result was not reported because of equipment failure, loss of or damage to the sample, or failure to comply with the analytical method requirements.
- The approved laboratory failed to analyze the sample.

Additional reference information is attached for your use. If you have questions regarding this letter, please contact us by sending an e-mail to stage2mdbp@epa.gov. For more information regarding this rule visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2.

Enclosures:
LT2ESWTR Quick Reference Guide
LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet
LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet
[list other enclosures]

Letterhead

Contact Name
System Name
Address
City, State 12345

PWSID: XX1234567

RE: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
Re-sampling Requirements Because of a Laboratory Error

Dear Mr./Mrs./Ms._____:

An error occurred at the laboratory for the [insert type of sample, *Cryptosporidium*, *E. coli*, Turbidity] sample submitted on [enter date] by your system for compliance with the LT2ESWTR source water monitoring requirements. Due to this error your system is required to collect a replacement sample no later than 21 days after receiving this letter. If this is not feasible, you must notify this office immediately and provide an explanation of why the sample may not be collected within the 21 days.

Additional reference information is attached for your use. If you have questions regarding this letter, please contact us by sending an e-mail to stage2mdbp@epa.gov. For more information regarding this rule visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2.

Enclosures:
LT2ESWTR Quick Reference Guide
LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet
LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet
[list other enclosures]

Letterhead

Contact Name
System Name
Address
City, State 12345

PWSID: XX1234567

RE: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
Source Water Monitoring Plan Submission Approval

Dear Mr./Mrs./Ms._____:

On [insert date], this office received a letter from the [insert name of system] containing a source water monitoring plan. This letter is to confirm that this submission has been reviewed and approved by this office. Your system is required to collect monthly [insert what the system must sample for, *Cryptosporidium*, *E. coli*, Turbidity] samples as specified in the source water monitoring plan. Once all required source water monitoring samples are collected, a bin classification will need to be determined for your system. Your bin classification determines whether further treatment for *Cryptosporidium* is required.

A second round of source water monitoring is required as part of the LT2ESWTR. Your system will be required to submit a source water monitoring plan for the second round of source water monitoring.

Additional reference information is attached for your use. If you have questions regarding this letter, please contact us by sending an e-mail to stage2mdbp@epa.gov. For more information regarding this rule visit the LT2ESWTR website at www.epa.gov/safewater/disinfection/lt2.

Enclosures:
LT2ESWTR Quick Reference Guide
LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People Factsheet
LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People Factsheet
[list other enclosures]

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Appendix F
Data Collection and Tracking System

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Data Collection and Tracking System (DCTS)

1. *Registration Step-by-Step*

2. *Users' Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) Data Collection and Tracking System*

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Step-by-Step Registration for Central Data Exchange (CDX)/ Data Collection and Tracking System (DCTS)

Did you receive a letter from EPA/IPMC providing a Customer Retrieval Key (CRK)?

YES - Follow the directions under "A. Step-by-Step Registration for DCTS using CRK"

NO - Follow the directions under "B. Step-by-Step Registration for DCTS using CDX"

A. *Step-by-Step Registration for DCTS using CRK (Steps A.1. - A.12. need to be completed once. Once the password is setup, go to A.13.)*

A.1. Go to: http://cdx.epa.gov/preregistration

A.2. Input the CRK provided in the letter from EPA. You will only input the CRK the first time you enter the DCTS

A.3. Click on "Register"

A.3. Read the Warning Notice and Privacy Statements

A.4. Click on "Click here to continue" – New screen will appear

A.5. Read the Terms and Conditions

A.6. Click on "I Accept" and you will be sent to the registration page – New screen will appear

CDX Registration: User Information

A.7. Note – The user name box will automatically have your user name. **This must not be changed** (see Figure 1). This is the user name you will use in the future each time you log-in to DCTS.

Figure 1

CDX Registration: User Information

Please verify the information in your user profile. Use the TAB key to move from field to field. * = REQUIRED FIELD

First Name: Mr. John *

Last Name: Smith * Suffix: ---

Please choose a user name and password--the password must be at least 8 characters long and contain at least one number. Both passwords and user names are restricted to alpha-numeric characters and may not begin with a number or contain spaces or symbols, e.g. $ # . " or @. Your user name should not be a part of your password. If you enter a user name which is in use, you will be asked to select a new user name.

SEE STEP A.7. This user name must not be changed.

User Name: SmithJohn *
(More than 7 characters; Don't use $ # . " or @)

Password: *

Re-enter Password: *
(More than 7 characters w/1 number; Don't use $ # . " or @)

The Help Desk will use the Secret Question and Answer to authenticate you if you forget your password. Please enter a secret question which has relevance to you and has an answer which is not easily guessed by others.

Secret Question: *

Secret Answer: *

A.8. Input a password (following recommended format)

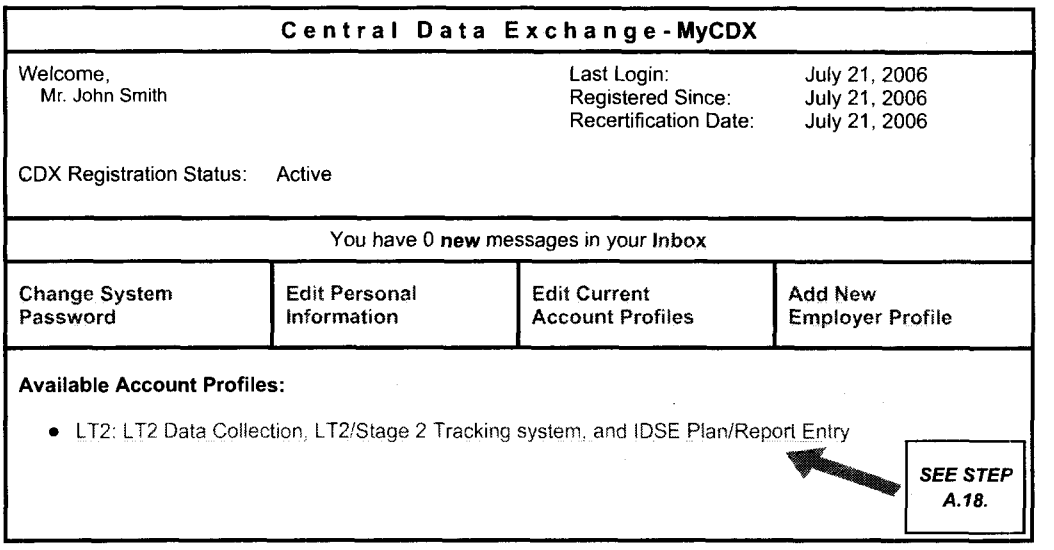
A.9. Re-enter the password

A.10. Input a secret question and answer – This will be used by the Help Desk to authenticate you if you forget your password

A.11. Click on "Next"

A.12. You should receive a message from "CDX Registration" [EPACDX@csc.com] within 24 hours of submitting your request. Once you have received the e-mail confirming your set-up, you can log into the DCTS.

Figure 2



Logging into the Data Collection and Tracking System (DCTS)

Once you have received the e-mail confirming your set-up, you can log into the DCTS.

A.13. Go to: http://www.epa.gov/cdx

A.14. Click on "Log-in to CDX" (on sidebar) – New screen will appear

A.15. Input your user name – This is the user name created for you when you originally logged in with your CRK (see Step A.7.)

A.16. Input your password

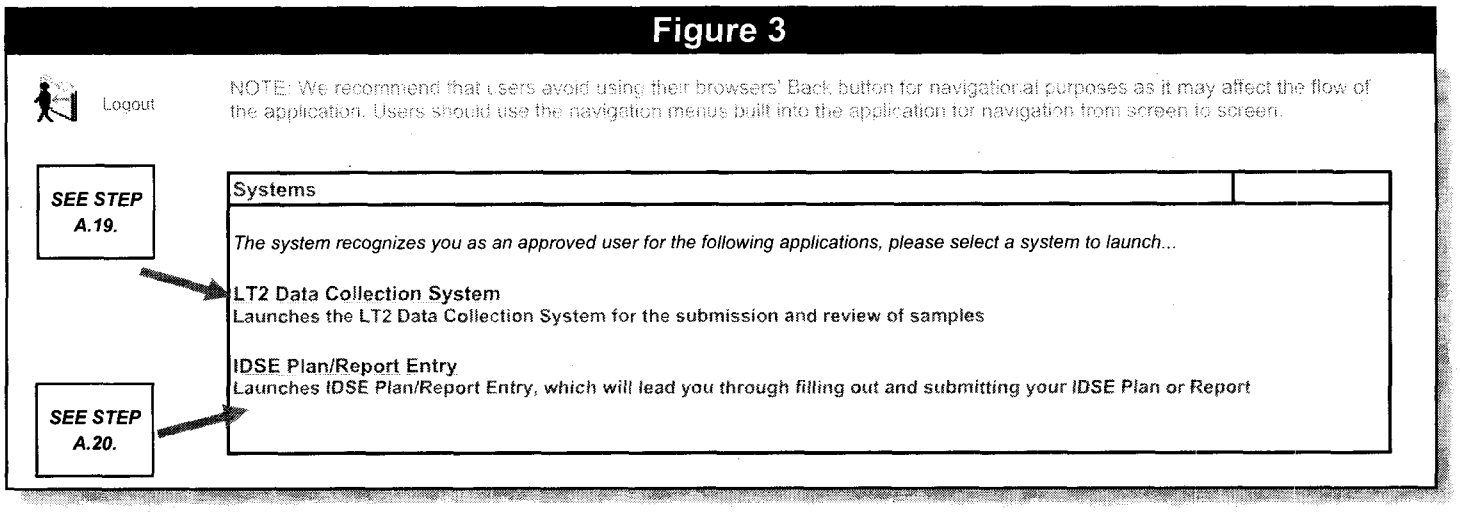
A.17. Click on "Login" – New screen will appear

A.18. Click on the long link "LT2: LT2 Data Collection, LT2/Stage 2 Tracking system, and IDSE Plan/Report Entry" program (see Figure 2). New window will appear

A.19. To open data system related to submission and review of samples for compliance with the LT2 Rule click on LT2 Data Collection System (see Figure 3)

A.20. To open data system related to submission of your IDSE Plan or IDSE Report for compliance with the Stage 2 Rule click on IDSE Plan/Report Entry (see Figure 3)

Figure 3



B. Step-by-Step Registration for DCTS using CDX (Steps B.1. - B.17. need to be completed for registration. Once the password is setup, go to B.19.)

B.1. Go to: http://www.epa.gov/cdx

B.2. Click on "Log-in to CDX" (on sidebar) – New screen will appear

B.3. Click on "Registration" (on sidebar) – New screen will appear

B.4. Read the Warning Notice and Privacy Statements

B.5. Click on "Click here to continue" – New screen will appear

B.6. Read the Terms and Conditions and click on "I Accept" – New screen will appear

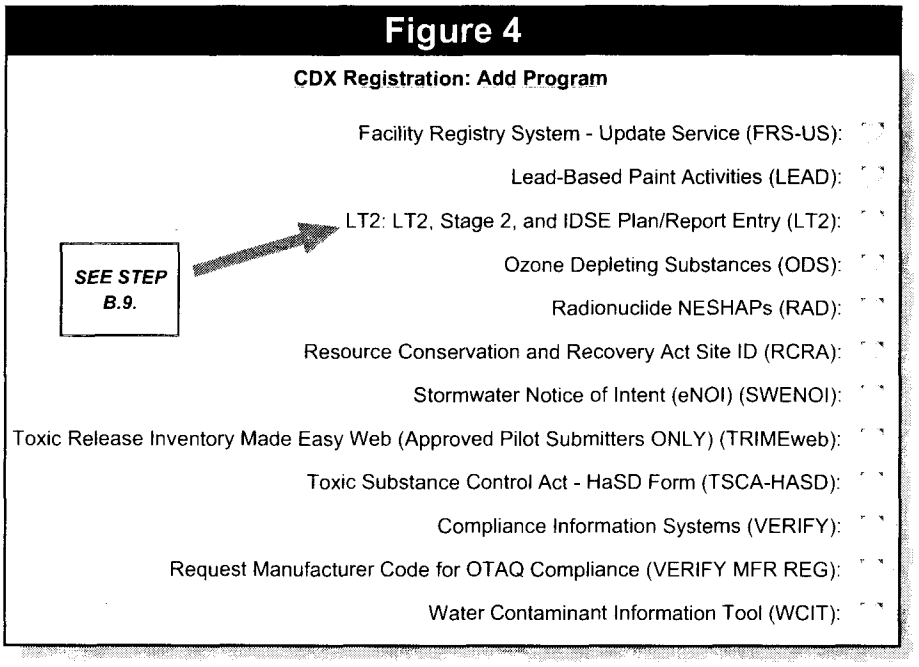
B.7. Input a user's first and last name, user name (following recommended format), password (following recommended format) and re-enter the password, a question that can be used in case you forget your password, and the answer to the question – New screen will appear

B.8. Input the water system's name in the Organization Name field and all other requested information. Click on "Next" - New screen will appear

CDX Registration: Add Program

B.9. Select "LT2: LT2, Stage 2, and IDSE Plan/Report Entry (LT2)" (see Figure 4).

Figure 4



B.10. Click on "Next" – New screen will appear

Complete Role Information –

B.11. Role is "Asubmitter" only option

B.12. Select "Standard" (This is CDX. This is not where you request DCTS Admin access.)

B.13. Input your water system's federal PWSID (i.e., WA5312345) in the ID field. If you don't know your PWSID please send an e-mail to stage2mdbp@epa.gov.

B.14. Submission method is "WEBFORM" (only option)

B.15. Click on "Next"

B.16. Read the message

B.17. Click on "Finished"

B.18. You should receive confirmation from "CDX Registration" [EPACDX@csc.com] within 24 hours of submitting your request. Once you have received the e-mail confirming your CDX set-up, you can log into the DCTS.

Logging into the Data Collection and Tracking System (DCTS)

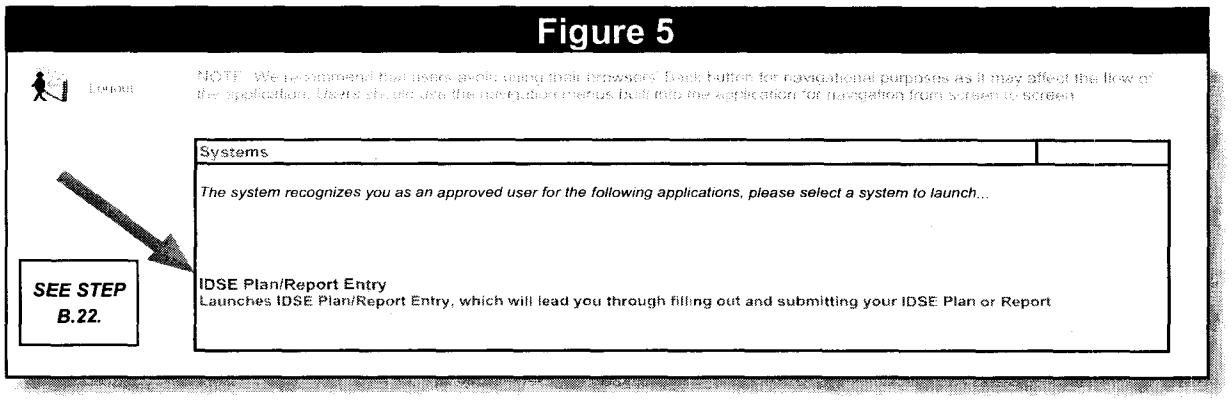
B.19. Follow steps B.1. and B.2.

B.20. Input your user name and password – This is the user name you choose for yourself when setting up your CDX account (see Step B.7.). Click "Login" - New screen will appear

B.21. Click "LT2: LT2 Data Collection, LT2/Stage 2 Tracking system, and IDSE Plan/Report Entry" program (see Figure 2) - New window will appear

B.22. To submit your IDSE Plan electronically for compliance with the Stage 2 Rule click on IDSE Plan/Report Entry (see Figure 5). This is the final registration step for DCTS users that need to comply with the Stage 2 requirements for only one water system.

Figure 5



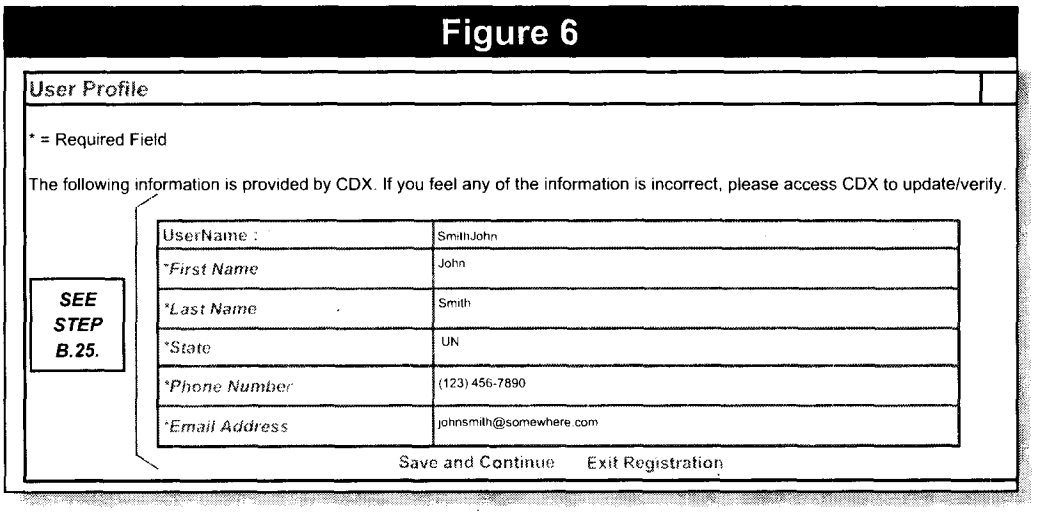
If you need access to multiple systems to complete multiple IDSE plans/reports or if you need to comply with the LT2 requirements, you must request access to the LT2 Data Collection System. To obtain access to the LT2 Data Collection System you must contact your system's DCTS administrator. If you do not know your system's DCTS administrator, e-mail your system's PWSID, water system name, and CDX user name to stage2mdbp@epa.gov.

B.23. Once access is granted to the LT2 Data Collection System please click on the LT2 Data Collection System link that will appear above the IDSE Plan/Report Entry link (see Figure 3)

B.24. Click on the "User Profile" icon

B.25. Update information for First Name, Last Name, State, Phone Number, or E-mail Address if any are incorrect (see Figure 6)

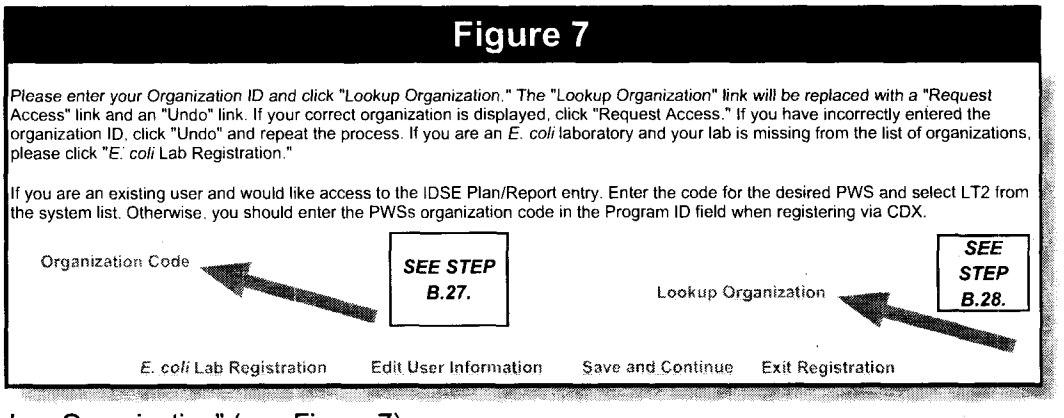
Figure 6



B.26. Click on "Save and Continue"

B.27. Input your water system's federal PWSID (i.e., WA5312345) in the Organization Code field (see Figure 7)

Figure 7



B.28. Click on "Lookup Organization" (see Figure 7)

B.29. A new field "System Type" will appear; select "Both" (even if you only need access to one of the rules)

B.30. Click on "Request Access"

B.31. Click on "Save and Continue"

B.32. If you need to request access to additional systems, repeat steps B.27. through B.31. Once you are finished, click on "Exit Registration."

Once your user name has been authenticated by the DCTS administrator for your system, you will be granted access to the data system for these additional system(s).

Users' Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) Data Collection and Tracking System

Version 1.2

June 2, 2006

Prepared for

United States Environmental Protection Agency

Office of Water (4607)

http://www.epa.gov/safewater/lt2/

May 2006

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Disclaimer

This Users' Manual has been reviewed by the Standards and Risk Management Division (SRMD) within the USEPA OGWDW. Mention of company names, trade names, or commercial products in this report does not constitute endorsement or recommendation for use. This Users' Manual is available for download in Adobe Acrobat (.pdf) format from http://www.epa.gov/safewater/lt2/.

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Section 1. Introduction

Welcome to the Users' Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) Data Collection and Tracking System. This document is intended to provide guidance to laboratories, public water systems (PWSs), and state and USEPA officials on the various functions of the LT2 Data Collection and Tracking System (DCTS), which has been developed to support data reporting under the LT2 Rule monitoring program.

The LT2 rule requires PWSs that use surface water or groundwater under the direct influence of surface water to monitor their source water (influent water prior to treatment) for *Cryptosporidium*, Escherichia coli (*E. coli*), and turbidity. In support of the monitoring requirements specified by this rule, three documents have been developed to provide guidance to the affected PWSs and the laboratories that support them:

Source Water Monitoring Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-005]. This guidance manual for PWSs affected by the rule provides information on laboratory contracting, sample collection procedures, and data evaluation and interpretation.

Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006]. The goal of this manual is to provide *Cryptosporidium* and *E. coli* laboratories analyzing samples in support of the LT2 rule with guidance and detailed procedures for all aspects of microbial analyses under the rule to maximize data quality and consistency.

Users' Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule) Data Collection and Tracking System [EPA-No.-TBD] (this document). This manual provides PWSs and laboratories with instructions on the entry, review, and approval of electronic data using the LT2 DCTS, and provides USEPA and states with instructions on viewing system-generated reports.

These manuals, as well as additional information and updates on the LT2 rule are available on the Web at http://www.epa.gov/safewater/lt2/.

If you have additional questions not addressed by this manual, please email LT2 Technical Support, at stage2mdbp@epa.gov, or contact the LT2/Stage 2 Data Collection and Tracking System user support at 1-888-LT2-0020 (1-888-582-0020).

1.1 Organization of Manual

This manual provides guidance on the following aspects of the LT2 DCTS:

- **Section 1** - Provides an overview of the LT2 rule and manual organization. It also provides background information on the LT2 DCTS, the use of the data in the LT2 DCTS, the analytical method specifications in the LT2 rule, and the various user roles.
- **Section 2** - Provides details on the LT2 DCTS requirements, process for connecting to the LT2 DCTS, the Administrative User's role, the login process, new user registration, how to request help, and the logout procedure.
- **Section 3** - Provides Lab User details.
- **Section 4** - Provides PWS User details.
- **Section 5** - Provides EPA and State User details.
- **Section 6** - Describes the XML data submission process.
- **Section 7** - Provides legal and security information.

1.2 About the LT2 Data Collection System

Under the LT2 rule, filtered PWSs that serve more than 10,000 people (i.e., large filtered systems), and that use surface water or groundwater under the direct influence of surface water as their drinking water source, will be required to sample for *Cryptosporidium*, *E. coli*, and turbidity.

The USEPA developed the LT2 DCTS to support the activities required under the LT2 Rule. PWSs collect water samples to be analyzed for three specific measures of water quality: the presence of *Cryptosporidium*, *E. coli*, and turbidity. The samples are analyzed (by either the PWS on-site laboratory or an off-site laboratory) in compliance with the LT2 monitoring program. The data generated from the analysis is entered into the LT2 DCTS either by manually entering the data in data collection forms or by uploading the data in XML format. The DCTS acts as a repository for these data, and provides analytical support by calculating sample results. PWSs use the LT2 DCTS to review sample data prior to submission to USEPA and/or state officials. A summary of the data flow through the LT2 DCTS is provided in Figure 1-1. Details on the different user roles are provided in Section 1.5, User Roles.

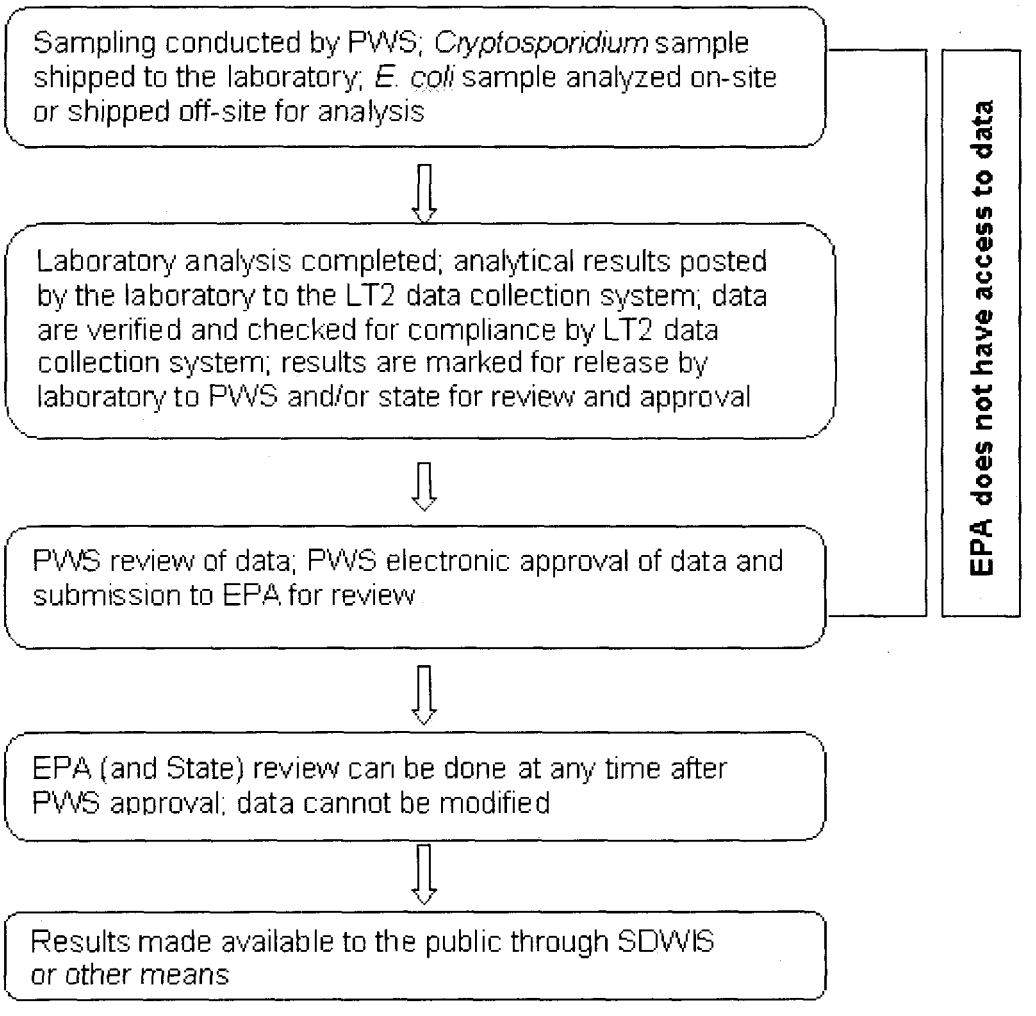


Figure 1-1. LT2 DCTS Data Entry/Upload, Review, and Approval Process

1.3 Data Use

The data collected for compliance with the LT2 rule will be used to determine whether improved treatment for the control of microbial pathogens will be needed in the future for individual PWSs. The data will be used for the following purposes:

Assessment of mean *Cryptosporidium* concentration for individual plants - to assess the need for additional treatment by classifying each plant by treatment requirements. (This requires reliable *Cryptosporidium* data from field samples.)

Evaluation of the relationship between *Cryptosporidium* occurrence, *E. coli*, and turbidity - Reassessment of the microbial index to determine how *E. coli* and turbidity monitoring can be used to assess the need to monitor for *Cryptosporidium* at small systems. (This requires reliable *Cryptosporidium*, *E. coli,* and turbidity data from field samples.)

Evaluation of *Cryptosporidium* method performance in source waters - to verify the assumptions upon which the Federal Advisory Committee Act Agreement in Principle was based. (This requires reliable *Cryptosporidium* data from matrix spike samples.)

More detailed information on the uses of each of these types of data are provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006] and the Source Water Monitoring Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-005].

1.4 Analytical Methods

All analytical data entered into the LT2 DCTS must be generated using methods approved for use under the LT2 rule and in accordance with defined quality assurance (QA) procedures. Details on approved *Cryptosporidium* and *E. coli* methods and QA procedures are provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006].

Public water systems measuring turbidity during sample collection under the LT2 rule must use turbidity methods approved for use under the rule. Detailed information on turbidity measurements and methods is provided in the Source Water Monitoring Guidance Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-005].

1.5 User Roles

Five different user roles will access the LT2 DCTS:

- **Lab User:** Enters and edits the data via web entry forms or XML file submission.
- **Lab Approver User:** Authorizes submission of sample results to the PWS by checking and approving the associated data. The Lab Approver User may also enter and edit data via web entry forms or XML file submission. For *Cryptosporidium* laboratories, the data approver is the laboratory's Principal Analyst under the Lab QA Program.
- **PWS User:** Reviews sample results submitted by the Lab Approver User. The PWS User may release the results to USEPA and the state in which the facility is located as approved or contested results, or may return the sample to the lab for error correction.
- **State User:** Reviews the results that have been approved by the PWSs within its jurisdiction (generally within their state). The State User only sees samples that have been approved or contested by the PWS, as well as samples that have not been reviewed by the PWS within the designated time frame. They do not see samples that have been flagged or returned to the lab.
- **EPA User:** Reviews the results that have been released by all PWSs. The EPA User only sees samples that have been approved or contested by the PWS, as well as samples that have not

been reviewed by the PWS within the designated time frame. They do not see samples that have been flagged or returned to the lab.

For each user role, there is also an "Administrative User." This is a user that belongs to one of the five roles that is able to perform all the functions of that user role as well as being able to update users and change their status within their organization (e.g. change a "Pending" user to a "Lab Approver User"). A matrix of the LT2 DCTS user roles and actions is provided in Figure 1-2. The registration procedure for each user role is discussed in Section 2 of this manual.

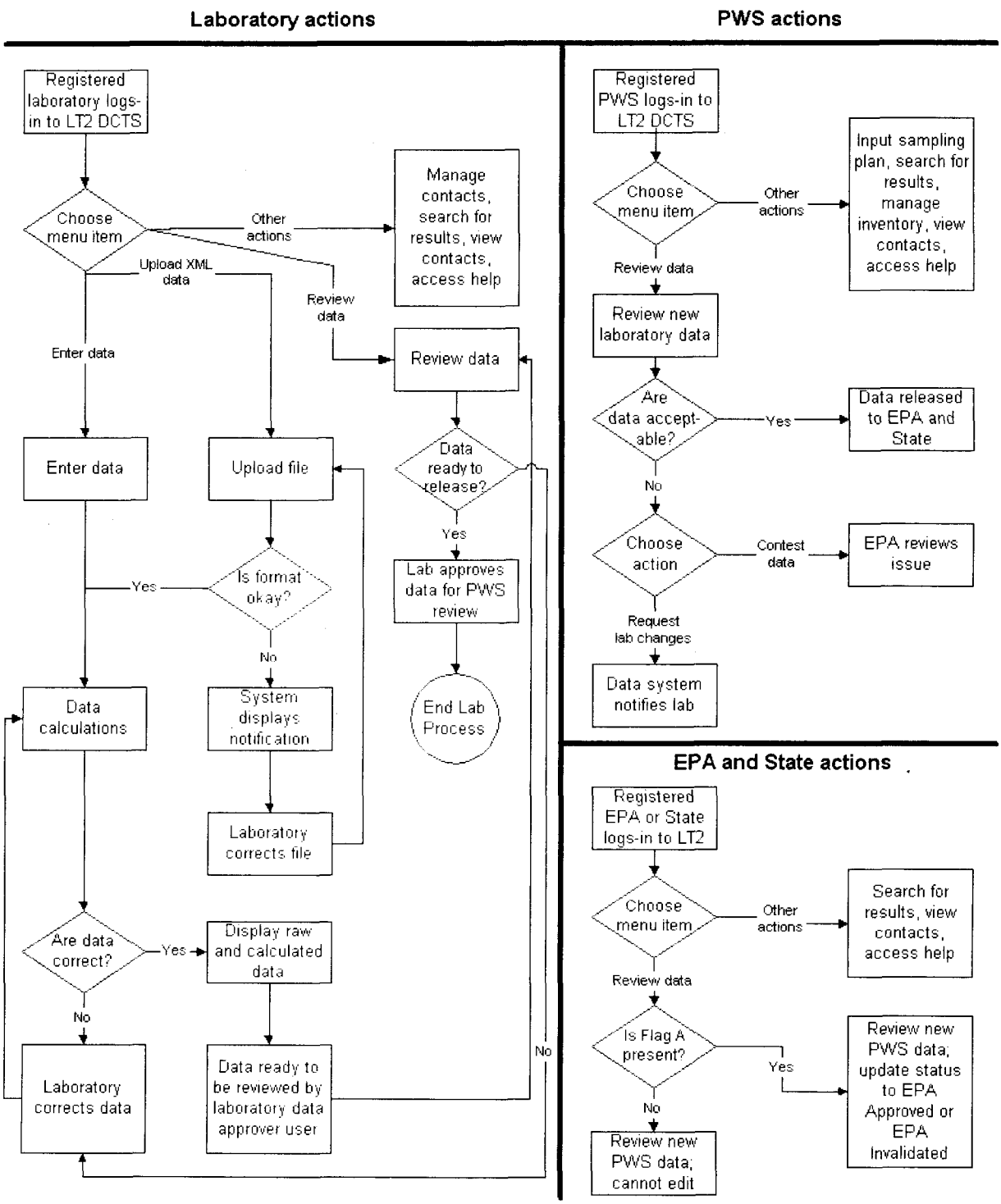


Figure 1-2. Overview of the LT2 DCTS User Roles

Section 2. Getting Started

This section provides instructions for connecting to the LT2 DCTS, the Administrative User's role, the log in process, new user registration information, accessing help, and logging out.

2.1 System Requirements

The LT2 DCTS was designed to be accessible from most personal computers (PCs) with an Internet connection. Ensure that you have the following before using the LT2 DCTS:

- PC with 486 MHz processor or better; Pentium is recommended;
- One of the following Microsoft Platforms: Windows 95, 98, 2000, XP or NT;
- Web Browser: Microsoft Internet Explorer (IE), version 5.5 or above, or Netscape Navigator, version 4.0 or above, with 128-bit encryption; and.
- Internet access; high-speed connection is recommended.

Note: If you have Internet Explorer 6.0 or above, verify that your browser has the following settings selected. Click on TOOLS and select "Internet Options." Click on the "SECURITY" tab. Click on the "CUSTOM LEVEL..." button. Scroll down to "Microsoft VM," and change the Java Permissions by selecting the "Low Safety" radio button. Scroll down to "Miscellaneous," and change the "Access Data Across Domains" to enable. Repeat with "Allow Meta Refresh" and "Display mixed content."

No additional hardware, software, or tools should be needed.

2.2 Connecting to the LT2 Data Collection System

The official contact for the PWSs and *Cryptosporidium* laboratories will receive CDX Customer Retrieval Keys (CRK) to access the LT2 DCTS for the first time. All other users that need access to the system should follow the instructions for new user registration provided in Section 2.2.1.To access as a pre-registered user, perform the following steps:

- Open your Web browser connected to the Internet.
- Open the CDX CRK login page (provided in your welcome email/letter).
- Enter your CRK.
- Setup a user name and password and update prepopulated user information.
- Select the LT2: LT2/Stage 2, and IDSE Plan/Report Entry (shown in Figure 2-1)
- CDX will now redirect you to the LT2/Stage 2 Data Collection and Tracking System, which will open in a new window, once there the Select Application screen is displayed as shown in Figure 2-2.
- Click on the "LT2 DATA COLLECTION SYSTEM" link to access the LT2 Data Collection System.

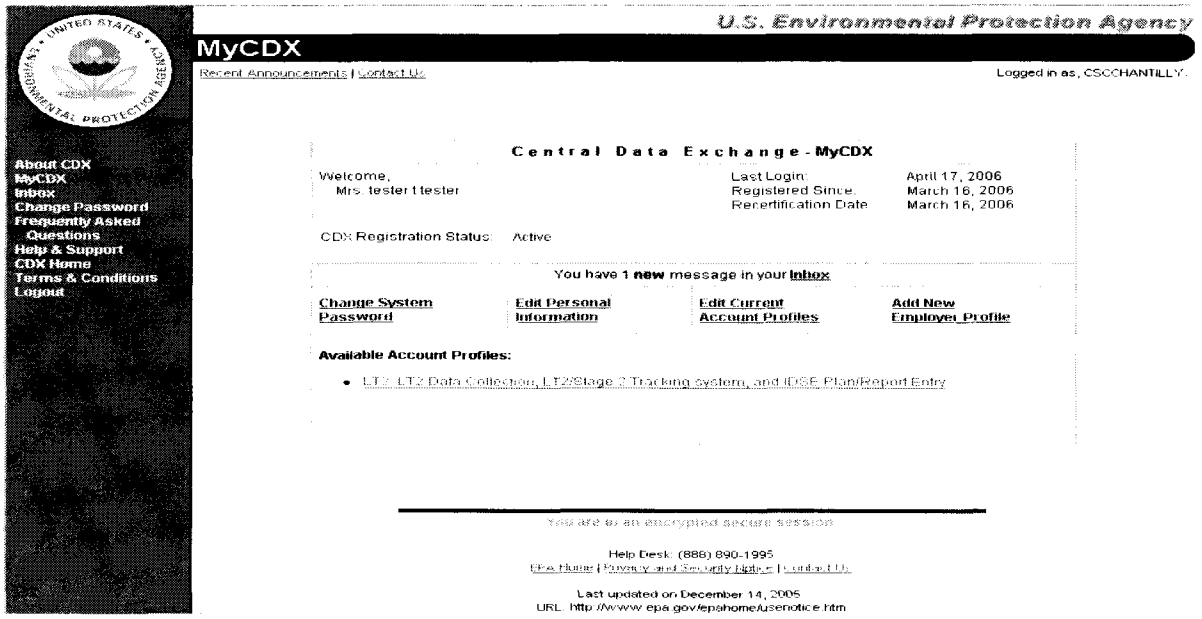


Figure 2-1. CDX Select Application Screen

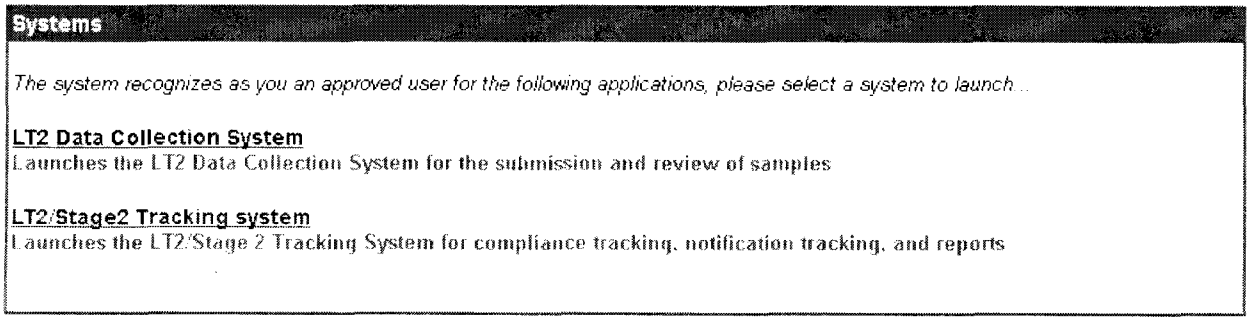


Figure 2-2. Systems Screen

2.2.1 New User Registration

Those users that are not provided with CRKs in the mail will have to register through CDX for access to the LT2 DCTS. The LT2/Stage 2 Tracking System utilizes EPA's CDX as its authentication mechanism. To request access to the LT2/Stage 2 Tracking System, perform the following steps:

- Open your Web browser connected to the Internet.
- Open the CDX home page available on the Web at https://cdx.epa.gov/SSL/cdx/login.asp.
- Read and acknowledge the warning notice and privacy statement
- Access the registration pages and create your user profile by submitting the following user information (figure 2-3):
  a. Name including first and last name, with prefix, middle initial, and suffix being optional)
  b. User Name
  c. Password (with a second entry of the password for confirmation

d. Organization (including name, address, city, state, zip code, and country)
e. Phone Number
f. E-mail Address
g. Secret question and answer

- Select the LT2: LT2/Stage 2, and IDSE Plan/Report Entry from the list of available applications
- EPA will review your registration information and confirm that you are eligible for access to the LT2/Stage 2 Tracking System
- Once your eligibility to access the system is confirmed you will receive an email granting you access to the system

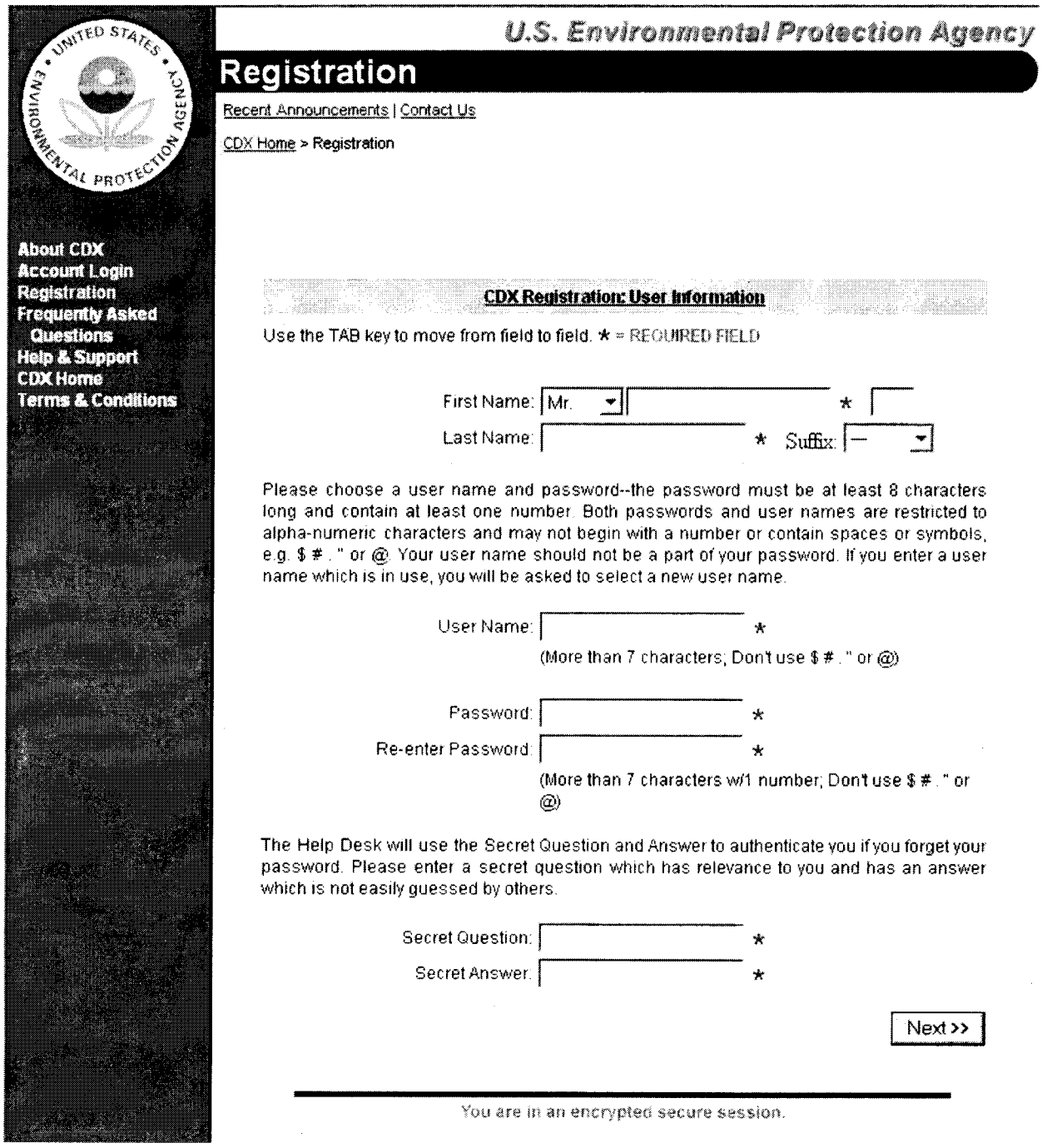


Figure 2-3. New User Registration Screen

2.2.1.1 Requesting Access to Organizations in LT2

Once you have received notice that you were approved in CDX. You may follow the directions in 2.2 above for continuing into LT2. Once you select LT2, you must first go to the User Profile to confirm your contact information. After confirming your contact information click "Save and Continue," (Figure 2.4) you will be prompted to enter the organization ID(s) for the organization(s) you represent. To request access to an organization, enter the organization ID and click "LOOKUP ORGANIZATION" Figure 2-5 provides an example of the "New User Registration Organization Identification" screen. If a valid organization ID was entered, the page will refresh and display the corresponding organization name. Verify this information and click "REQUEST ACCESS" to add the selected organization to the list of organizations you represent.

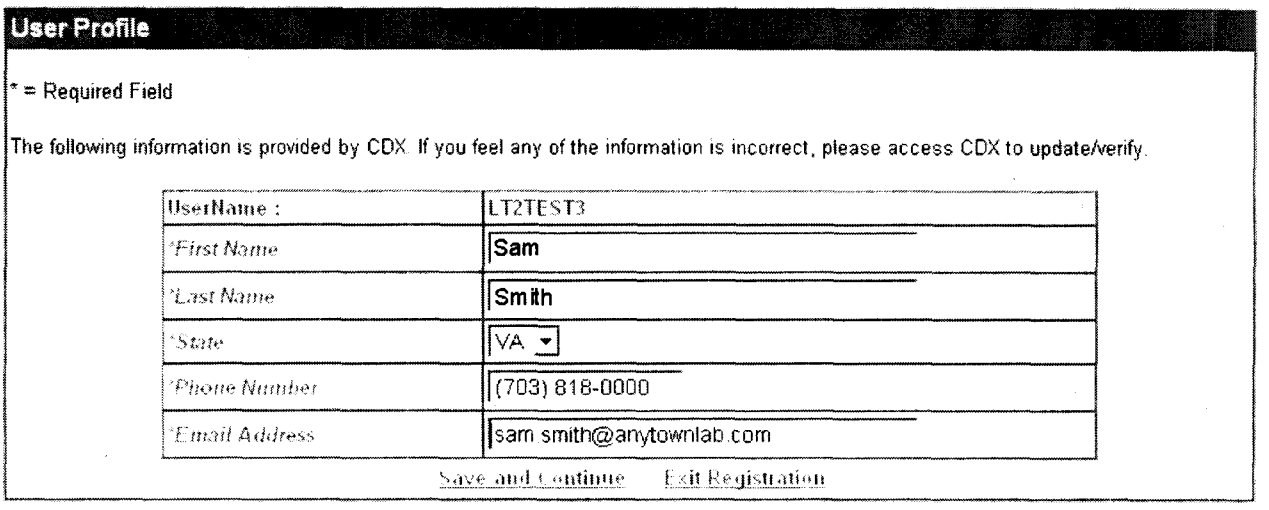


Figure 2.4. User Profile

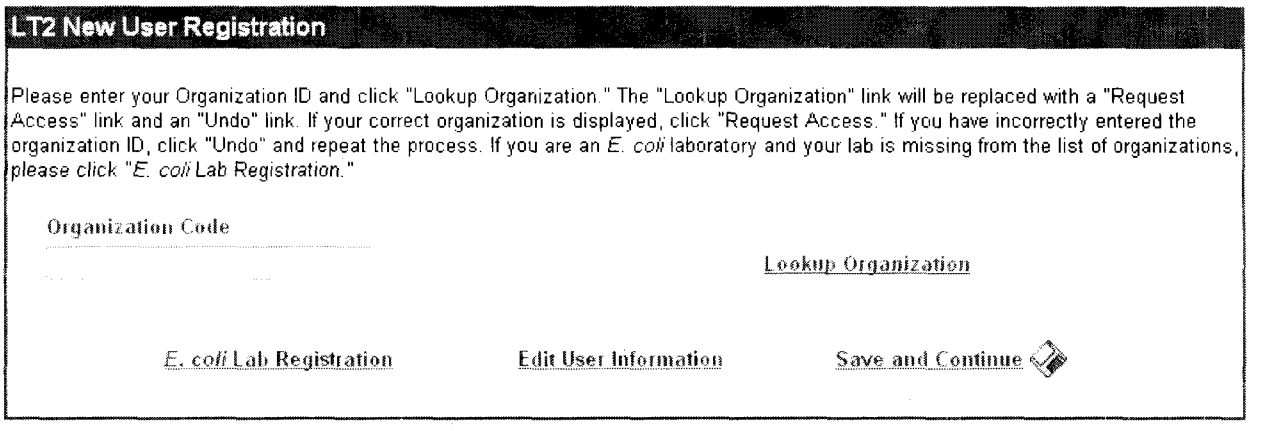


Figure 2-5. New User Registration Organization Identification Screen

You may repeat the previous process until all of the organizations you represent have been entered. The LT2 DCTS will confirm registration in the top section of the form. After you have requested access to the necessary organization(s), click "SAVE AND CONTINUE" at the bottom of the screen. If you would like to remove any organizations from this list, click the corresponding "DELETE" button next to each organization.

A new screen will open, detailing the information you provided to the LT2 DCTS. If any information is incorrect, you may return to the previous screens by clicking the appropriate link at the bottom of the summary screen, as seen in Figure 2-6.

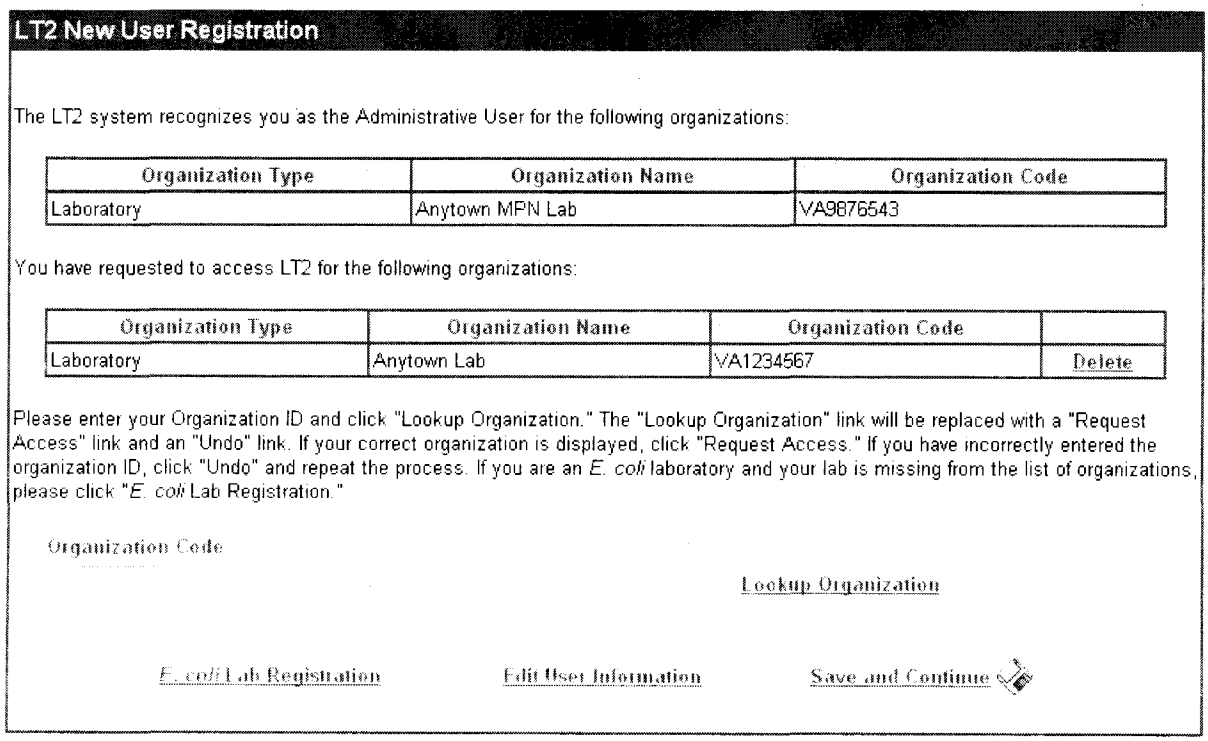


Figure 2-6. New User Registration Organization Identification Information Screen

2.2.2 Password Reset

If you forget your Password, CDX allows you to reset your password. To reset your Password, click the link at the top of the CDX log-in screen. When prompted, enter your User Name and click "SUBMIT." and the "Secret Question/Secret Answer Process" screen will display as shown in Figure 2-7. Enter the answer to your secret question and click "Submit." You will then be provided with a temporary password to use for log-in. You will be prompted to change your password when you log-in.

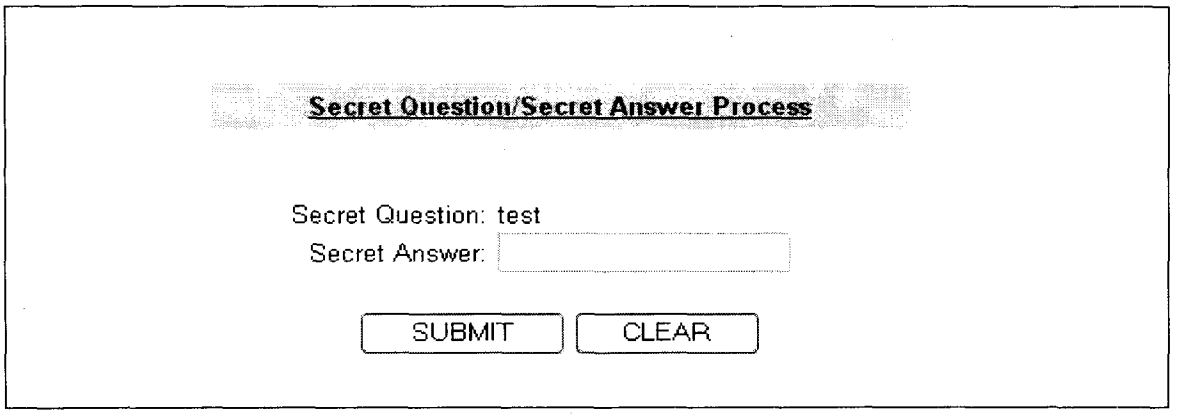


Figure 2-7. Password Notification Screen

2.3 Administrative User Functions

Each lab or PWS that is registered with the LT2 DCTS has an Administrative User. The Administrative User is key to the initial registration of the entire lab or PWS. If the Administrative User does not complete the following tasks (described in Sections 2.3.1 - 2.3.4), no other user will be able to effectively access or use the LT2 DCTS.

2.3.1 User Registration

If you are the Administrative User for an organization, login to CDX and continue to LT2. Click on the "USER PROFILE" link, and verify your pre-populated contact information. To update your contact information, go to your MyCDX page. You must be registered before others from your organization can use the LT2 DCTS.

2.3.2 New *Cryptosporidium* Laboratory

Cryptosporidium laboratories will be pre-registered to the DCTS. However, if your laboratory is not listed in the DCTS, please contact USEPA with your laboratory information.

2.3.3 New *E. coli* Laboratory

After you have logged in to the LT2 DCTS, you can view your personal contact information and list of organizations you represent by clicking on the "USER PROFILE" link on the navigational toolbar at the left of the screen. You will be able verify your contact information. To update your contact information, go to your MyCDX page.

As the Administrative User for an *E. coli* laboratory, you may register the laboratory by clicking on the "*E. coli* LAB REGISTRATION" link on the bottom of the "Organization Identification" screen, as seen in Figure 2-

8. The LT2 "Organization Information" screen allows *E. coli* laboratories that have not previously registered with the LT2 DCTS to electronically request access to the LT2 DCTS.

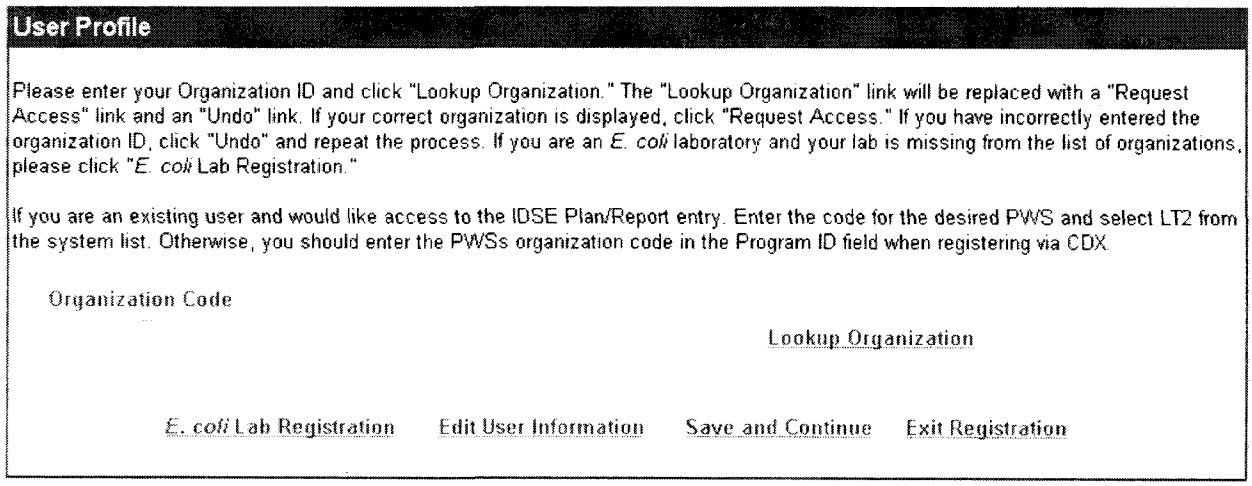


Figure 2-8. New User Registration Organization Identification Screen

You will be required to enter in your Lab ID, Lab Name, and Lab Type, mailing address, city, state, zip code, and phone number. This information should be reviewed and updated (if necessary) to reflect the laboratory's contact information. Figure 2-9 provides an example of the "*E. coli* Lab Registration" screen.

After you have entered the required information, click "SAVE AND CONTINUE" at the bottom of the screen and a summary of the information submitted to the LT2 DCTS will be provided. If any of this information is incorrect you may return to the previous screens by clicking the "EDIT INFORMATION" link at the bottom of the summary screen. Click "CONTINUE WITH REGISTRATION" to return to the organization identification screen and continue with your personal registration. To receive more details regarding the information required for certification, click the "CERTIFICATION INFORMATION" link towards the bottom of the screen.

Note: If you are already registered with the LT2 DCTS, you can access the *E. coli* New Lab Registration module within the User Profile pages.

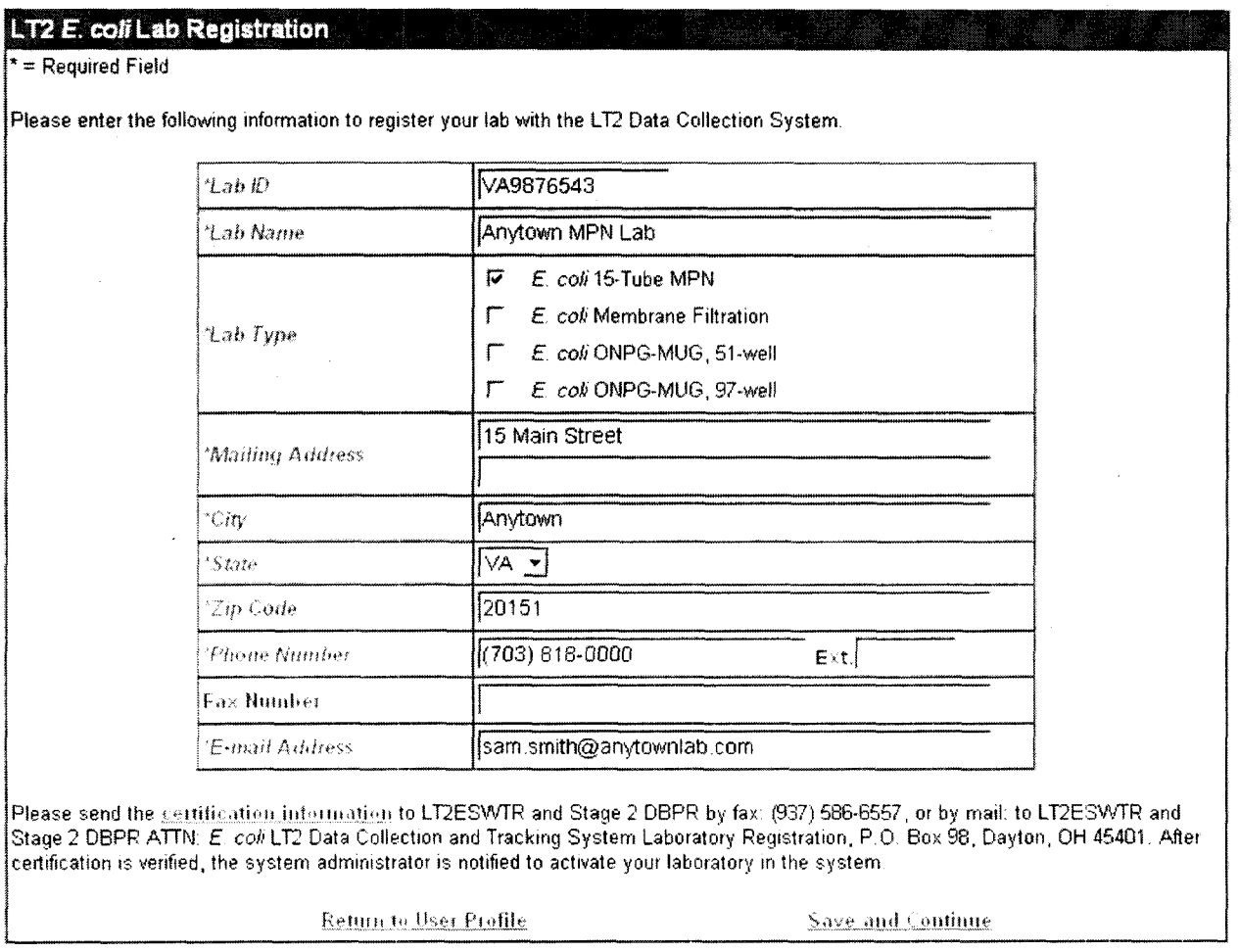


Figure 2-9. E. coli Lab Registration Screen

2.3.4 Update Users – PWS and Lab Users

In the Update Users function, the Administrative User has the ability to assign roles and administrative rights to those who have requested access to the LT2 DCTS for your organization. This function is accessed from the side navigational toolbar, under the "UPDATE USERS" link. This link appears only to the Administrative User for an organization. Figure 2-10 provides an example of the "Update Users" screen.

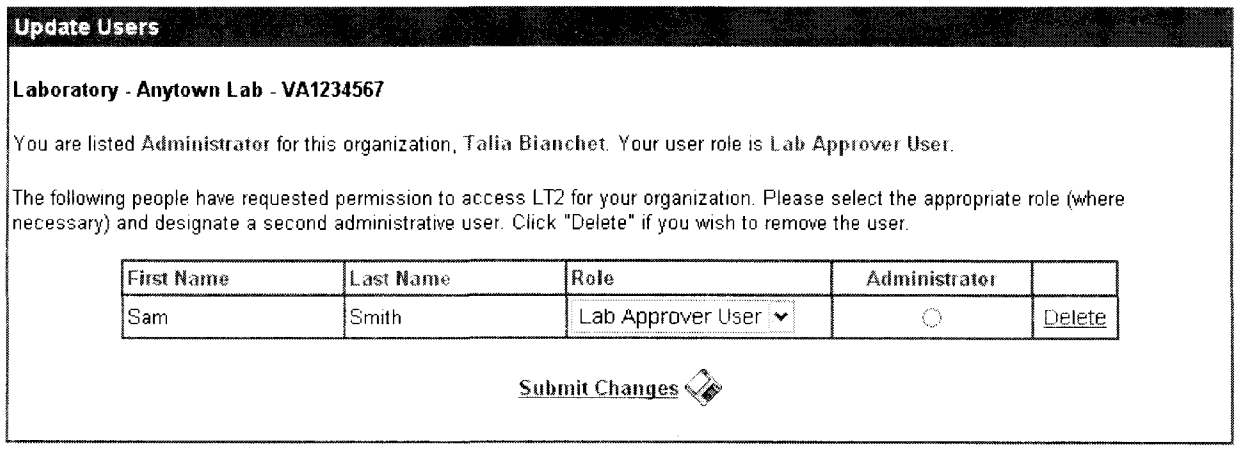


Figure 2-10. Update Users Screen

A list of users who have requested access to the LT2 DCTS for your organization will display. Designate a role for each user by selecting the appropriate role from the drop-down menu to the right of the user's name. Appoint a secondary Administrative User for each organization by clicking the radio button corresponding to the desired user. If the user should not receive access to the LT2 DCTS for your organization, remove their name from the list by clicking "DELETE." When you are finished making the appropriate modifications, click "SUBMIT CHANGES" to commit all changes to the database.

2.3.5 Update Contracting Labs

This link appears only to the Administrative User for a PWS. The Update Contracting Labs module provides you, as the PWS Administrative User, a means for selecting the contracting laboratories for your organization. This function is accessed from the left-hand side navigational toolbar, under the "UPDATE CONTRACT LABS" link. It is essential to access this module and set up a laboratory before the laboratory can submit data for your PWS. Figure 2-11 provides an example of the "Update Contracting Labs" screen.

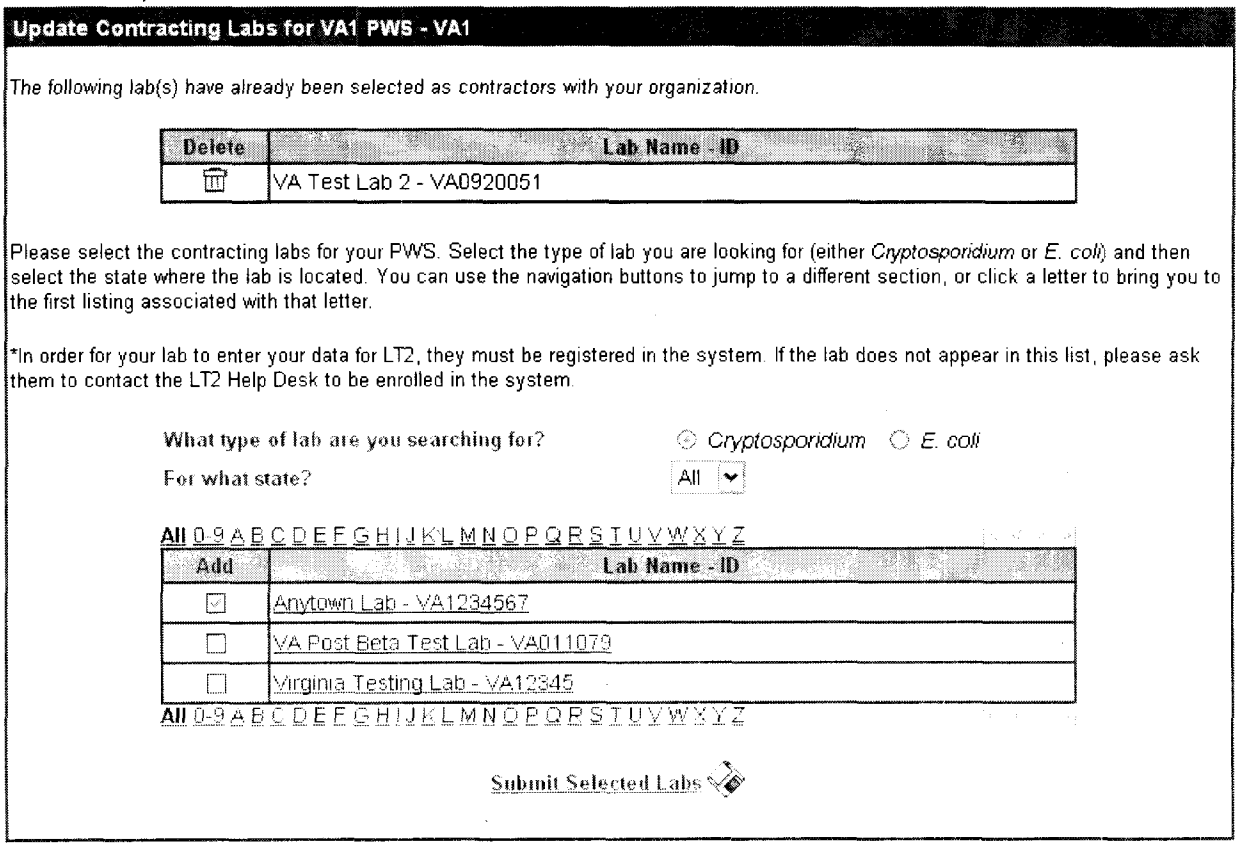


Figure 2-11. Update Contracting Labs Screen

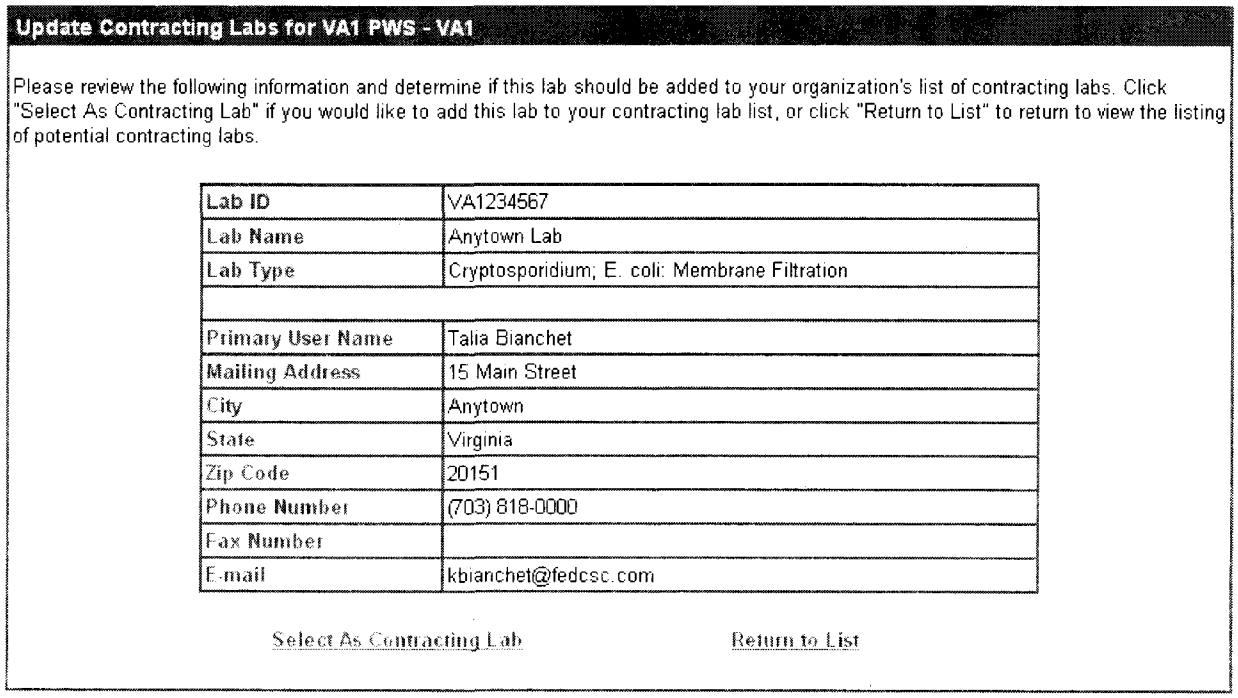
In order to select a laboratory as a contractor for your PWS, you must search by laboratory type and state. Select whether you would like to search for *Cryptosporidium* or *E. coli* laboratories by clicking the radio button that appears to the left of the desired laboratory type. Next, select the state for which you would like to search using the drop-down menu. The page will refresh with a listing of laboratories that meet the selected criteria. Browse through the listing of laboratories by using the navigational links that appear at the top and bottom of the search results table. Use > to continue to the next 30 laboratories, < to return to the previous 30 laboratories, >| to skip to the last 30 laboratories, and |< to return to the first 30 laboratories. The alphabetical links can also be used to bring you to the first laboratory that is associated with that letter.

To select one or more laboratories as your contracting laboratory, click the check box that appears to the left of the laboratory name(s) and click the "SUBMIT SELECTED LABS" link to complete the process. The newly selected laboratory name(s) will appear at the top of the screen with the rest of the contracting laboratories for your PWS. You can remove a laboratory from this list by clicking the trash can icon that appears to the left of the laboratory name.

Note: You may select multiple laboratories in multiple states.

If you would like to view more information regarding a laboratory before selecting it as a contracting laboratory, click on the Lab Name. The pertinent contact information for the laboratory will display on a new page. Figure 2-12 provides an example of the "Update Contracting Labs" information screen. If you have selected the correct laboratory and wish to add it to your list of contracting laboratories, click the

"SELECT AS CONTRACTING LAB" link. If you would like to return to the list of potential laboratories without selecting this laboratory as a contracting laboratory, click the "RETURN TO LIST" link.



Update Contracting Labs for VA1 PWS - VA1

Please review the following information and determine if this lab should be added to your organization's list of contracting labs. Click "Select As Contracting Lab" if you would like to add this lab to your contracting lab list, or click "Return to List" to return to view the listing of potential contracting labs.

Lab ID	VA1234567
Lab Name	Anytown Lab
Lab Type	Cryptosporidium; E. coli: Membrane Filtration
Primary User Name	Talia Bianchet
Mailing Address	15 Main Street
City	Anytown
State	Virginia
Zip Code	20151
Phone Number	(703) 818-0000
Fax Number	
E-mail	kbianchet@fedcsc.com

Select As Contracting Lab Return to List

Figure 2-12. Update Contracting Labs Information Screen

2.4 Updating User-Specific Information

After you have registered with the LT2 DCTS, you can view your personal contact information and update the list of organizations you represent by clicking on the "USER PROFILE" link on the navigational toolbar at the left-hand side of the screen. You will be able to verify your contact information. To update your contact information, go to your MyCDX page. Figure 2-13 provides an example of the "User Profile" screen for data review and entry.

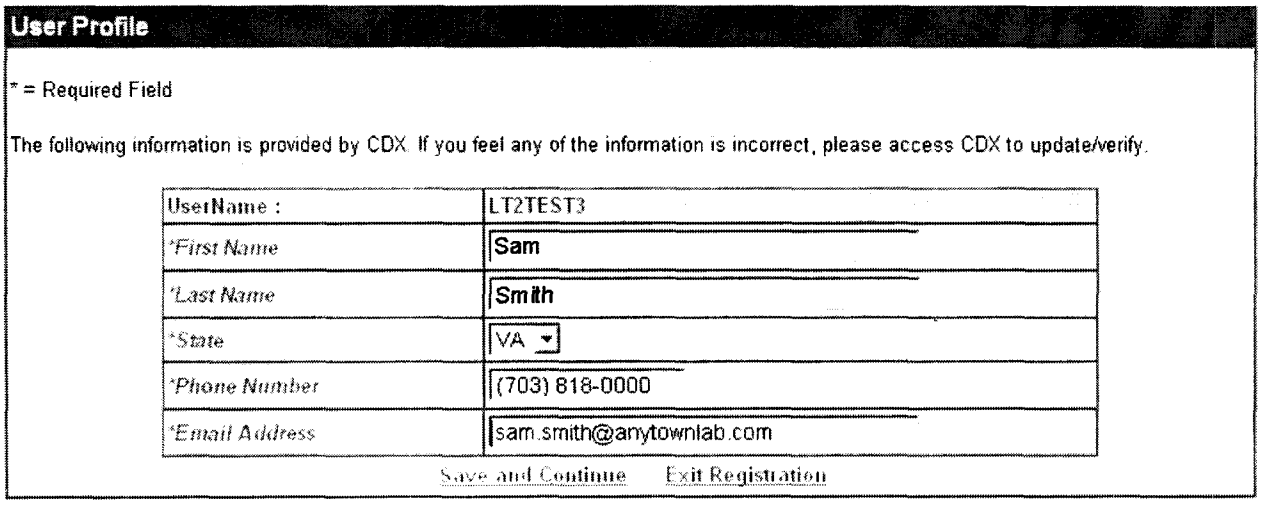


Figure 2-13. User Profile Screen

After you have reviewed the information, click the "SAVE AND CONTINUE" link to proceed to the next section and edit your organization information. The LT2 DCTS will confirm registration to previously selected organizations listed at the top of the screen. If you would like to remove any organizations from this list, click the corresponding "DELETE" button.

To request access to a new organization, enter the organization ID and click the "LOOKUP ORGANIZATION" link. If a valid organization ID was entered, the page will refresh displaying the corresponding organization name. Verify this information and click the "REQUEST ACCESS" link to add the selected organization to the list of organizations you represent. If you have incorrectly entered the organization ID, click "UNDO" to repeat the process. You may repeat the process until all of the organizations you represent have been entered. Figure 2-14 provides an example of the "User Profile Organization Identification" screen.

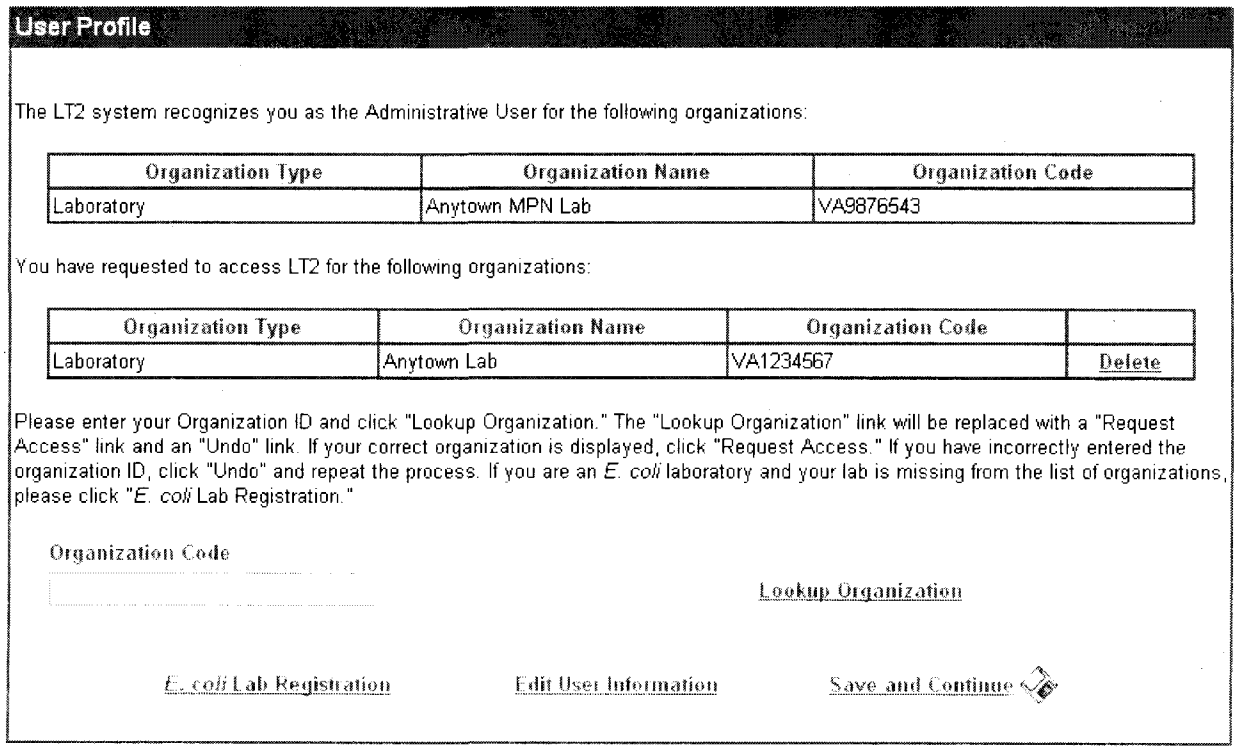


Figure 2-14. User Profile Organization Identification Screen

After you have requested access to the necessary organization(s), click the "SAVE AND CONTINUE" link at the bottom of the screen a summary of the information you submitted to the LT2 DCTS will be provided. If any information is incorrect, you may return to the previous screens by clicking the appropriate link at the bottom of the summary screen.

2.5 Navigation Toolbar

Upon successful login, a navigation toolbar will appear on the left-hand side of each page of the LT2 DCTS and will allow you to quickly select the tool you wish to access. The navigation toolbar that appears is dependent on the user role. Lab Users will see the "Lab Tools" toolbar; PWS Users will see the "PWS Tools" toolbar, et cetera. If a user has requested access to the LT2 DCTS, but has not yet been granted permission, they will see a "Tools" toolbar where they will only have access to their User Profile.

Examples of each navigation toolbar are provided in Figures 2-15 through 2-18. A detailed explanation of each toolbar item is provided in Sections 3, 4, and 5 which specifically address the Laboratory, PWS, and EPA/State roles respectively.

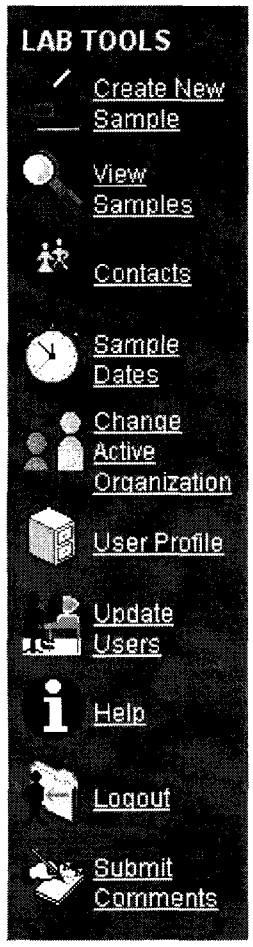


Figure 2-15. Lab Toolbar

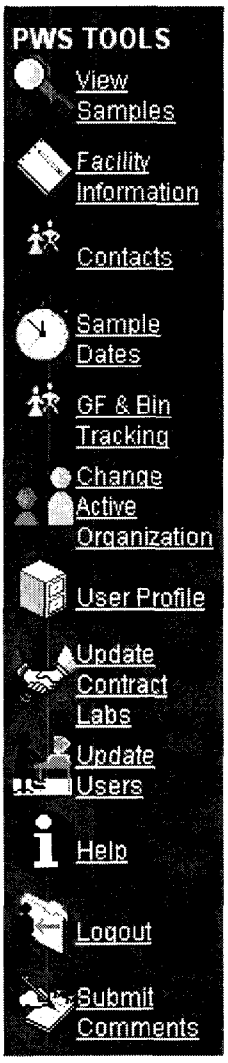


Figure 2-16. PWS Toolbar

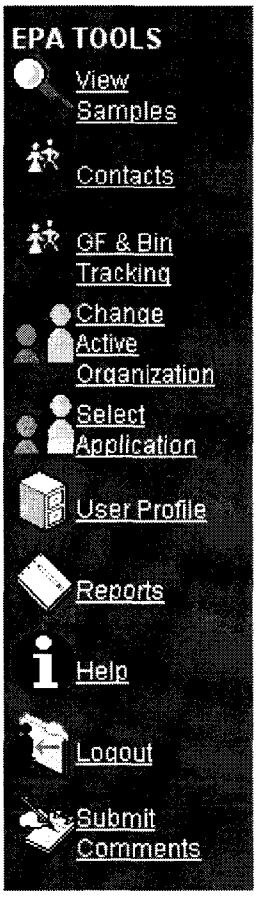


Figure 2-17. EPA Toolbar

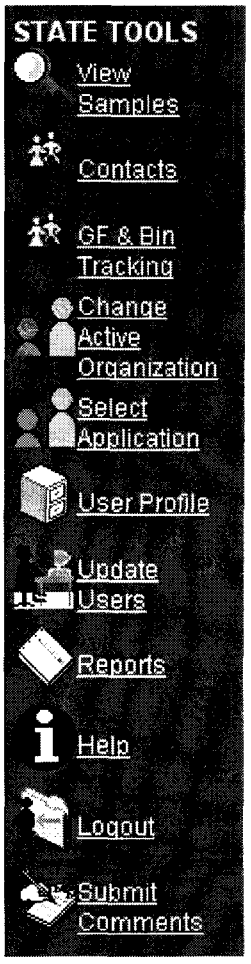


Figure 2-18. State Toolbar

2.6 Help Screens

The Help module of the LT2 DCTS is designed to provide you with a set of instructions relevant to the screen on which you are currently working. You will also have the ability to view other sections of the help guide by selecting the "TABLE OF CONTENTS" link on the left-hand navigation toolbar of the "Help" screen. The Help module will appear in a new window to enable you to view both the LT2 DCTS and the help text simultaneously. An example of the "Help" screen is included in Figure 2-19.

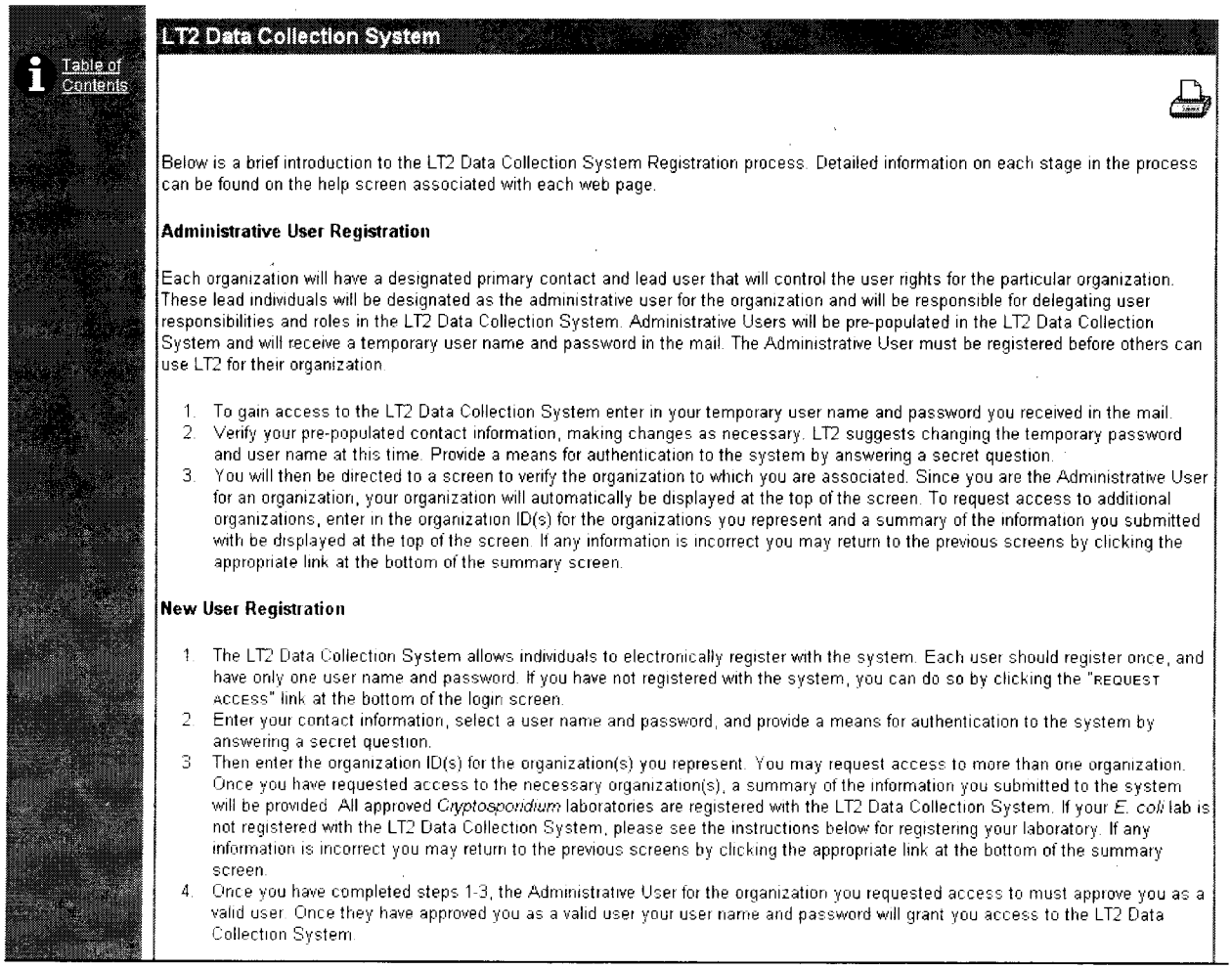


Figure 2-19. Example Help Screen

You can receive general LT2 DCTS help tips, by selecting the "GENERAL HELP TIPS FOR ALL USERS" link on the table of contents.

Help text screens are outlined in the following sections:

2.6.1 Lab User Help Screens

The following help screens are available to the Lab User:

- Select Organization
- Create New Sample
  - *Cryptosporidium* Entry
  - *Cryptosporidium* Resample
  - *Cryptosporidium* Review
  - *E. coli* Membrane Filtration Entry
  - *E. coli* Membrane Filtration Review
  - *E. coli* 15 MPN Entry

  - *E. coli* 15 MPN Review
  - *E. coli* ONPG-MUG, 51-well Entry
  - *E. coli* ONPG-MUG, 51-well Review
  - *E. coli* ONPG-MUG, 97-well Entry
  - *E. coli* ONPG-MUG, 97-well Review
- Upload Samples
  - Creating an XML Document
- Search
- Official Contact List
- Contact List
- Edit/Create New Contact
- Sample Dates
- Lab User Glossary
  - *Cryptosporidium* Entry
  - *Cryptosporidium* Review
  - *E. coli* Membrane Filtration Entry
  - *E. coli* Membrane Filtration Review
  - *E. coli* 15 MPN Entry
  - *E. coli* 15 MPN Review
  - *E. coli* ONPG-MUG, 51-well Entry
  - *E. coli* ONPG-MUG, 51-well Review
  - *E. coli* ONPG-MUG, 97-well Entry
  - *E. coli* ONPG-MUG, 97-well Review
  - *E. coli* Calculations

2.6.2 PWS User Help Screens

The following help screens are available to the PWS User:

- Select Organization
- Search
  - *Cryptosporidium* Review
  - *E. coli* 15 MPN Review
  - *E. coli* ONPG-MUG, 51-well Review
  - *E. coli* ONPG-MUG, 97-well Review
  - *E. coli* Membrane Filtration Review
- Facility Information
  - Edit/Add New Facility/Sample Collection Point
- Official Contact List
- Contact List
- Edit/Create New Contact
- Sampling Schedule - Edit
- Sample Schedule - Print View
- GF and Bin Status Tracking
- PWS User Glossary
  - Edit/Add New Facility/Sample Collection Point

2.6.3 EPA User Help Screens

The following help screens are available to the EPA User:

- Select Organization
- Search
    - *Cryptosporidium* Review
    - *E. coli* 15 MPN Review
    - *E. coli* ONPG-MUG, 51-well Review
    - *E. coli* ONPG-MUG, 97-well Review
    - *E. coli* Membrane Filtration Review
- Official Contact List
- Contact List
- View Contact
- Sampling Schedule – Edit
- Sample Schedule – Print View
- GF and Bin Tracking
- Reports
    - Sample Tracking
    - Sample Tracking Detail
    - Sample Backlog
    - List of Users
    - LT2 Data Collection and Tracking System Usage
    - PWS Schedule Submission Compliance
    - Sample History
    - Binning Report
    - Missed and Re-Sampled Events
    - Grandfathered Data
    - Monitoring Waived
    - PWS Sample Location Plan Compliance
    - Sample Pair Incomplete
    - PWS Facility Compliance

2.6.4 State User Help Screens

The following help screens are available to the State User:

- Select Organization
- Search
    - *Cryptosporidium* Review
    - *E. coli* 15 MPN Review
    - *E. coli* ONPG-MUG, 51-well Review
    - *E. coli* ONPG-MUG, 97-well Review
    - *E. coli* Membrane Filtration Review
- Official Contact List
- Contact List
- View Contact
- GF and Bin Tracking
- Reports
    - Sample Tracking
    - Sample Backlog
    - PWS Schedule Submission Compliance
    - Binning Report
    - Missed and Re-Sampled Events

- Grandfathered Data
- Monitoring Waived
- PWS Sample Location Plan Compliance
- Sample Pair Incomplete
- PWS Facility Imcomplete

2.6.5 Administrative Functions Help Screens

The following help screens are available on the administrative functions:

- Administrative Functions Overview
- All Users
  - New User Registration
    - Contact Information, User Name and Password, Secret Question and Answer
    - Associate Organizations
    - Confirmation
  - User Profile
    - Review Contact Information
    - Update Associated Organizations
  - Password Reset
    - Confirmation
- Administrative User
  - *E. coli* Lab Registration
    - Contact Information
    - Confirmation
  - Assign User Roles
  - Select Contracting Labs
  - Lab-Specific Details
- System Administrator
  - Approve *E. coli* Labs
    - Lab Specific Details
    - Confirmation

2.7 Logout

You will be logged out of the LT2 DCTS upon selecting the logout option from the navigation toolbar. The LT2 DCTS will display a confirmation message: "You have successfully logged out." You must repeat the login process to regain access to the LT2 DCTS. There is also an automatic time-out function built into the database that logs you out after 30 minutes of system inactivity.

Section 3. Lab User Role

This section provides instructions for a Lab User and Lab Approver User. The basic laboratory capabilities are shown in Figure 3-1.

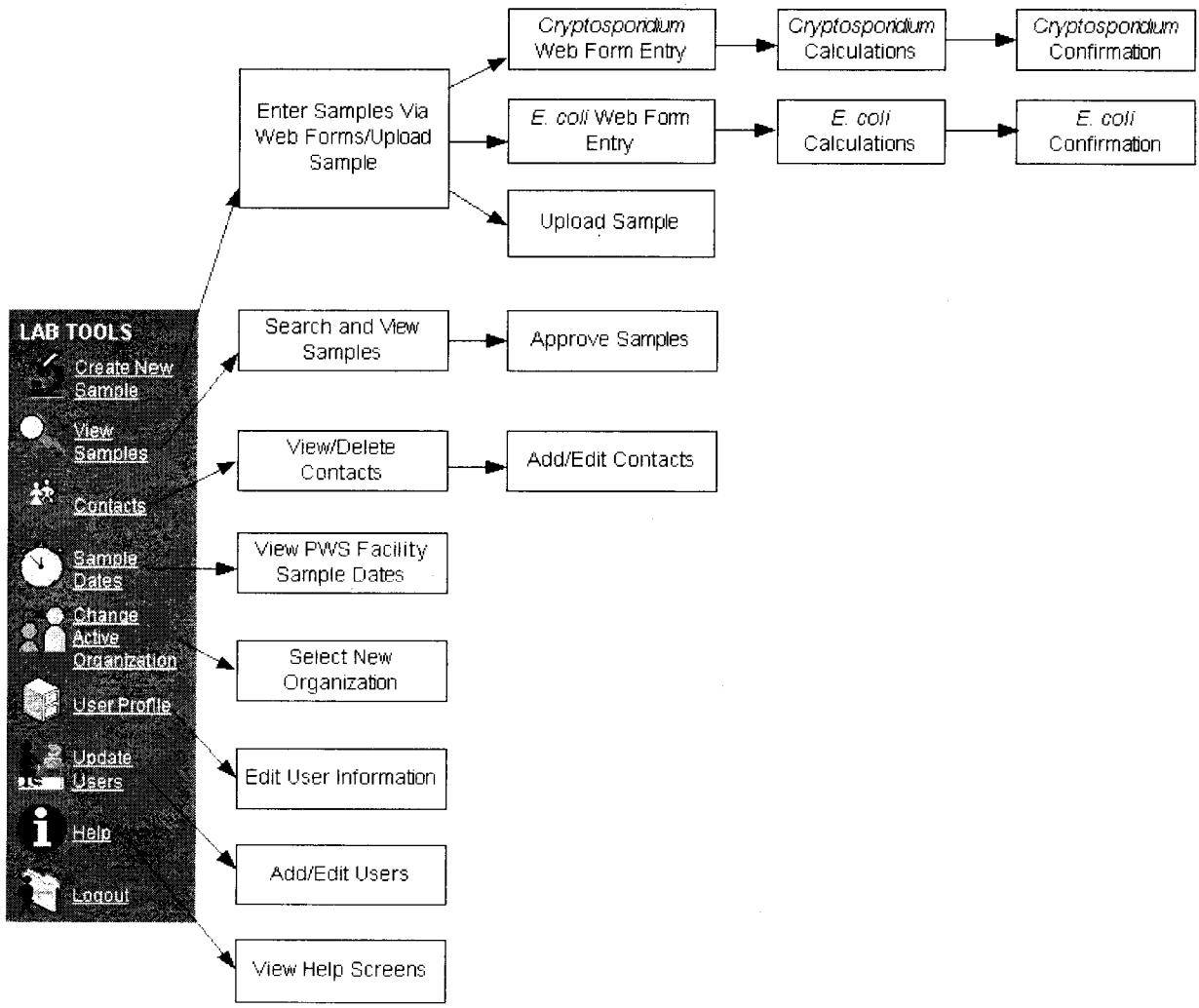


Figure 3-1. LT2 Data Collection System Lab User Basic Work Flow

All laboratory functions described in this section are initiated by logging into the LT2 DCTS Home Page, available on the Web at http://www.epa.gov/safewater/lt2/ and selecting the appropriate link from the navigation toolbar on the left-hand side of the screen.

3.1 Select Organization

The "Select Organization" screen is intended for those users who are associated with more than one organization. If you are only associated with one organization, you will not be directed to this screen after log in. If you are registered for more than one organization, this screen will open automatically. You must

select the organization you wish to access. Figure 3-2 provides an example of the "Select Organization" screen.

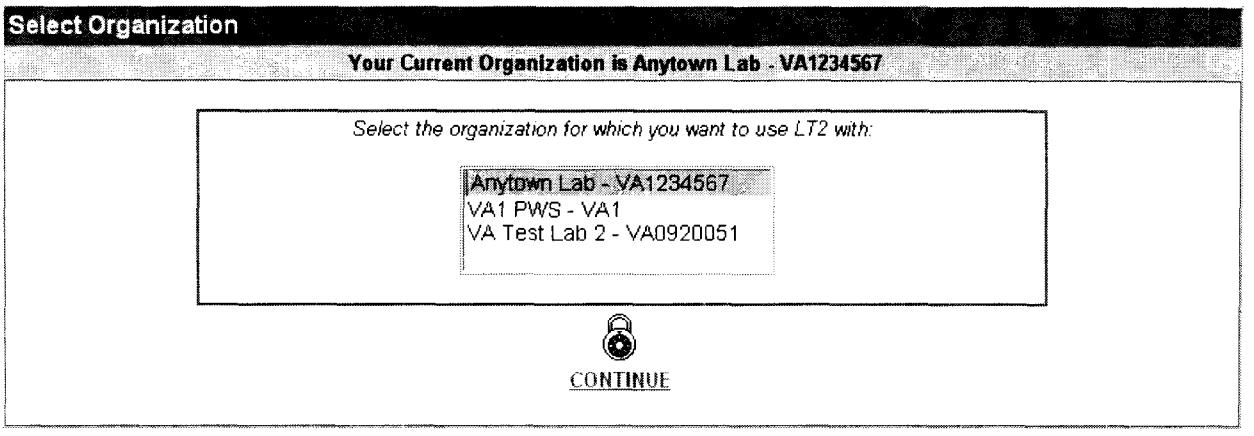


Figure 3-2. Select Organization Screen

The LT2 DCTS will display a list of associated organizations and you will be required to select the organization for which you would like to edit/view/enter data. At any given point, you can only enter/view/review samples for one organization. To switch to another organization, click the "CHANGE ACTIVE ORGANIZATION" link that appears in the side navigation toolbar. The "Select Organization" screen will display, and you may choose to work within a different organization. The organization that you are currently working under will display at the top of each screen.

The LT2 DCTS will, by default, link you to the first organization that appears on your list. You can change this default by selecting a new organization from your list box. The page will refresh, and you will be associated with the new organization. For example, by default you may be entered as Anytown Lab. If however, you would like to review samples for VA1 PWS, select VA1 PWS by clicking on its name in your list box. The page will refresh and VA1 PWS will appear as the active organization at the top of the screen.

Click "CONTINUE" to complete the "Select Organization" procedure. After selecting your current organization, you will be directed to the "Search for a Sample for Lab" screen, as seen in Figure 3-15. The navigation toolbar will appear in the side toolbar with the links appropriate to the selected user role.

3.2 Creating a New Sample – This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

The LT2 DCTS allows both laboratory data approvers and those who enter laboratory data to enter *Cryptosporidium* and *E. coli* data via web entry forms and an XML upload process. If you are registered only as an *E. coli* laboratory, the only sample option available to you will be *E. coli* method types, and you will only be able to upload *E. coli* XML files. Alternatively, if you are registered as only a *Cryptosporidium* laboratory, the only sample option that you can choose is *Cryptosporidium*, and you will only be able to upload *Cryptosporidium* XML files. If you are registered as both a *Cryptosporidium* and *E. coli* laboratory, all sample method types and uploads will be available to you.

To enter data, select the "CREATE NEW SAMPLE" link from the navigation toolbar on the left. Figure 3-3 displays the "Create New Sample" screen.

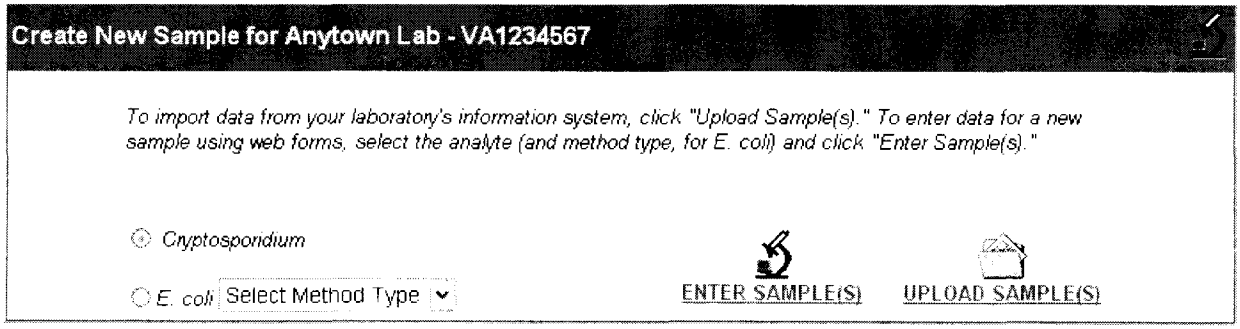


Figure 3-3. Create New Sample Screen

To import *Cryptosporidium* or *E. coli* data already entered in your Laboratory Information Management System (LIMS) or data tracking database, click the "UPLOAD SAMPLE(S)" link on the right side of the screen. Details for using the upload process are discussed in Section 6.

To enter data manually into the LT2 DCTS via the web entry forms, you must first select the analyte for which data will be entered. *Cryptosporidium* is the default analyte.

To enter data for *E. coli* samples, click on the radio button to the left of "*E. coli*." Then, select the appropriate method type from the drop-down menu. The four *E. coli* method types include the following:

- 15-tube MPN
- ONPG-MUG, 51-well
- ONPG-MUG, 97-well
- Membrane Filtration

Details on the specific methods associated with each of these method types are provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006].

After the appropriate analyte information is selected, you must click the "ENTER SAMPLE(S)" link to the right to be directed to the appropriate data entry form. The following sections discuss the data entry process for each analyte and method:

- Cryptosporidium - Section 3.3
- *E. coli* 15-tube MPN - Section 3.4
- *E. coli* ONPG-MUG, 51-well - Section 3.5
- *E. coli* ONPG-MUG, 97-well - Section 3.6
- *E. coli* Membrane Filtration - Section 3.7

3.3 *Cryptosporidium* Samples **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The following section details data entry and data review for *Cryptosporidium* samples.

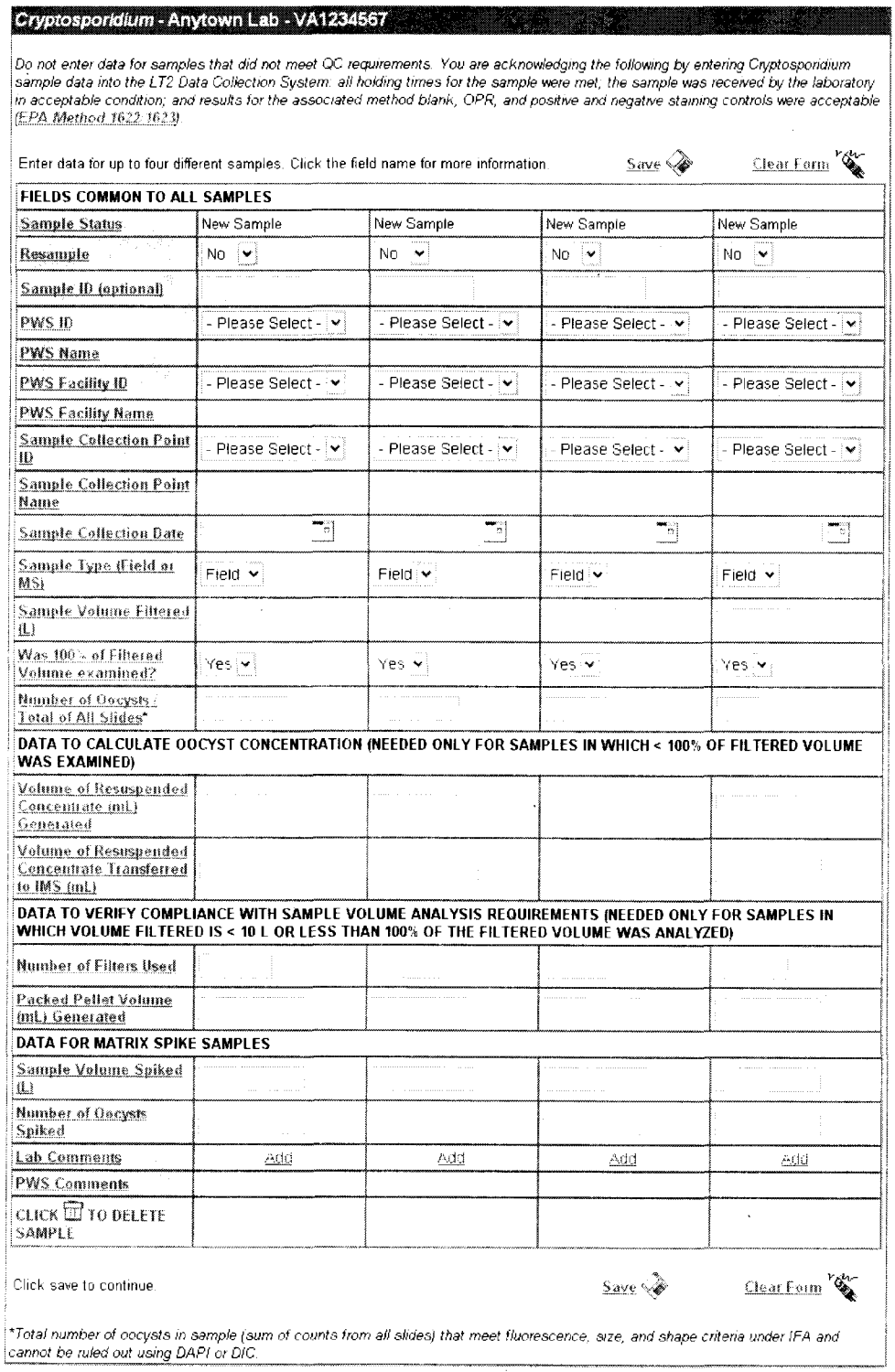
3.3.1 *Cryptosporidium* Data Entry **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

Approved *Cryptosporidium* laboratories can use the LT2 DCTS to enter *Cryptosporidium* sample data for new monitoring (and not grandfathered data). *Cryptosporidium* analyses conducted in support of the LT2 rule must be performed using the 2005 version of Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA (EPA-821-R-01-026) or the 2005 version of Method 1623: *Cryptosporidium* and Giardia in Water by Filtration/IMS/FA (EPA-821-R-01-025). The full versions of these methods are available for download in Adobe Acrobat (.pdf) format from the following sites:

- http://www.epa.gov/nerlcwww/1622de05.pdf
- http://www.epa.gov/nerlcwww/1623de05.pdf
- http://www.epa.gov/microbes/

Guidance on the use of these methods during the LT2 rule are provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006].

Figure 3-4 displays an example of a "*Cryptosporidium* Data Entry" screen. Users may enter data for up to four *Cryptosporidium* samples using this screen.



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Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering Cryptosporidium sample data into the LT2 Data Collection System: all holding times for the sample were met; the sample was received by the laboratory in acceptable condition; and results for the associated method blank, OPR, and positive and negative staining controls were acceptable (EPA Method 1622/1623)

Enter data for up to four different samples. Click the field name for more information. Save Clear Form

FIELDS COMMON TO ALL SAMPLES				
Sample Status	New Sample	New Sample	New Sample	New Sample
Resample	No	No	No	No
Sample ID (optional)				
PWS ID	- Please Select -	- Please Select -	- Please Select -	- Please Select -
PWS Name				
PWS Facility ID	- Please Select -	- Please Select -	- Please Select -	- Please Select -
PWS Facility Name				
Sample Collection Point ID	- Please Select -	- Please Select -	- Please Select -	- Please Select -
Sample Collection Point Name				
Sample Collection Date				
Sample Type (Field or MS)	Field	Field	Field	Field
Sample Volume Filtered (L)				
Was 100 % of Filtered Volume examined?	Yes	Yes	Yes	Yes
Number of Oocysts - Total of All Slides*				
DATA TO CALCULATE OOCYST CONCENTRATION (NEEDED ONLY FOR SAMPLES IN WHICH < 100% OF FILTERED VOLUME WAS EXAMINED)				
Volume of Resuspended Concentrate (mL) Generated				
Volume of Resuspended Concentrate Transferred to IMS (mL)				
DATA TO VERIFY COMPLIANCE WITH SAMPLE VOLUME ANALYSIS REQUIREMENTS (NEEDED ONLY FOR SAMPLES IN WHICH VOLUME FILTERED IS < 10 L OR LESS THAN 100% OF THE FILTERED VOLUME WAS ANALYZED)				
Number of Filters Used				
Packed Pellet Volume (mL) Generated				
DATA FOR MATRIX SPIKE SAMPLES				
Sample Volume Spiked (L)				
Number of Oocysts Spiked				
Lab Comments	Add	Add	Add	Add
PWS Comments				
CLICK TO DELETE SAMPLE				

Click save to continue. Save Clear Form

*Total number of oocysts in sample (sum of counts from all slides) that meet fluorescence, size, and shape criteria under IFA and cannot be ruled out using DAPI or DIC.

Figure 3-4. Cryptosporidium Data Entry Screen

Each of the four columns on the screen represents an individual sample. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of each column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Sample Status - The sample status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The Resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

The following fields are entered in the top section of the screen labelled "Fields Common To All Samples." The majority of these fields must be completed with information that is required for each analysis. Three of the fields are auto-populated and should be verified and corrected if needed.

PWS ID - The PWS ID is the public water system ID, which is usually comprised of a two-letter state code followed by a seven-digit number. The PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *Cryptosporidium* laboratory will display in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *Cryptosporidium* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. Compare the name in this field to the PWS name supplied by the PWS on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. The PWS Facility ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will display in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS Facility ID entered. Compare the name in this field to the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. The Sample Collection Point ID is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only ID's for the sampling points associated with the selected facility will display in the drop-down menu.

Sample Collection Point Name - The Sample Collection Point Name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated by the LT2 DCTS, based on the Sample Collection Point ID entered. Compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - This is the date the sample was collected by the facility. The Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a sample collection date was not supplied with the sample, contact the PWS to obtain the correct date. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 Data Collection System.

Sample Type (Field or MS) - Use the drop-down menu for this field to select whether the sample is a field sample (a routine, unspiked source water sample) or a matrix spike (MS) sample (a source water sample spiked with a known number of *Cryptosporidium* oocysts to determine method recovery). If MS is selected, data must be entered in the supplemental fields provided to calculate the Analytical Accuracy.

Sample Volume Filtered (L) - Enter the Sample Volume Filtered, in L, in this field. If the sample was filtered in the field, use the sample volume filtered reported by the PWS on the LT2 Sample Collection Form. The sample volume filtered value must be greater than 0 and may be reported to the nearest hundredth (for example, 10.41). However, the value should not be more precise than the measurement method (for example, if a flow totalizer that provides measurements to the nearest tenth is used, the value should be reported to the nearest tenth (10.4), NOT the nearest hundredth (10.40).

Was 100% of Filtered Volume examined? - Use the drop-down menu for this field to select "Yes" or "No." "Yes" is selected when all of the filtered volume was processed through the entire method and examined. "No" is selected when not all of the volume filtered is examined (for example, if the filtered volume yields > 2.0 mL of packed pellet volume, and only 2 mL is examined). If "No" is selected, data must be entered into supplemental fields provided to calculate oocyst concentration and verify that LT2 rule sample volume analysis requirements were met for the sample.

Number of Oocysts / Total of All Slides - Enter the total number of oocysts identified on all slides from the sample. *Cryptosporidium* oocysts to be reported using EPA Method 1622/1623 are defined as the following: Those determined by brilliant apple green fluorescence under UV light, size (4 to 6 m in diameter), and shape (round to oval), excluding atypical organisms specifically identified as other microbial organisms by FITC & DIC (for example, those possessing spikes, stalks, appendages, pores, one or two large nuclei filling the cell, red fluorescing chloroplasts, crystals, spores, etc.).

Additional fields are required by the LT2 DCTS to calculate oocyst concentrations for samples in which less than 100% of the sample volume filtered was examined:

Volume of Resuspended Concentrate (mL) Generated - Enter the volume, in mL, of the resuspended concentrate for the sample that you measured in Section 13.2.4 in the 2005 version of EPA Method 1622/1623. This volume should have been entered on line 25(a) of the Method 1622/23 Bench Sheet. The value entered for this field must be a whole number.

Volume of Resuspended Concentrate Transferred to IMS (mL) - Enter the volume, in mL, of the resuspended concentrate that was actually transferred to IMS for processing through the remainder of the

Method. This volume is the total of the volumes of the multiple, individual resuspended concentrates transferred to flat-sided sample tubes for IMS processing in Section 13.2.4.2 of the 2005 version of EPA Method 1622/1623. This volume should have been entered on line 25(b) of the Method 1622/23 Bench Sheet. The value entered for this field must be a whole number, which is less than or equal to the Volume of Resuspended Concentrate (mL) Generated entered for this sample.

Additional fields required by the LT2 DCTS to verify compliance with sample volume analysis requirements if the sample volume filtered was less than 10 L or less than 100% of the filtered volume was examined:

Number of Filters Used - Enter the number of filters used. The value entered must be a whole number greater or equal to 0 if direct centrifugation (no filter) was used.

Packed Pellet Volume (mL) Generated - Enter the total packed pellet volume, in mL, that was generated for the sample after centrifugation and measured in Section 13.2.1 of the 2005 version of Method 1622/1623. The value entered for this field may be reported to the nearest tenth of a mL (for example, 2.6 mL).

Using the information entered into the data fields on this screen, the LT2 DCTS can determine whether the requirements for sample volume have been met. Under the LT2 rule, PWSs are required to analyze, at a minimum, either 10 L of sample, OR 2 mL of packed pellet volume, OR as much volume as two filters can accommodate before clogging. The two-filter condition applies only to filters that have been approved by USEPA for nationwide use with Methods 1622/1623: the Pall Gelman Envirochek™ and Envirochek™ HV filters, and the IDEXX FiltaMax™ foam filter.

Additional fields required by the LT2 DCTS if the sample is a matrix spike to calculate MS recoveries include:

Sample Volume Spiked (L) - Enter into this field the sample volume spiked, in L. The value may be reported to the nearest hundredth (for example, 10.41). However, the value should not be more precise than the measurement method. For instance, if a graduated carboy is used to measure the volume to be spiked before filtration, and you cannot determine measurements with more precision than the nearest tenth, the value should be reported to the nearest tenth (10.4), NOT the nearest hundredth (10.40). If you use a graduated carboy calibrated to the nearest quarter liter, you should report to the nearest quarter liter (for example, 10, 10.25, 10.5, or 10.75 L). The volume entered for this field must not be less than the value entered for Sample Volume Filtered.

Number of Oocysts Spiked - Enter into this field the estimated number of oocysts spiked in the matrix spike sample, based on the information provided with your flow cytometer-sorted oocysts.

If you have made errors in data entry for one or more samples and have not yet clicked "SAVE," you may erase all of the data entered on the screen by clicking "RESET ENTIRE FORM."

If data are not entered into all of the required fields are not entered, an error message will display at the top of the screen when you select "SAVE". You will not be permitted to continue until all necessary values are supplied.

After primary measurements (such as Sample Volume Filtered and Number of Oocysts / Total of Slides Identified) are entered on this screen, and you have clicked "SAVE" to continue, the LT2 DCTS will automatically calculate the oocyst concentration in the sample.

Note: If any information is entered onto the bottom portion of the data entry screen that is not required for a particular sample, this information will not be saved.

Lab Comments (optional) - As a Lab User, you can click "ADD" to incorporate comments concerning the sample into the information sent to the PWS. After entering comments into the comments box, click "SAVE" to save the comment. By clicking "CANCEL" in the comment box, the comment box will close and any information entered will not be recorded to the sample.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

If the sample is a resample, additional data must be provided for the following fields:

Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

3.3.1.1 *Cryptosporidium* Resample Data This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

If the resample field is marked as "Yes" for any of the four samples, you will be required to enter the original sample collection date, as well as comments on why the resample is being collected. Click "SAVE" to continue and "CANCEL" to return to the previous page. Figure 3-5 displays the "*Cryptosporidium* Resample" screen.

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The following item(s) were marked as a resample and if editable, require additional collection information.

Sample Status	New Sample
Sample ID	Oct1
PWS ID	VA1
PWS Name	VA1 PWS
PWS Facility ID	VA011
PWS Facility Name	VA011 fac
Sample Collection Point ID	SP2
Sample Collection Point Name	SP2
Sample Collection Date	10/04/2005
Original Sample Collection Date	
Resample Explanations	Add

Save Cancel

Figure 3-5. Cryptosporidium Resample Screen

3.3.2 Calculations Associated with *Cryptosporidium* Data Processing **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS will help users perform the required method calculations by using the data entered by the laboratories to automatically calculate the sample results. After the user has entered data into all of the required fields for a *Cryptosporidium* sample, the LT2 DCTS will automatically calculate the sample results and present the "Calculated *Cryptosporidium* Sample Results Ready for Submission" screen as shown in Figure 3-6.

***Cryptosporidium* - Anytown Lab - VA1234567**

Calculated Sample Results

Click the field name for more information.

Status	Pending Release	Pending Release
Sample ID (optional)	Oct1	Oct1a
PWS ID	VA1	VA1
PWS Name	VA1 PWS	VA1 PWS
PWS Facility ID	VA011	VA011
PWS Facility Name	VA011 fac	VA011 fac
Sample Collection Point ID	SP2	SP2
Sample Collection Point Name	SP2	SP2
Sample Collection Date	10/04/2005	10/04/2005
Sample Type	Field	MS
Sample Volume Analyzed (L)	8	12
Pellet Volume Analyzed (mL)	23	
Contaminant/Parameter	Cryptosporidium	Cryptosporidium
Analytical Method Number	1622/1623	1622/1623
Analytical Result - Value	0.25	0.25
Analytical Result - Unit of Measure	oocysts/L	oocysts/L
Analytical Accuracy (%) (MS only)		0%
Flags		**D**
Resample	Yes	Yes
Original Sample Collection Date	09/06/2005	09/06/2005
Resample Explanation	View	View
CHECK THE BOX TO DELIVER SAMPLE(S) TO PWS	☐	☐

A flag is associated with your sample for non-compliance to LT2 rule requirements. Please contact your PWS regarding recollection of the sample.

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date
B	Sample volume analysis requirements not met
C	Matrix spike sample was spiked with greater than 500 oocysts
D	The matrix spike volume analyzed is not within +/- 10% of the volume analyzed for the associated field sample

Edit Sample(s)

Deliver Sample(s) to PWS

Enter New Sample(s)

Logout

Figure 3-6. Calculated Cryptosporidium Sample Results Ready for Submission Screen

To help you identify the sample, several previously entered data elements will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS ID
- PWS Facility ID
- Sample Collection Point
- Sample Collection Date
- Resample
- Original Sample Collection Date
- Resample Explanation

The following fields are the DCTS-calculated values resulting from the DCTS calculations and values that are automatically populated to provide the data needed for later storage in Safe Drinking Water Information System (SDWIS) will display. These calculated and auto-populated elements include the following:

Sample Volume Analyzed (L) (LT2 DCTS-calculated) - If less than 100% of the sample volume filtered is examined, then the sample volume analyzed and the pellet volume analyzed must be calculated. Otherwise, the sample volume analyzed equals the sample volume filtered. The sample volume analyzed is calculated using Formula 1:

Formula 1

$$\text{Sample volume analyzed} = \text{Volume filtered} * \frac{\text{Resuspended concentrate volume transferred to IMS}}{\text{Resuspended concentrate volume}}$$

Pellet Volume Analyzed (mL) (LT2 DCTS-calculated; only for samples in which less than 100% of the filtered volume was examined) - The pellet volume analyzed is calculated using Formula 2:

Formula 2

$$\text{Pellet volume analyzed} = \text{Pellet volume} * \frac{\text{Resuspended concentrate volume transferred to IMS}}{\text{Resuspended concentrate volume}}$$

Contaminant Parameter (automatically populated with "*Cryptosporidium*")

Analytical Method Number (automatically populated with "1622/1623")

Analytical result - Value and **Unit of Measure** (LT2 DCTS-calculated) - The analytical result is measured in oocysts/L and is calculated using Formula 3:

Formula 3

$$\text{Analytical Result} = \frac{\text{Number of oocysts}}{\text{Sample volume analyzed}}$$

Analytical accuracy % (LT2 DCTS-calculated; MS samples only) - If MS was entered as the sample type, then the analytical accuracy must be calculated to display the percent recovery for matrix spike samples. The analytical accuracy is calculated using Formula 4:

Formula 4

$$\text{Analytical Accuracy} = \frac{\text{Calculated \# of oocysts/L (MS sample)} - \text{Calculated \# of oocysts/L (associated field sample)}}{\text{Estimated number of oocysts spiked/L}} * 100\%$$

The final component of the DCTS calculations is assignment of data qualifier flags. These flags are placed at the bottom of the screen. If data is not compliant with LT2 rule monitoring requirements, it will automatically be flagged in the DCTS, and the appropriate flag key identifying the noncompliant monitoring requirement will display in the Flags field of the sample results information. Table 3-1 displays the four flags that can apply to *Cryptosporidium* data, as well as the conditions that trigger each flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

Table 3-1. Cryptosporidium Data Flags

KEY	FLAG	TRIGGER
A	Sample schedule not met.	The sample collection date is not within +/- 2 days of the predetermined sampling date.
B	Sample volume analysis requirements not met.	The LT2 requirements for sample volume analyzed were not met (and this flag is triggered) when: 1 filter was used and <10 L was analyzed AND <2 mL packed pellet was analyzed. -OR- More than 1 filter was used and <100% was examined AND <10 L was analyzed AND <2 mL packed pellet was analyzed.
C	Matrix spike sample was spiked with greater than 500 oocysts.	The number of oocysts entered is a value greater than 500.
D	The matrix spike volume analyzed is not within +/- 10% of the volume analyzed for the associated field sample.	The matrix spike volume entered into the field is not within +/- 10% of the entered analyzed volume for the associated field sample.
E	An associated *E. coli* sample has not been submitted.	An *E. coli* sample has not been submitted for the same PWS, facility, sampling point, and sample collection date.

3.3.3 *Cryptosporidium* Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows the Principal Analyst at a laboratory to review, edit, and approve *Cryptosporidium* sample results for submission to the PWS. Principal Analysts are identified as Lab Approver Users in the LT2 DCTS. If you are the designated Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the DCTS calculation page displayed in Figure 3-6 to review data. As a Lab Approver User, you will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the

results can be edited by clicking on the "EDIT SAMPLES" link in the bottom right corner. If you would like to approve the sample, check the box at the bottom of each column of a pending release sample and click the "DELIVER SAMPLE(S) TO PWS" link in the bottom right corner.

The laboratory must verify that all holding times and other QC requirements were met. Before the sample(s) can be approved, you must agree to the following statement:

"By approving these *Cryptosporidium* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all Method 1622/1623 and LT2 rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample(s) to the lab-approved status, thereby making it available for PWS review. If "CANCEL" is clicked, the sample(s) will not be approved. Criteria for valid *Cryptosporidium* samples are provided in Appendix B.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *Cryptosporidium* sample(s) were successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the lab by the PWS.

3.4 *E. coli* 15-tube MPN Method Samples **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

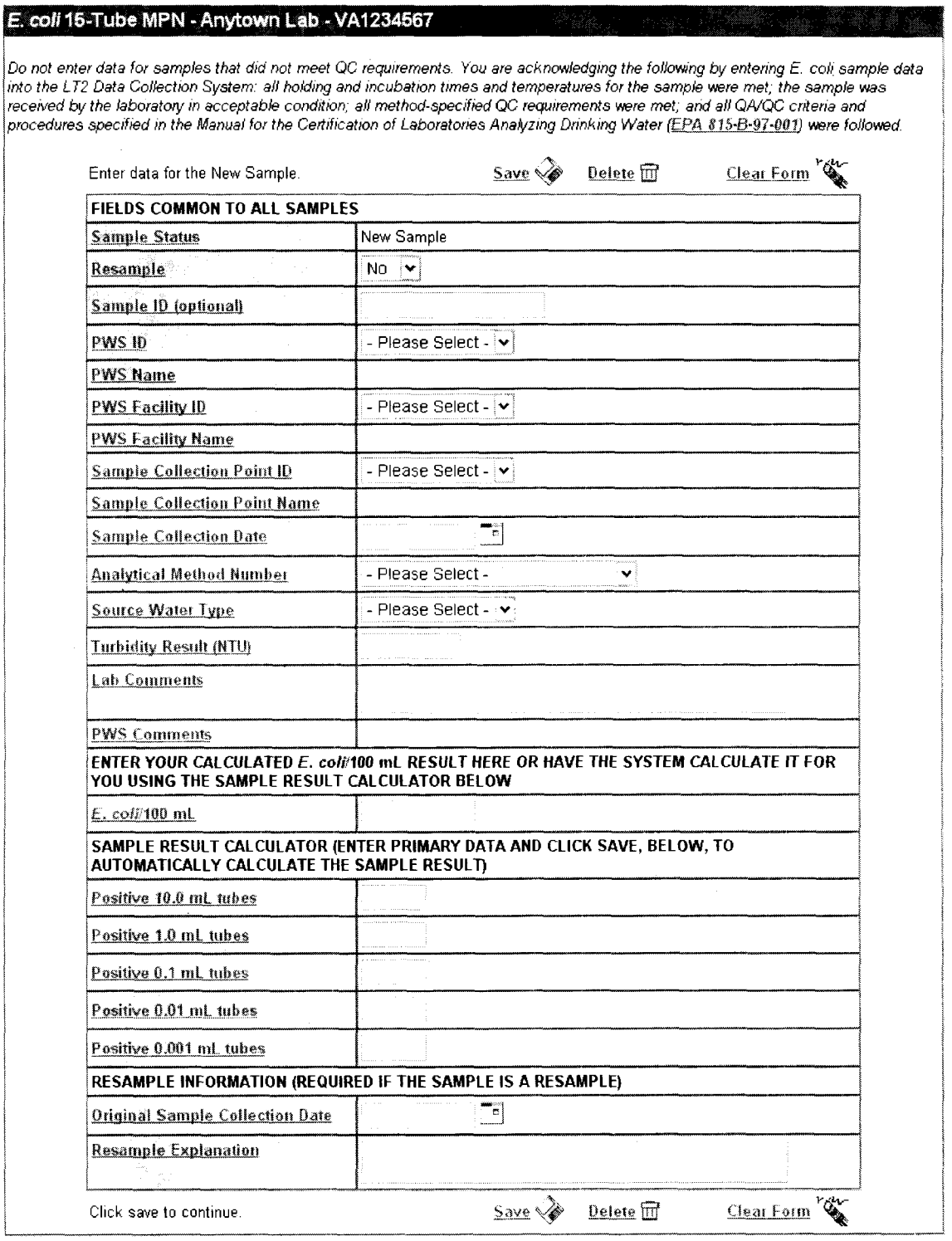
The following section details data entry and data review for *E. coli* 15-tube MPN method samples.

3.4.1 *E. coli* 15-tube MPN Method Data Entry **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

Laboratories certified to analyze *E. coli* using the 15-tube Most Probable Number (MPN) method format can use the LT2 DCTS to enter valid *E. coli* MPN sample data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* analytical method type from the drop-down menu. The following 15-tube MPN methods are approved for LT2 *E. coli* analysis:

- Standard Methods 9221B/9221F (LTB to EC-MUG) 15-tube MPN
- Colilert (Standard Methods 9223)
- Colilert-18 (Standard Methods 9223)

The full versions of these methods are available for download in Adobe Acrobat (.pdf) format from http://www.epa.gov/safewater/lt2/index.html or http://www.epa.gov/microbes/. Guidance on the use of these methods under the LT2 rule, as well as the full text of the method, is provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006]. Figure 3-7 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter *E. coli* sample data generated using the 15-tube MPN method.



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Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample. Save Delete Clear Form

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No
Sample ID (optional)	
PWS ID	- Please Select -
PWS Name	
PWS Facility ID	- Please Select -
PWS Facility Name	
Sample Collection Point ID	- Please Select -
Sample Collection Point Name	
Sample Collection Date	
Analytical Method Number	- Please Select -
Source Water Type	- Please Select -
Turbidity Result (NTU)	
Lab Comments	
PWS Comments	
ENTER YOUR CALCULATED *E. coli*/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Positive 10.0 mL tubes	
Positive 1.0 mL tubes	
Positive 0.1 mL tubes	
Positive 0.01 mL tubes	
Positive 0.001 mL tubes	
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	
Resample Explanation	

Click save to continue. Save Delete Clear Form

Figure 3-7. E. coli 15-tube MPN Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

New Sample - applies to samples that are being entered for the first time.

Pending Release - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.

Delivered to PWS - indicates that a sample has been released to the PWS for review. These samples cannot be edited.

Returned by PWS - samples have been returned to your laboratory by the utility for issue resolution.

PWS Reviewed - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

The following fields are required in the top section of the screen labelled "Fields Common To All Samples":

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will display in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will display in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS Facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will display in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the PWS Facility Name and the PWS Facility ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify that the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The sample collection point name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and that the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - This is the date the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed at the beginning of Section 3.4.1. Only approved analytical methods for the given method format (in this example, 15-tube MPN) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

After entering the required fields, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli* /100 mL calculated in your laboratory or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. Note: Do not complete the bottom section if you complete this field - any data entered will be ignored.

***E. coli* /100 mL** - The final calculated result of *E. coli* per 100 mL.

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. Note: Do not enter a value for "*E. coli* /100 mL" in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the DCTS. Additional fields required by the DCTS to calculate results for the *E. coli* 15-tube MPN method may include the following primary measurements:

Positive 10.0 mL tubes - This is the number of positive tubes containing 10.0 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 1.0 mL tubes - This is the number of positive tubes containing 1.0 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 0.1 mL tubes - This is the number of positive tubes containing 0.1 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 0.01 mL tubes - This is the number of positive tubes containing 0.01 mL of sample. This value must be reported as a whole number between 0 and 5.

Positive 0.001 mL tubes - This is the number of positive tubes containing 0.001 mL of sample. This value must be reported as a whole number between 0 and 5.

If the sample is a resample, additional data must be provided for the following fields:

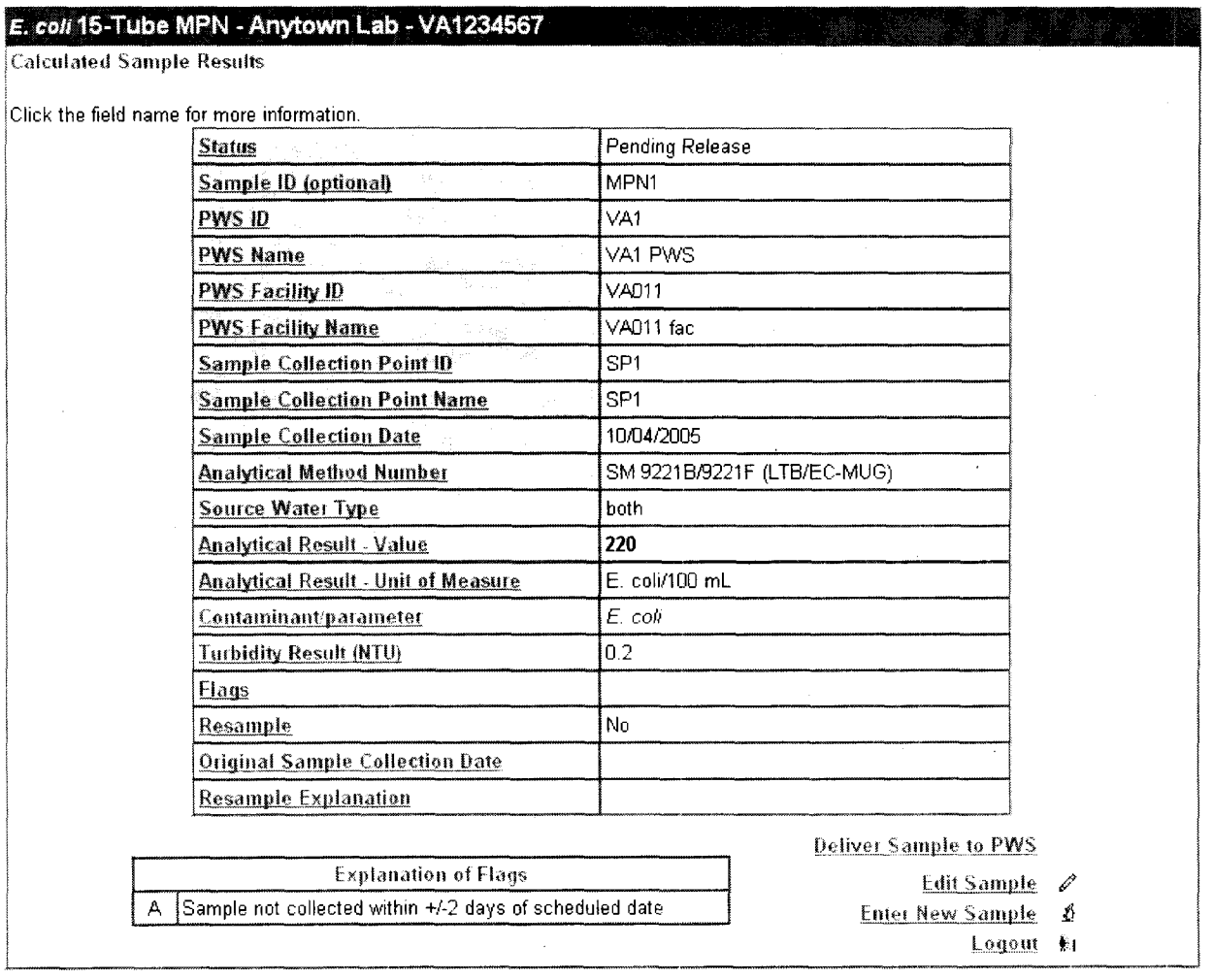
Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.4.2 Calculations Associated with *E. coli* 15-tube MPN Method Data Processing This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

The LT2 DCTS will allow you to perform the required method calculation by using the primary data entered by the laboratory to automatically calculate the sample results. After you have entered all of the required and primary measurement fields for an *E. coli* sample the LT2 DCTS will automatically calculate the sample results and present the "Calculated *E. coli* 15-tube MPN Method Sample Results Ready for Submission" screen as show in Figure 3-8.



***E. coli* 15-Tube MPN - Anytown Lab - VA1234567**

Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	MPN1
PWS ID	VA1
PWS Name	VA1 PWS
PWS Facility ID	VA011
PWS Facility Name	VA011 fac
Sample Collection Point ID	SP1
Sample Collection Point Name	SP1
Sample Collection Date	10/04/2005
Analytical Method Number	SM 9221B/9221F (LTB/EC-MUG)
Source Water Type	both
Analytical Result - Value	**220**
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	*E. coli*
Turbidity Result (NTU)	0.2
Flags	
Resample	No
Original Sample Collection Date	
Resample Explanation	

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

Deliver Sample to PWS
Edit Sample
Enter New Sample
Logout

Figure 3-8. Calculated E. coli 15-tube MPN Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date
- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

The LT2 DCTS-calculated "Analytical Result - Value" is automatically populated. The analytical result is measured in *E. coli* /100 mL and uses the following procedure described.

The data entry screens for both 15-tube methods require the user to input the number of positive 10.0, 1.0, 0.1, 0.01, and 0.001 mL tubes as appropriate.

The guidance and examples for determining *E. coli* concentrations using multiple-tube methods are based on the revision of Standard Methods 9221C included in the 2001 Supplement to the 20th Edition of Standard Methods, approved by the Standard Methods Committee in 1999.

Note: The analytical result can be automatically calculated using the LT2 DCTS.

For each sample volume (e.g., 10, 1, 0.1, and 0.01 mL or additional sample volumes as necessary), determine the number of positive tubes out of five.

A dilution refers to the volume of original sample that was inoculated into each series of tubes. Only three of the dilution series will be used to estimate the MPN. The three selected dilutions are called significant dilutions and are selected according to the following criteria. Examples of significant dilution selections are provided in Table 3-2.

Choose the highest dilution (the most dilute, with the least amount of sample) giving positive results in all five tubes inoculated, and the two succeeding higher (more dilute) dilutions (Table 3-2, Example A).

If the lowest dilution (least dilute) tested has less than five tubes with positive results, select it and the two next succeeding higher dilutions (Table 3-2, Examples B and C).

When a positive result occurs in a dilution higher (more dilute) than the three significant dilutions selected according to the rules above, change the selection to the lowest dilution (least dilute) that has less than five positive results and the next two higher dilutions (more dilute) (Table 3-2, Example D).

When the selection rules (above) have left unselected any higher dilutions (more dilute) with positive results, add those higher-dilution positive results to the results for the highest selected dilution (Table 3-2, Example E).

If there were not enough higher dilutions tested to select three dilutions, select the next lower dilution (Table 3-2, Example F).

MPN values need to be adjusted, based on the significant dilutions series selected above. Since the MPN/100 mL values in the table are based on the 10 mL, 1 mL, and 0.1 mL dilution series, per method requirements, the MPN value must be adjusted if these are not the significant dilution series selected. Use the following calculation to adjust the MPN when the 10 mL, 1 mL, and 0.1 mL dilution series are not the significant dilution series selected:

$$\text{Analytical Result} = \frac{\text{MPN value}}{\text{\# of mL in middle dilution}} = \textit{E. coli}\ \text{MPN/100 mL}$$

Table 3-2. MPN Value Table

	Least dilute (lowest)				Most dilute (highest)		
Example	10 mL	1 mL	0.1 mL	0.01 mL	0.001 mL	Combination of Positives	MPN Index No./100 mL
A	5	**5**	**1**	**0**	0	5-1-0	330
B	**4**	**5**	**1**	0	0	4-5-1	48
C	**0**	**0**	**1**	0	0	0-0-1	1.8
D	5	**4**	**4**	**1**	0	4-4-1	400
E	5	**4**	**4**	0	**1**	4-4-1	400
F	5	5	**5**	**5**	**2**	5-5-2	54,000

Example A: The significant dilution series for the 5-1-0 combination of positives includes the 1 mL, 0.1 mL, and 0.01 mL dilutions. Since the 10 mL, 1 mL, and 0.1 mL dilutions were not selected, an adjustment is necessary to account for the dilutions selected:

$$\text{Analytical Result} = \frac{33}{0.1} = 330 \textit{ E. coli} \text{ MPN/100 mL}$$

Example B: Since the 10 mL, 1 mL, and 0.1 mL dilutions are the significant dilutions, no adjustment is necessary and the result is 48 *E. coli* /100 mL.

Example C: Since the 10 mL, 1 mL, and 0.1 mL dilutions are the significant dilutions, no adjustment is necessary and the result is 1.8 *E. coli* /100 mL.

Examples D and E: The significant dilution series for the 4-4-1 combination of positives includes the 1 mL, 0.1 mL, and 0.01 mL dilutions. Since the 10 mL, 1 mL, and 0.1 mL dilutions were not selected, an adjustment is necessary to account for the dilutions selected:

$$\text{Analytical Result} = \frac{40}{0.1} = 400 \textit{ E. coli} \text{ MPN/100 mL}$$

Example F: The significant dilution series for the 5-5-2 combination of positives includes the 0.1 mL, 0.01 mL and .001 mL dilutions. Since the 10 mL, 1 mL, and 0.1 mL dilutions were not selected, an adjustment is necessary to account for the dilutions selected:

$$\text{Analytical Result} = \frac{540}{0.01} = 54{,}000 \textit{ E. coli} \text{ MPN/100 mL}$$

The remaining three fields in the "Calculated *E. coli* 15-tube MPN Method Sample Results Ready for Submission" screen include auto-populated fields to help define the sample specifications. The Sample Analytical Result unit of measure is auto-populated by the LT2 DCTS as "*E. coli*/100 mL," and the contaminant/parameter field is automatically populated by the LT2 DCTS as "*E. coli*."

The Final component of the DCTS calculations is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data is not compliant with LT2 rule monitoring requirements, it will

automatically be flagged in the DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the flags that can apply to *E. coli* data, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

Table 3-3. E. coli Data Qualifier Flags

KEY	FLAG	TRIGGER
A	Sample schedule not met.	The sample collection date is not within +/- 2 days of the predetermined sampling date.
E	An associated *Cryptosporidium* sample has not been submitted.	A *Cryptosporidium* sample has not been submitted for the same PWS, facility, sampling point, and sample collection date.

3.4.3 *E. coli* 15-tube MPN Method Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample 15-tube MPN results for submission to the PWS. Principal Analysts are identified as Lab Approver Users in the LT2 DCTS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS calculations page displayed in Figure 3-8 to approve data. As a Lab Approver User, you will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLES" link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLE TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement:

"By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it available for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid MPN *E. coli* samples are provided in Appendix C.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.5 *E. coli* ONPG-MUG, 51-well Method Samples This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

The following section details data entry and data review for *E. coli* ONPG-MUG, 51-well method samples.

3.5.1 *E. coli* ONPG-MUG 51-well Method Data Entry This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

Laboratories certified to analyze *E. coli* using the ONPG-MUG, 51-well method format can use the LT2 DCTS to enter valid *E. coli* sample data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* method type from the drop-down menu. The ONPG-MUG, 51-well analytical method numbers approved for LT2 *E. coli* analyses include the following:

- Colilert™ (Standard Methods 9223)
- Colilert-18™ (Standard Methods 9223)

The full versions of these methods are available for download in Adobe Acrobat (.pdf) format from http://www.epa.gov/safewater/lt2/index.html or http://www.epa.gov/microbes/. Guidance on the use of these methods under the LT2 rule, as well as the full text of the method, is provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006]. Figure 3-9 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter *E. coli* sample data generated using the ONPG-MUG, 51-well method.

E. coli ONPG-MUG, 51-well - Anytown Lab - VA1234567

Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met, and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample. Save Delete Clear Form

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No
Sample ID (optional)	
PWS ID	- Please Select -
PWS Name	
PWS Facility ID	- Please Select -
PWS Facility Name	
Sample Collection Point ID	- Please Select -
Sample Collection Point Name	
Sample Collection Date	
Analytical Method Number	- Please Select -
Source Water Type	- Please Select -
Turbidity Result (NTU)	
Lab Comments	
PWS Comments	
ENTER YOUR CALCULATED *E. coli*/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Volume analyzed (mL)	
Number of positive wells	
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	
Resample Explanation	

Click save to continue. Save Delete Clear Form

Figure 3-9. E. coli ONPG-MUG, 51-well Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

The following fields are required in the top section of the screen labelled "Fields Common To All Samples:"

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will be displayed in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the

PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will be displayed in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS Facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will be displayed in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the name in this field is your PWS Facility Name and PWS Facility ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify that the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The Sample Collection Point Name is the name of the sample collection point associated with the Sample Collection Point ID selected. This field is auto-populated, based on the sample collection point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - This is the date the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed at the beginning of Section 3.5.1. Only approved analytical methods for the given method format (in this example, ONPG-MUG, 51-well) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the comments field.

PWS comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the lab.

After entering the required fields, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli* /100 mL calculated in your laboratory or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. Note: do not complete the bottom section if you complete this field – any data entered will be ignored.

***E. coli* /100 mL** - The final calculated result of *E. coli* per 100 mL.

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. Note: Do not enter a value for "*E. coli* /100 mL" in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the LT2 DCTS. Additional fields required to calculate results for the *E. coli* ONPG-MUG, 51-well method may include the following primary measurements:

Volume analyzed (mL) - This is the mL of sample added to the tray for analysis. This value may be reported to four decimal places.

Number of positive wells - This is the number of total coliform positive wells with UV fluorescence. This value must be reported as a whole number between 0 and 51.

If the sample is a resample, additional data must be provided for the following fields:

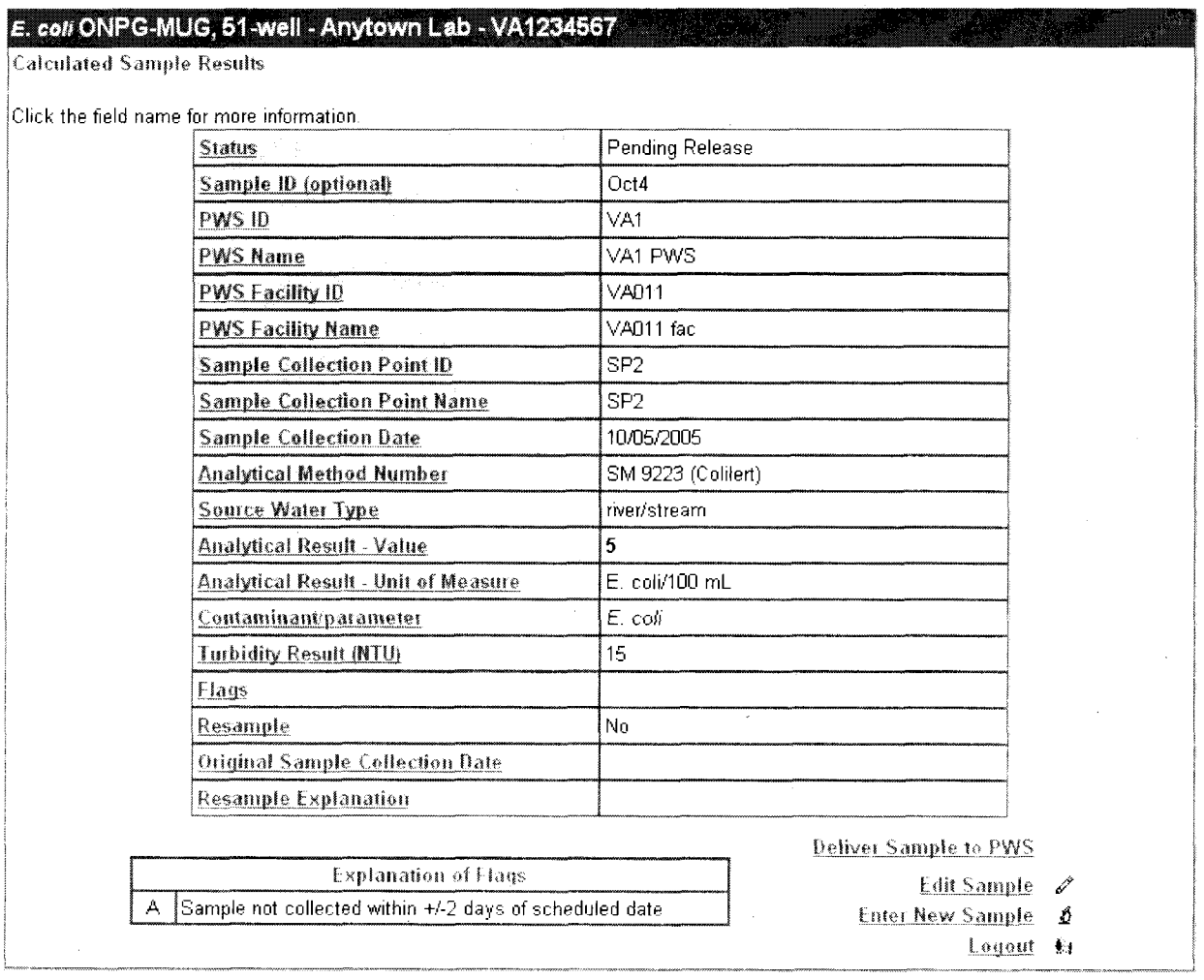
Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.5.2 Calculations Associated with *E. coli* ONPG-MUG, 51-well Method Data Processing **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS will help you perform the required method calculation by using the primary data entered by the laboratory to automatically calculate the sample results. After you have entered all of the required and primary measurement fields for an *E. coli* sample the LT2 DCTS will automatically calculate the sample results and present the "Calculated *E. coli* ONPG-MUG, 51-well Method Sample Results Ready for Submission" screen as shown in Figure 3-10.



E. coli ONPG-MUG, 51-well - Anytown Lab - VA1234567

Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	Oct4
PWS ID	VA1
PWS Name	VA1 PWS
PWS Facility ID	VA011
PWS Facility Name	VA011 fac
Sample Collection Point ID	SP2
Sample Collection Point Name	SP2
Sample Collection Date	10/05/2005
Analytical Method Number	SM 9223 (Colilert)
Source Water Type	river/stream
Analytical Result - Value	5
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	*E. coli*
Turbidity Result (NTU)	15
Flags	
Resample	No
Original Sample Collection Date	
Resample Explanation	

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

Deliver Sample to PWS

Edit Sample

Enter New Sample

Logout

Figure 3-10. Calculated E. coli ONPG-MUG, 51-well Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date
- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

Select appropriate dilution. If multiple dilutions are used, the tray exhibiting 80% positive wells (41 positive wells) should be used to determine MPN value.

Note: The analytical result can be automatically calculated using the LT2 DCTS.

Determine MPN. Using the number of positive wells from the appropriate dilution, identify the corresponding MPN/100 mL in the table provided by the vendor. For example, if a 100 mL sample was analyzed, and there were 41 positive wells, the corresponding MPN would be 83.1 MPN/100 mL

Adjust for dilution factor. Because the MPN/100 mL values in the table are based on 100 mL samples, the MPN value should be adjusted if less than 100 mL of sample volume was analyzed. Use the following calculation to adjust the MPN to account for the dilution:

$$\text{MPN value} * \frac{100}{\text{mL sample analyzed}} = \textit{E. coli}\ \text{MPN/100 mL}$$

Example:

Volume analyzed (mL) = 10 mL (in 90 mL of dilution water)

Number of positive wells = 41

MPN = 83.1

The analytical result is calculated as follows:

$$83.1 * \frac{100}{10} = 831\ \textit{E. coli}\ \text{MPN/100 mL}$$

On the ONPG-MUG, 51-well data entry screen, the user is asked to input the volume analyzed (mL) and the number of positive wells. The LT2 DCTS uses the answer provided for the number of positive wells, in order to select the corresponding MPN value from the IDEXX® 51-Well Quanti-Tray® MPN Table.

The remaining three fields in the "Calculated *E. coli* ONPG-MUG, 51-well Method Sample Results Ready for Submission" screen include auto-populated fields to help define the sample specifications. The sample analytical result unit of measure is auto-populated by the LT2 DCTS as "*E. coli* /100 mL," the contaminant/parameter field is automatically populated by the LT2 DCTS as "*E. coli*."

The final component of the LT2 DCTS calculations is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data are not compliant with LT2 rule monitoring requirements, it will automatically be flagged in the LT2 DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the flags that can apply to *E. coli* data, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

3.5.3 *E. coli* ONPG-MUG, 51-well Method Data Review This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample ONPG-MUG, 51-well procedure results for submission to the PWS. As the Principal Analyst, you are identified as Lab Approver User in the LT2 DCTS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTSs calculations page displayed in Figure 3-10 to approve data. You will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLE " link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLE TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement:

"By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it available for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid *E. coli* samples are provided in Appendix C.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.6 *E. coli* ONPG-MUG, 97-well Method Samples This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

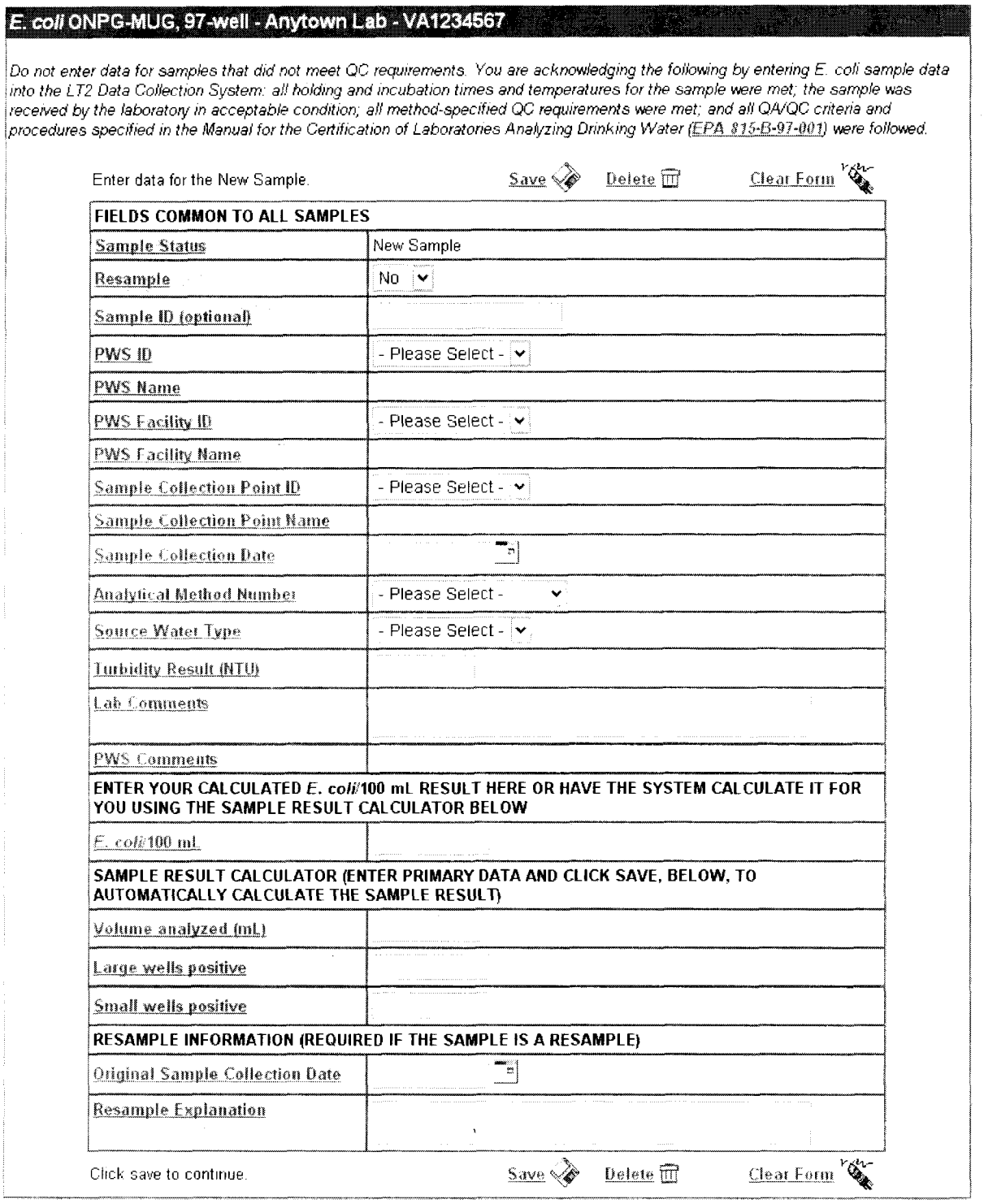
The following section details data entry and data review for *E. coli* ONPG-MUG, 97-well method samples.

3.6.1 *E. coli* ONPG-MUG, 97-well Method Data Entry **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

Laboratories certified to analyze *E. coli* using the ONPG-MUG, 97-well method format can use the LT2 DCTS to enter valid *E. coli* sample data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* method from the drop-down menu. The ONPG-MUG, 97-well analytical method type approved for LT2 *E. coli* analyses include the following:

- Colilert™ (Standard Methods 9223)
- Colilert-18™ (Standard Methods 9223)

The full versions of these methods are available for download in Adobe Acrobat (.pdf) format from http://www.epa.gov/safewater/lt2/index.html or http://www.epa.gov/microbes/. Guidance on the use of these methods under the LT2 rule, as well as the full text of the method, is provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006]. Figure 3-11 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter valid *E. coli* sample data generated using the ONPG-MUG, 97-well method.



E. coli ONPG-MUG, 97-well - Anytown Lab - VA1234567

Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample. Save Delete Clear Form

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No
Sample ID (optional)	
PWS ID	- Please Select -
PWS Name	
PWS Facility ID	- Please Select -
PWS Facility Name	
Sample Collection Point ID	- Please Select -
Sample Collection Point Name	
Sample Collection Date	
Analytical Method Number	- Please Select -
Source Water Type	- Please Select -
Turbidity Result (NTU)	
Lab Comments	
PWS Comments	
ENTER YOUR CALCULATED *E. coli*/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Volume analyzed (mL)	
Large wells positive	
Small wells positive	
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	
Resample Explanation	

Click save to continue. Save Delete Clear Form

Figure 3-11. E. coli ONPG-MUG, 97-well Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Sample Status - The Sample Status indicates the status of the sample in the sample review. The default setting is "New Sample" for sample data entry. Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

The following fields are required in the top section of the screen labelled "Fields Common To All Samples:"

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will be displayed in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will be displayed in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the PWS associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS Facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will be displayed in the drop-down menu.

PWS Facility Name - The PWS Facility Name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the PWS Facility Name and PWS Facility ID selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The sample collection point name is the name of the sample collection point associated with the sample collection point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that the Sample Collection Point Name and the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - This is the date the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed on at the beginning of section 3.6.1. Only approved analytical methods for the given method format (in this example, ONPG-MUG, 97-well) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

After entering the required data, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli* /100 mL calculated in your laboratory or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. Note: do not complete the bottom section if you complete this field – any data entered will be ignored.

***E. coli* /100 mL** - The final calculated result of *E. coli* per 100 mL.

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. Note: do not enter a value for "*E. coli* /100 mL" in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the LT2 DCTS. Additional fields required to calculate results for the *E. coli* ONPG-MUG, 97-well method may include the following primary measurements:

Volume analyzed (mL) - This is the mL of sample added to the tray for analysis. This value may be reported to four decimal places.

Large wells positive - This is the number of total coliform positive large wells with UV fluorescence. This value must be reported as a whole number between 0 and 49.

Small wells positive - This is the number of total coliform positive small wells with UV fluorescence. This value must be reported as a whole number between 0 and 48.

If the sample is a resample, additional data must be provided for the following fields:

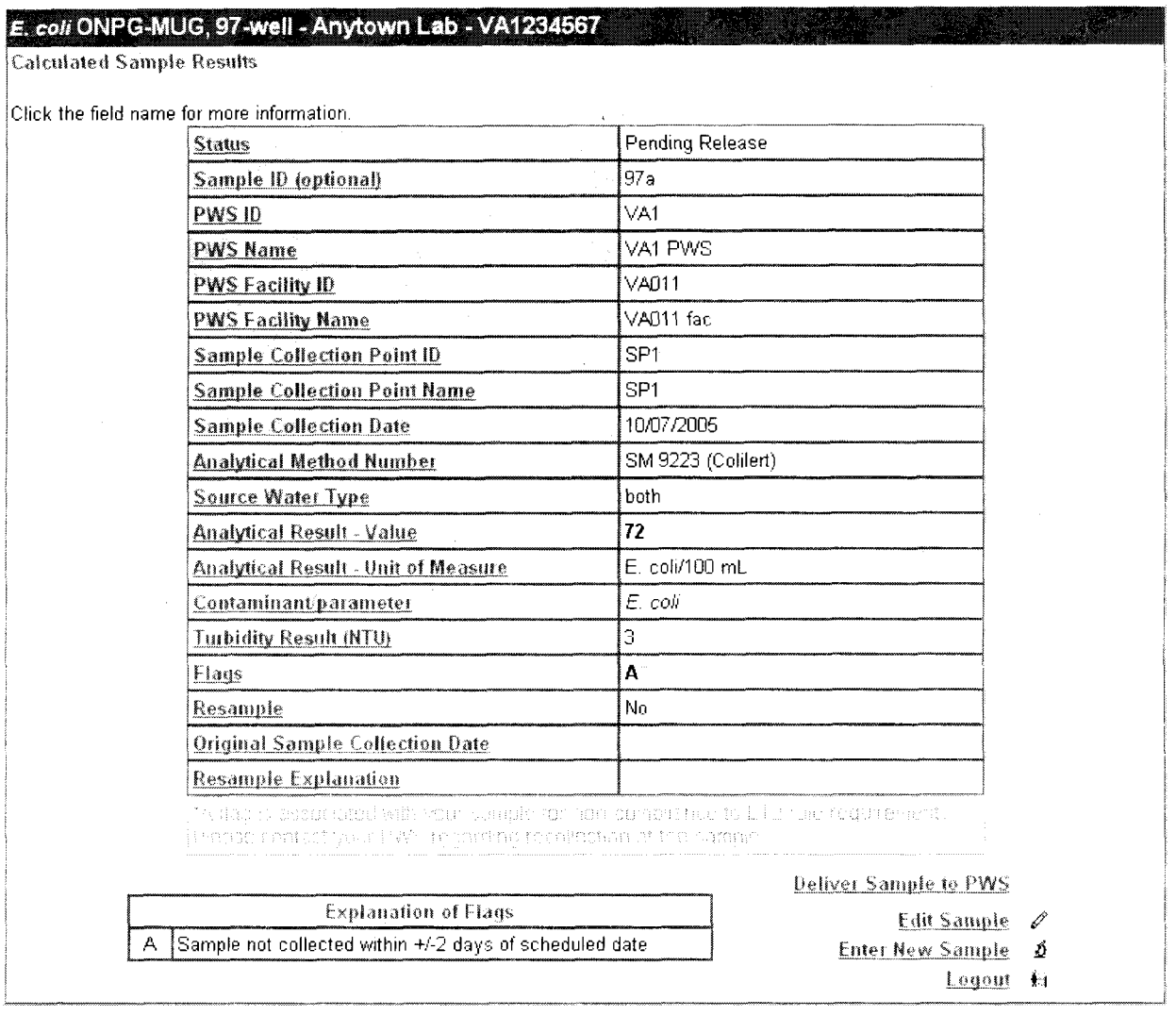
Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry, and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.6.2 Calculations Associated with *E. coli* ONPG-MUG, 97-well Method Data Processing **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS will help you perform the required method calculation by using the data entered by the laboratories to automatically calculate the sample results. After you have entered all of the required and primary measurement fields for an *E. coli* sample the LT2 DCTS will automatically calculate the sample results and present the "Calculated *E. coli* ONPG-MUG, 97-well Method Sample Results Ready for Submission" screen as shown in Figure 3-12.



E. coli ONPG-MUG, 97-well - Anytown Lab - VA1234567

Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	97a
PWS ID	VA1
PWS Name	VA1 PWS
PWS Facility ID	VA011
PWS Facility Name	VA011 fac
Sample Collection Point ID	SP1
Sample Collection Point Name	SP1
Sample Collection Date	10/07/2005
Analytical Method Number	SM 9223 (Colilert)
Source Water Type	both
Analytical Result - Value	**72**
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	*E. coli*
Turbidity Result (NTU)	3
Flags	**A**
Resample	No
Original Sample Collection Date	
Resample Explanation	

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

Deliver Sample to PWS

Edit Sample

Enter New Sample

Logout

Figure 3-12. Calculated E. coli ONPG-MUG, 97-well Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date
- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

In the section below these elements, the LT2 DCTS calculated value is automatically populated. The analytical result is measured in *E. coli* /100 mL and uses the equation below.

Select appropriate dilution to yield countable results. If multiple dilutions are used, the tray exhibiting positive wells in the 40% to 80% range (39 to 78 total positive large and small wells) should be used to determine MPN value.

Note: The analytical result can be automatically calculated using the LT2 DCTS.

Determine MPN. Using the number of large positive wells and small positive wells from the appropriate dilution, identify the corresponding MPN/100 mL in the table provided by the vendor. Large well values are located in the left column; small well values are located in the top row. For example, if a 100 mL sample was analyzed, and there were 29 large positive wells and 5 small positive wells, the corresponding MPN would be 49.6 MPN/100 mL.

Adjust for dilution factor. Because the MPN/100 mL values in the table are based on 100 mL samples, the MPN value should be adjusted if less than 100 mL of sample volume was analyzed. Use the following calculation to adjust the MPN to account for the dilution:

$$\text{Analytical result} = \text{MPN value} * \frac{100}{\text{mL sample analyzed}}$$

Example:

Volume analyzed = 10 mL of sample (in 90 mL of dilution water)

Large wells positive = 39

Small wells positive = 5

The MPN value calculated based on the intersection of 10 and 2 in the table.

MPN = 81.3

$$\text{Analytical result} = 81.3 * \frac{100}{10} = 813 \text{ } E. coli \text{ MPN/100 mL}$$

On the ONPG-MUG, 97-well data entry screen, you are asked to input the volume analyzed (mL), the number of large wells positive and the number of small wells positive. The LT2 DCTS uses the answers

provided for the numbers of large and small wells positive in order to select the corresponding MPN value from the IDEXX Quanti-Tray/2000 MPN Table. On the IDEXX Quanti-Tray/2000 MPN Table, the rows represent the number of large wells positive and the columns represent the number of small wells positive. The MPN is determined based on the intersection of rows and columns.

The remaining three fields in the "Calculated *E. coli* ONPG-MUG, 97-well Method Sample Results Ready for Submission" screen include auto-populated fields to help define the sample specifications. The sample analytical result unit of measure is auto-populated by the LT2 DCTS as "*E. coli* /100 mL," and the contaminant/parameter field is automatically populated by the LT2 DCTS as "*E. coli*."

The final component of the LT2 DCTS calculation is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data are not compliant with LT2 rule monitoring requirements, it will automatically be flagged in the LT2 DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the flags that can apply to *E. coli* data, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

3.6.3 *E. coli* ONPG-MUG, 97-well Method Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample ONPG-MUG, 97-well procedure results for submission to the PWS. As the Principal Analyst, you are identified as Lab Approver User in the LT2 DCTS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status, you will not have the option to submit data to the PWS. Rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS calculations page displayed in Figure 3-12 to approve data. You will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLE" link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLES TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement:

"By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it viewable for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid *E. coli* samples are provided in Appendix C.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.7 *E. coli* Membrane Filtration Method Samples **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

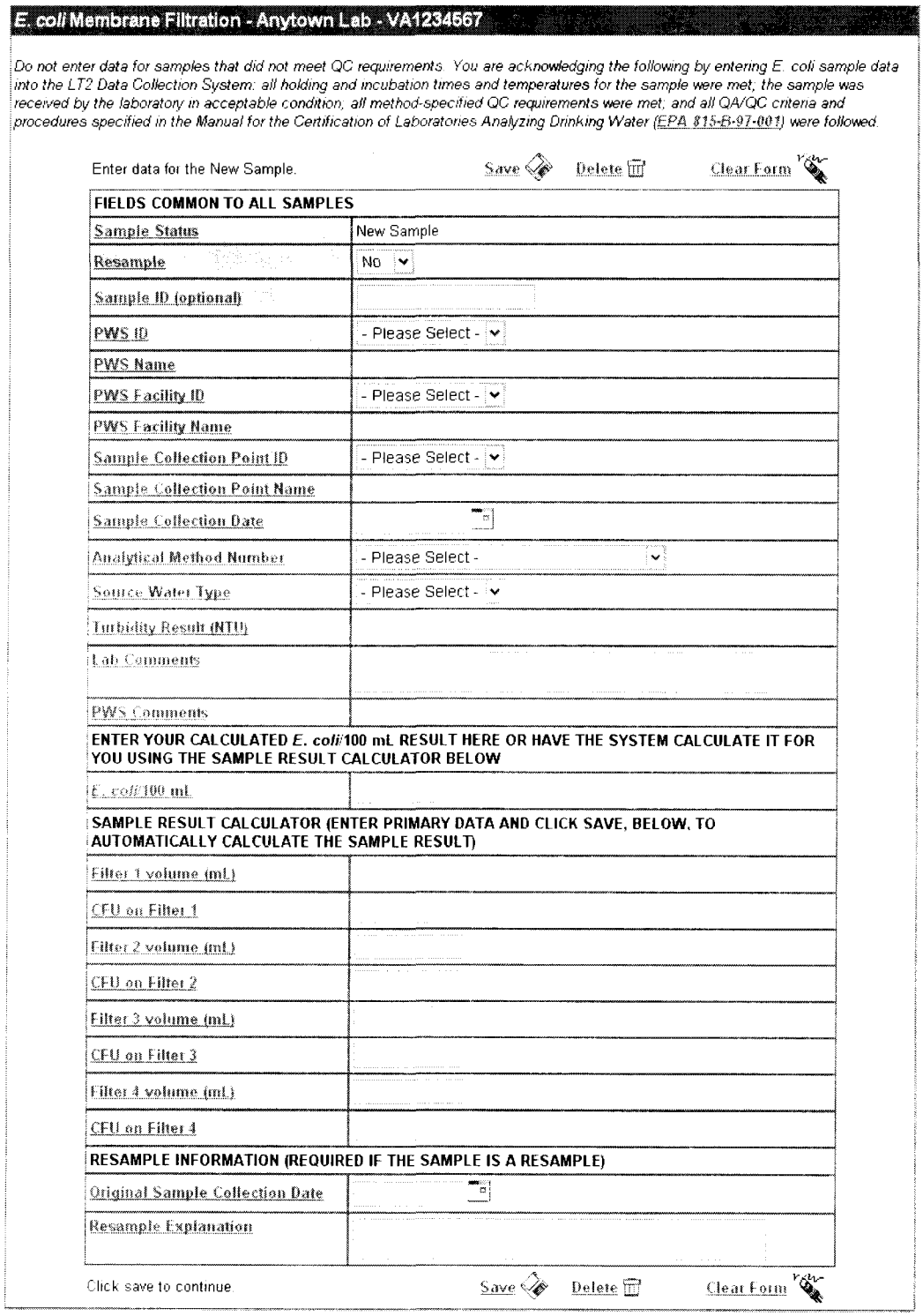
The following section details data entry and data review for *E. coli* Membrane Filtration method samples.

3.7.1 *E. coli* Membrane Filtration Method Data Entry **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

Laboratories certified to analyze *E. coli* using the membrane filtration method format can use the LT2 DCTS to enter valid *E. coli* membrane filtration data. If you analyzed the *E. coli* sample using a different method, click the "CREATE NEW SAMPLE" icon on the toolbar and select the appropriate *E. coli* analytical method from the drop-down menu. The following membrane filtration procedures are approved for LT2 *E. coli* analyses:

- Standard Methods 9222B/9222G (mEndo orLES-Endo/NA-MUG)
- Standard Methods 9222D/9222G (mFC/NA-MUG)
- Standard Methods 9213D (mTEC)
- Method 1603 (Modified mTEC)
- Method 1604 (MI medium)
- m-ColiBlue24 Broth

The full versions of these methods are available for download in Adobe Acrobat (.pdf) format from http://www.epa.gov/safewater/lt2/index.html or http://www.epa.gov/microbes/. Guidance on the use of these methods under the LT2 rule, as well as the full text of the method, is provided in the Microbial Laboratory Manual for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006]. Figure 3-13 displays the LT2 DCTS screen used by an approved *E. coli* laboratory to enter valid *E. coli* sample data generated using the Membrane Filtration method.



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Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering E. coli sample data into the LT2 Data Collection System: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

Enter data for the New Sample. Save Delete Clear Form

FIELDS COMMON TO ALL SAMPLES	
Sample Status	New Sample
Resample	No
Sample ID (optional)	
PWS ID	- Please Select -
PWS Name	
PWS Facility ID	- Please Select -
PWS Facility Name	
Sample Collection Point ID	- Please Select -
Sample Collection Point Name	
Sample Collection Date	
Analytical Method Number	- Please Select -
Source Water Type	- Please Select -
Turbidity Result (NTU)	
Lab Comments	
PWS Comments	
ENTER YOUR CALCULATED *E. coli*/100 mL RESULT HERE OR HAVE THE SYSTEM CALCULATE IT FOR YOU USING THE SAMPLE RESULT CALCULATOR BELOW	
E. coli/100 mL	
SAMPLE RESULT CALCULATOR (ENTER PRIMARY DATA AND CLICK SAVE, BELOW, TO AUTOMATICALLY CALCULATE THE SAMPLE RESULT)	
Filter 1 volume (mL)	
CFU on Filter 1	
Filter 2 volume (mL)	
CFU on Filter 2	
Filter 3 volume (mL)	
CFU on Filter 3	
Filter 4 volume (mL)	
CFU on Filter 4	
RESAMPLE INFORMATION (REQUIRED IF THE SAMPLE IS A RESAMPLE)	
Original Sample Collection Date	
Resample Explanation	

Click save to continue Save Delete Clear Form

Figure 3-13 E. coli Membrane Filtration Method Data Entry Screen

Only one sample may be entered at a time. Definitions for each data field can be viewed by clicking on the field name in the left column of the screen. Starting at the top of the data entry column, enter the value for each field, moving down the column in order. The following is a detailed description of each field.

Sample Status - The Sample Status indicates the status of the sample in the sample review process. The default setting is "New Sample" for sample data entry.Valid values include:

- **New Sample** - applies to samples that are being entered for the first time.
- **Pending Release** - indicates that a sample has been entered or uploaded, and is ready for laboratory review and approval, and release to the PWS. These samples can still be edited by the laboratory to correct any errors before the information is submitted to the PWS.
- **Delivered to PWS** - indicates that a sample has been released to the PWS for review. These samples cannot be edited.
- **Returned by PWS** - samples have been returned to your laboratory by the utility for issue resolution.
- **PWS Reviewed** - samples have been reviewed by the PWS and submitted to USEPA and state.

Resample - The resample field indicates whether or not the sample is a resample.

Sample ID (optional) - The Sample ID field may be entered for any or all samples if your laboratory wishes to use this information to easily track samples in the LT2 DCTS.

The following fields are required in the top section of the screen labelled "Fields Common To All Samples."

PWS ID - The PWS ID is the public water system ID, which is comprised of a two-letter state code followed by a seven-digit number. If your laboratory is a PWS laboratory, the PWS ID for your utility will be displayed in the drop-down menu that appears when you click the arrow next to the field. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS ID was not supplied with the sample, contact the PWS to obtain the correct value.

The PWS IDs of all PWSs that have selected your laboratory as their *E. coli* laboratory will be displayed in the drop-down menu that appears when you click the arrow next to the field. If the PWS ID for the sample you need to enter does not appear, your laboratory has not been selected by the PWS as their *E. coli* laboratory. You need to contact the PWS to request that they select your laboratory in the LT2 DCTS before their PWS ID will appear in the drop-down menu.

PWS Name - The PWS Name is the name of the public water system associated with the PWS ID selected. This field is auto-populated by the LT2 DCTS, based on the PWS ID entered. If your laboratory is a PWS laboratory, confirm the name in this field is your PWS name and verify that the PWS ID you selected is correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the PWS name supplied on the LT2 Sample Collection Form and verify that the PWS ID you entered is correct for this sample.

PWS Facility ID - The PWS Facility ID identifies the plant within the PWS from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate PWS Facility ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the PWS facility ID for the sample is provided on the LT2 Sample Collection Form you received with the sample. If a PWS Facility ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the facilities associated with the PWS you selected will be displayed in the drop-down menu.

PWS Facility Name - The PWS Facility name is the name of the facility associated with the PWS Facility ID selected. This field is auto-populated, based on the PWS Facility ID entered. If your laboratory is a PWS laboratory, confirm that the PWS Facility Name and PWS Facility ID selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, verify that the PWS Facility Name supplied by the PWS on the LT2 Sample Collection Form and the PWS ID you entered are correct for this sample.

Sample Collection Point ID - The Sample Collection Point ID indicates the sampling point at the facility from which the sample was collected. If your laboratory is a PWS laboratory, select the appropriate Sample Collection Point ID corresponding to your PWS. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Point ID for the sample is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a PWS Sample Collection Point ID was not supplied with the sample, contact the PWS to obtain the correct value. Only IDs for the sampling points associated with the selected facility will be displayed in the drop-down menu.

Sample Collection Point Name - The sample collection point name is the name of the sample collection point associated with the sample collection point ID selected. This field is auto-populated, based on the Sample Collection Point ID entered. If your laboratory is a PWS laboratory, confirm that theSample Collection Point Name and the Sample Collection Point ID you selected are correct for this sample. If your laboratory is analyzing *E. coli* samples for a PWS client, compare the name in this field to the Sample Collection Point Name supplied by the PWS on the LT2 Sample Collection Form and verify that the Sample Collection Point ID you entered is correct for this sample.

Sample Collection Date - This is the date the sample was collected by the facility. Use the mm/dd/yy format to enter the date. Sample collection dates that are earlier than 01/01/99 or later than the current date will not be accepted by the LT2 DCTS. If your laboratory is a PWS laboratory, enter the date the sample was collected by the facility. If your laboratory is analyzing *E. coli* samples for a PWS client, the Sample Collection Date is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If a Sample Collection Date was not supplied with the sample, contact the PWS to obtain the correct date.

Analytical Method Number - This is the method number used to designate the analytical method used for analysis, as listed at the beginning of Section 3.7.1. Only approved analytical methods for the given method format (in this example, membrane filtration) will be displayed in the drop-down menu.

Source Water Type - This is the type of water body used as the source for the drinking water facility from which the sample was collected, and is needed to evaluate the potential relationship between *Cryptosporidium* and *E. coli* concentrations. Select "Flowing Stream," "Lake/Reservoir," "Both FS and L/R" (for both Flowing Stream and Lake/Reservoir), "GWUDI-FS" (Ground Water Under the Direct Influence of Flowing Stream), or "GWUDI-LR" (Ground Water Under the Direct Influence of Lake/Reservoir).

Turbidity Result (NTU) (required only for filtered systems with a population greater than 10,000) - This is the measured turbidity reported as NTU. Turbidity should be measured by the facility at the time of sample collection. If your laboratory is a PWS laboratory, the turbidity should be reported with the sample when sent to your laboratory for analysis. If your laboratory is analyzing *E. coli* samples for a PWS client, the turbidity result is provided by the PWS on the LT2 Sample Collection Form you received with the sample. If no turbidity result was supplied by the PWS with the sample, contact the PWS to obtain the turbidity result.

Lab Comments (optional) - As a Lab User, you can incorporate comments concerning the sample into the information sent to the PWS by entering comments into the comments field.

PWS Comments (if available) - As a Lab User, you can view comments in this field concerning the sample that the PWS has sent back to the laboratory.

After entering the required fields, you may choose to enter the final calculated concentration of *E. coli* in the sample reported as *E. coli* /100 mL calculated in your laboratory or have the LT2 DCTS calculate your results based on primary measurements. If you do not want the LT2 DCTS to automatically calculate your result using your primary measurements, complete the *E. coli* result – value field. This value may be reported to the nearest tenth. Note: Do not complete the bottom section if you complete this field – any data entered will be ignored.

***E. coli* /100 mL** - The final calculated result of *E. coli* per 100 mL.

To enter primary measurements from the sample and have the LT2 DCTS automatically calculate the final result, complete the bottom section of the screen. Note: Do not enter a value for "*E. coli* /100 mL" in the middle section. If a value is entered for this field any additional primary measurements entered will be ignored by the LT2 DCTS. Additional fields required by the LT2 DCTS to calculate results for the *E. coli* Membrane Filtration method may include the following primary measurements:

Filter 1 volume (mL) - the mL of sample filtered on Filter 1. This value may be reported to four decimal places.

Filter 1 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 1. This value must be reported as a whole number.

Filter 2 volume (mL) - the mL of sample filtered on Filter 2. This value may be reported to four decimal places.

Filter 2 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 2. This value must be reported as a whole number.

Filter 3 volume (mL) - the mL of sample filtered on Filter 3. This value may be reported to four decimal places.

Filter 3 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 3. This value must be reported as a whole number.

Filter 4 volume (mL) - the mL of sample filtered on Filter 4. This value may be reported to four decimal places.

Filter 4 CFU - the number of *E. coli* colony forming units (CFU) observed on Filter 4. This value must be reported as a whole number.

If the sample is a resample, additional data must be provided for the following fields:

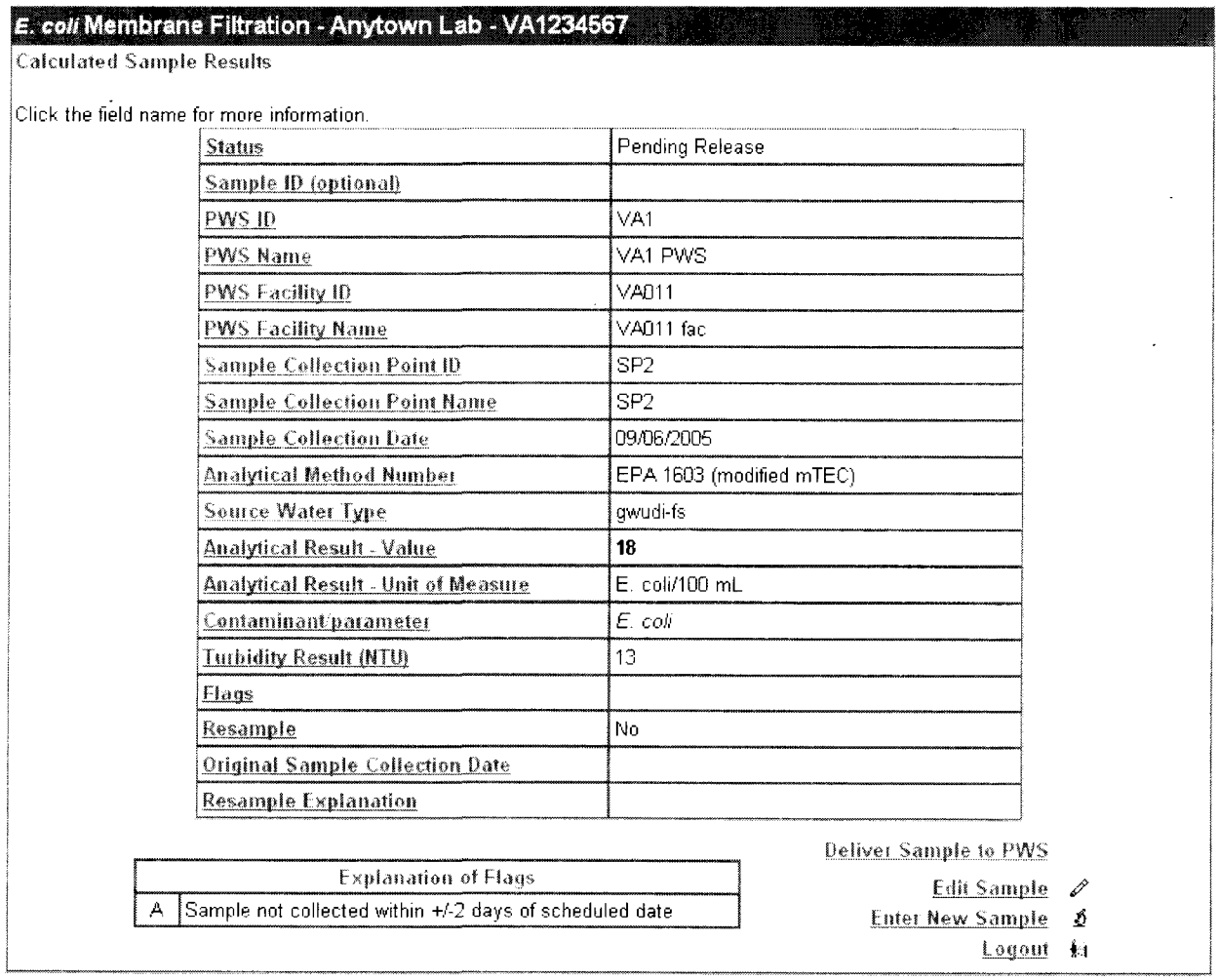
Original Sample Collection Date - The date the original sample was collected.

Resample Explanation - The reason for why this resample is required.

After the first section and either the middle section or bottom section have been completed, click "SAVE" to continue. If you have made errors in data entry and have not yet clicked "SAVE," you can erase all of the data entered on the screen by clicking "RESET ENTIRE FORM." You cannot save sample data unless all required fields for the sample have been completed.

3.7.2 Calculations Associated with *E. coli* Membrane Filtration Method Data Processing **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS will help you perform the required method calculation by using the primary data entered by the laboratory to automatically calculate the sample results. After the user has entered all of the required and primary measurement fields for an *E. coli* sample the LT2 DCTS will automatically calculate the sample results and present the "Calculated *E. coli* Membrane Filtration Method Sample Results Ready for Submission" screen as shown in Figure 3-14.



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Calculated Sample Results

Click the field name for more information.

Status	Pending Release
Sample ID (optional)	
PWS ID	VA1
PWS Name	VA1 PWS
PWS Facility ID	VA011
PWS Facility Name	VA011 fac
Sample Collection Point ID	SP2
Sample Collection Point Name	SP2
Sample Collection Date	09/06/2005
Analytical Method Number	EPA 1603 (modified mTEC)
Source Water Type	gwudi-fs
Analytical Result - Value	**18**
Analytical Result - Unit of Measure	E. coli/100 mL
Contaminant/parameter	*E. coli*
Turbidity Result (NTU)	13
Flags	
Resample	No
Original Sample Collection Date	
Resample Explanation	

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

Deliver Sample to PWS

Edit Sample

Enter New Sample

Logout

Figure 3-14. Calculated E. coli Membrane Filtration Method Sample Results Ready for Submission

To help you identify the sample, several previously entered fields will be redisplayed at the top of the screen, including the following:

- Sample ID
- PWS
- PWS facility
- Sample collection point
- Sample collection date
- Analytical method number
- Source water type
- Resample
- Original Sample Collection Date
- Resample Explanation

In the section below these elements, the LT2 DCTS-calculated value is automatically populated. The analytical result value is the final calculated concentration of *E. coli* in the sample, reported as *E. coli* /100 mL. The Analytical result is measured in *E. coli* /100 mL and uses several steps to reach the final value. On the membrane filtration data entry screen, the user is asked to input the volume and CFU value for Filters 1 through 4. These values will be used to determine the CFU/100 mL analytical result value.

E. coli counts should be determined from the volume(s) filtered that yielded 20 to 80 *E. coli* colonies (20-60 for mFC-NA-MUG), and not more than 200 total colonies per plate. (Guidance for samples that do not yield countable plates is provided in Sections E and F of the February 2006 version of the Microbial Laboratory Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) [EPA-815-R-06-006] (Reference 4.6.2.2).

Note: The analytical result can be automatically calculated using the LT2 DCTS.

If there are greater than 200 colonies per membrane, even for the lowest dilution, the result is recorded as "too numerous to count" (TNTC). These results cannot be reported for LT2 monitoring, as they cannot be used for the required data analyses. During the next sampling event, analyze an additional, lower dilution volume (the highest dilution volume may be omitted) unless conditions were unusual (e.g., heavy rains, flooding, etc.) during the sampling event yielding TNTC for all dilutions.

If colonies are not sufficiently distinct for accurate counting, the result is recorded as "confluent growth" (CNFG). To prevent CNFG from occurring, smaller sample aliquots should be filtered. For example, if sample volumes of 100, 10, 1 and 0.1 mL are analyzed and even the 0.1 mL plate results in CNFG, then potentially 0.01 mL should be analyzed during the next sampling event. For sample volumes less than 1 mL, serial dilutions should be used, and 1 mL volumes of the dilutions should be filtered. The 100 mL volume can be eliminated. Note: If growth is due to high levels of total coliforms but low *E. coli*, another method should be chosen for analysis that does not rely on total coliform determination prior to or simultaneously with *E. coli* determination.

Note: Results that are TNTC or CNFG are not appropriate for LT2 microbial data analysis, and cannot be entered into the LT2 DCTS. These results should not be reported.

Using the *E. coli* counts from the appropriate dilution, *E. coli* CFU/100 mL is calculated based on the following equation:

$$\textit{E. coli}\ \text{CFU} * \frac{100}{\text{mL sample filtered}} = \textit{E. coli}\ \text{CFU/100 mL}$$

Example 1:

Filter 1 volume = 100 mL	CFU = TNTC
Filter 2 volume = 10 mL	CFU = 40
Filter 3 volume = 1.0 mL	CFU = 9
Filter 4 volume = 0.1 mL	CFU = 0

Using the guidance on countable colonies above, the counts from the 10 mL plate will be used to calculate the *E. coli* concentration for the sample:

$$40\ E.\ coli\ \text{CFU} * \frac{100}{10} = 400\ E.\ coli\ \text{CFU/100 mL}$$

If no *E. coli* colonies are present, the detection limit is calculated as the following:

< largest volume filtered per 100 mL.

$$\text{Detection Limit} = \frac{100\ \text{mL}}{\text{Largest volume filtered}} = E.\ coli\ \text{CFU/100 mL}$$

Example 2:

Filter 1 volume (mL) = 100 mL	CFU = 0
Filter 2 volume (mL) = 10 mL	CFU = 0
Filter 3 volume (mL) = 1.0 mL	CFU = 0

Calculation of *E. coli* /100 mL:

$$\frac{100\ \text{mL}}{100\ \text{mL}} = <1\ E.\ coli\ \text{CFU/100 mL}$$

Example 3:

Filter 1 volume (mL) = 100 mL	CFU = Lab incident, no data available
Filter 2 volume (mL) = 10 mL	CFU = 0
Filter 3 volume (mL) = 1.0 mL	CFU = 0

Calculation of *E. coli* /100 mL:

$$\frac{100\ \text{mL}}{10\ \text{mL}} = <10\ E.\ coli\ \text{CFU/100 mL}$$

If there are no filters with *E. coli* counts in the 20-80 colony range (20-60 for mFC-NA-MUG), sum the *E. coli* counts on all filters, divide by the volume filtered and report as number per 100 mL.

Example 4:

Filter 1 volume (mL) = 50 mL CFU = 15

Filter 2 volume (mL) = 25 mL CFU = 6

Filter 3 volume (mL) = 10 mL CFU = 0

The analytical result is calculated as:

$$(15 + 6 + 0) * \frac{100}{(50 + 25 + 10)} = 25 \textit{ E. coli} \text{ CFU/100 mL}$$

Example 5:

Filter 1 volume (mL) = 50 mL CFU = 105

Filter 2 volume (mL) = 25 mL CFU = 92

Filter 3 volume (mL) = 10 mL CFU = 85

The analytical result is calculated as:

$$(105 + 92 + 85) * \frac{100}{(50 + 25 + 10)} = 332 \textit{ E. coli} \text{ CFU/100 mL}$$

Example 6:

Filter 1 volume (mL) = 100 mL CFU = 82

Filter 2 volume (mL) = 10 mL CFU = 18

Filter 3 volume (mL) = 1 mL CFU = 0

The analytical result is calculated as:

$$(82 + 18 + 0) * \frac{100}{(100 + 10 + 1)} = 90 \textit{ E. coli} \text{ CFU/100 mL}$$

Example 7:

Filter 1 volume (mL) = 50 mL CFU = TNTC

Filter 2 volume (mL) = 25 mL CFU = TNTC

Filter 3 volume (mL) = 10 mL CFU = 83

The analytical result is calculated as:

$$(83) * \frac{100}{10} = 830 \textit{ E. coli} \text{ CFU/100 mL}$$

The remaining three fields in the "Calculated *E. coli* Membrane Filtration Method Sample Results Ready for Submission" screen include auto-populated fields to help define the sample specifications. The sample analytical result unit of measure is auto-populated as "*E. coli* /100 mL," and the contaminant/parameter field is automatically populated by the LT2 DCTS as "*E. coli.*"

The final component of the LT2 DCTS calculations is assignment of a data qualifier flag. This flag is placed at the bottom of the screen. If data are not compliant with LT2 rule monitoring requirements, it will automatically be flagged in the LT2 DCTS, and the flag key identifying the noncompliant monitoring requirement will be displayed in the flag row of the sample results information. Table 3-3 displays the flags that can apply to *E. coli* data, as well as the condition that triggers the flag. A legend defining the flag keys will appear with the key letter and the flag at the bottom of the screen.

3.7.3 *E. coli* Membrane Filtration Method Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows the Principal Analyst at the laboratory to review and approve *E. coli* sample membrane filtration method results for submission to the PWS. If you have been designated as the Lab Approver User, you will have the option to approve the sample results for submission to the PWS at this time. If you are without designated approval status you will not have the option to submit data to the PWS, rather, you will have the option to edit the current sample data or enter new samples.

Lab Approver Users use the LT2 DCTS calculations page displayed in Figure 3-14 to approve data. You will review the entered, calculated, and populated results for each sample to verify that they are correct before approving the results for submission to the PWS. If errors are identified, the results can be edited by clicking on the "EDIT SAMPLE" link in the bottom right corner. If you would like to approve the sample, click the "DELIVER SAMPLE TO PWS" link in the bottom right corner.

Before the sample can be approved, you must agree to the following statement:

"By approving these *E. coli* monitoring results for release from your laboratory, you are verifying that the results were generated in accordance with all method and LT2 rule QC requirements. [Ok] [Cancel]"

Clicking "OK" will update the sample to the lab-approved status, thereby making it viewable for PWS review. If "CANCEL" is clicked, the sample will not be approved. Criteria for valid membrane filtration *E. coli* samples are provided in Appendix D.

If "OK" is clicked, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted to the PWS on [date sent]." To navigate from this confirmation screen use the main toolbar on the left.

If no inaccuracies or other issues are identified, approve the data for "release" to the PWS for review (USEPA does not receive the data at this point). When the data are approved, the rights to the data are transferred electronically by the LT2 DCTS to the PWS, and the data can no longer be changed by the laboratory unless returned to the laboratory by the PWS.

3.8 View Samples and Search **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows laboratories to search for *Cryptosporidium* or *E. coli* samples already entered by their laboratory. The search screen serves as an access point to view the existing sample data. You can

set search specifications for *E. coli* or *Cryptosporidium* data, sample ID, PWS inventory data, status, last update date, and sample collection date. Figure 3-15 displays an example of the search screen.

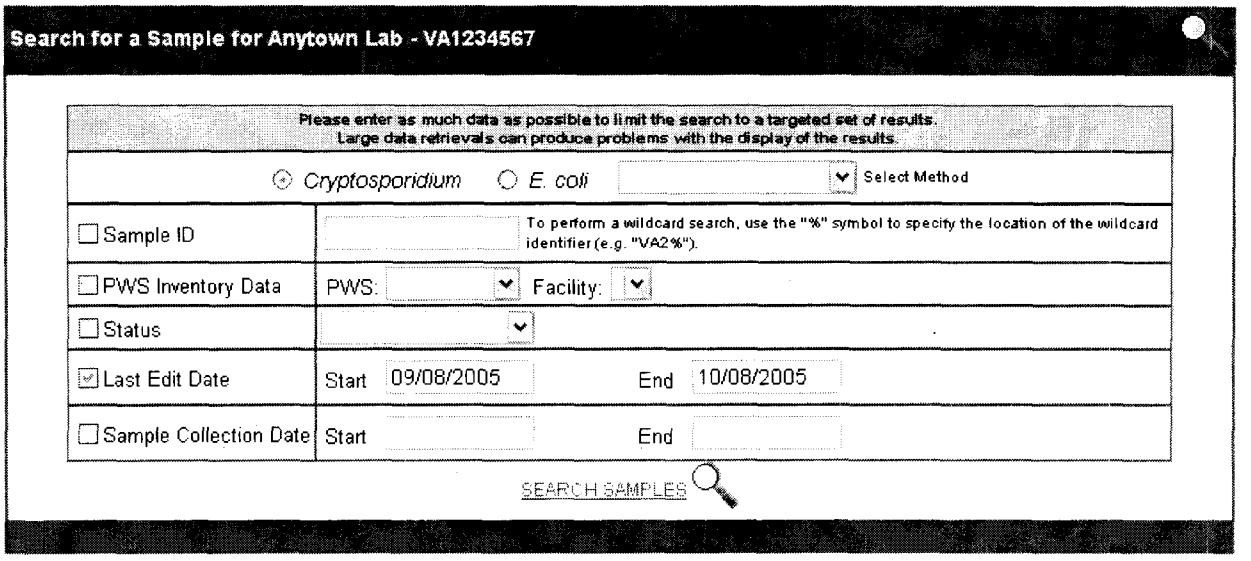


Figure 3-15. Laboratory Search Screen

To search for a sample, first select either *Cryptosporidium* or *E. coli* at the top of the table by clicking the appropriate radio button. If *E. coli* is selected, select the appropriate method type from the drop-down menu. You can search for all four *E. coli* method types by selecting "All Methods" from the drop-down menu. After selecting the analyte, select one or more of the search specification displayed in the table by clicking the box next to the criterion. For each criterion selected, enter the value in the field, or pick the desired value from the drop-down menu to the right. After you have selected the analyte and search specifications, click on the "SEARCH SAMPLES" link to display the search results. A listing of relevant samples will appear at the bottom of the screen. Up to 10 samples will be viewed at one time. If more than 10 samples match the search specifications, navigational buttons will be displayed to permit the user to click through the rest of the data. There are buttons to move to the next set of 10 samples (>), last set of 10 samples (>|), previous set of 10 samples (<), and first set of 10 samples (|<). If you chose to search for all *E. coli* methods, the method that was used for the sample will be color-coded in the search results:

- Yellow: 15-tube MPN
- Purple: Membrane Filtration
- Grey: ONPG-MUG, 51-well
- Pink: ONPG-MUG, 97-well

The text at the top of the bottom section of the screen indicates how many samples matched your search specifications. If you would like to modify your search, return to the top of the screen, modify the search information and click on the "SEARCH SAMPLES" link again.

Search results are organized in the table by three "status" categories:

- **Pending release** - samples that have been entered by your laboratory but not approved for release to the PWS.
- **Delivered to the PWS** - samples that have been approved by your laboratory for PWS review, and can no longer be changed by your laboratory.
- **Returned by PWS** - samples that have been submitted by your laboratory to the PWS, but returned to you by the PWS for action.

Once a sample has been either approved or contested by the PWS, it switches to a "PWS Reviewed" status. These samples are not automatically displayed to the user. They must be searched for specifically, by selecting the "PWS Reviewed" status from the drop-down menu in the search specifications.

Under each status, the data are initially sorted by "Last Edit Date." You may also sort the data by clicking on any of the column headings including Sample ID, PWS, PWS Facility, Sample Collection Point, Last Edit Date, Sample Collection Date, and Last Edit User.

You can view (or edit for samples that are pending release) up to four *Cryptosporidium* samples or one *E. coli* sample at a time by clicking the check boxes to the left of the samples, then clicking on the "EDIT/VIEW SELECTED SAMPLE DATES" link. You can download samples that have been delivered to the PWS by clicking the check boxes to the left of the samples, then clicking on the "DOWNLOAD SELECTED SAMPLES" link. You may also print the search results using the "PRINT SEARCH RESULTS." Once the "PRINT SEARCH RESULTS" link is clicked and your printer's menu appears, set the print layout/orientation to "Landscape" in order to see the entirety of the search results.

To return to the first record in your search click the "RETURN TO TOP OF RESULTS" link on the bottom of the page. To perform a new search, click on the "CHANGE SEARCH OPTIONS" link at the bottom of the screen to go back to the top of the page.

3.9 Sample Dates

Laboratories may view a PWS' established sampling schedule dates by using the left-hand toolbar and clicking on the "Sample Dates" button. This leads to a screen with two search options: by date range or by organization. To view sampling dates, select both a start and end date and click "Submit" to view all scheduled sample dates that match the search specification. To view established sampling schedule dates by organization, select both the PWS name and facility name from the list and click the "SUBMIT" link to view sampling dates associated with the selected PWS and facility. Figure 3-16 displays an example of the "PWS Sampling Schedule" search screen.

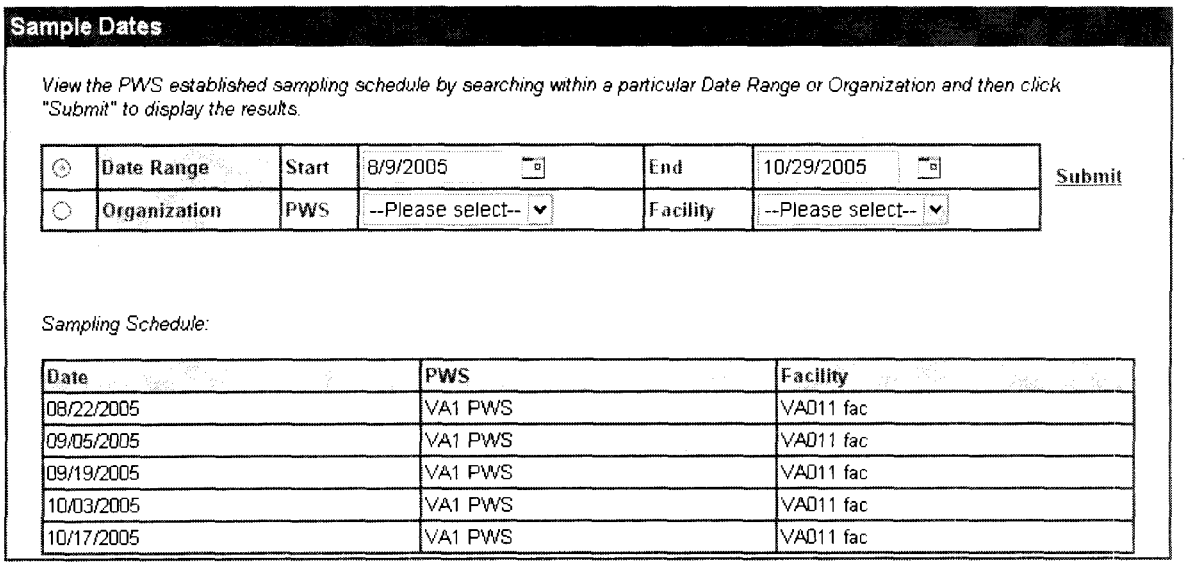


Figure 3-16. View a PWS Sampling Schedule

3.10 Contacts

The LT2 DCTS allows Lab Users to view the list of contacts for their laboratory. Lab Approver Users may select and/or update the Official Contact for their laboratory by clicking on the "CONTACTS" link in the navigational toolbar. New contacts entered into the LT2 DCTS will automatically be associated with the laboratory you are currently working on and will be visible only to users with permission to access data for the laboratory. Lab Users can also view the contacts for the PWSs for which they are a contracting laboratory. Note: Lab Users do not have the ability to modify the PWS contacts. Figure 3-17 displays an example of the "LT2 Contacts" screen.

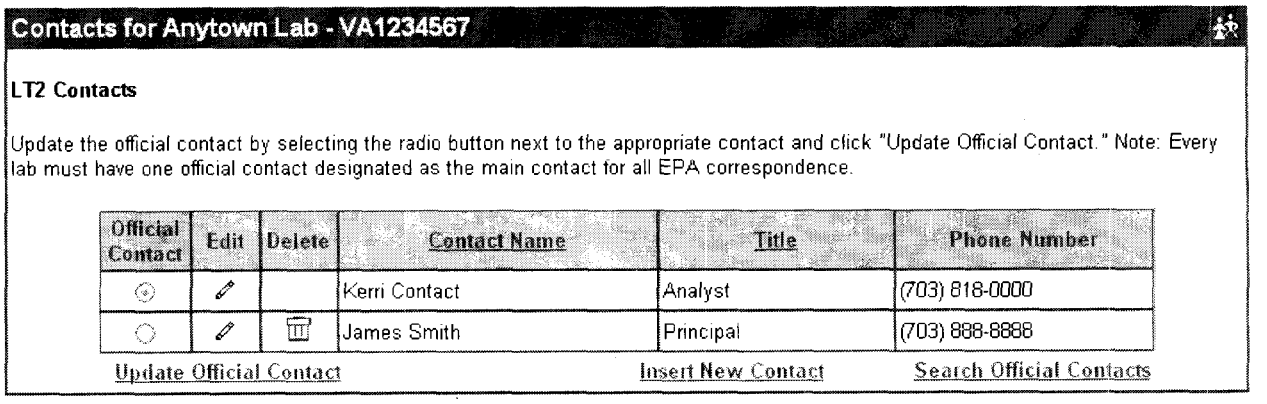


Figure 3-17. Laboratory Contact List

Every laboratory must have an Official Contact identified in the LT2 DCTS as the point of reference on all USEPA correspondence. The first contact entered into the LT2 DCTS will automatically be selected as the Official Contact. If more than one contact is listed for a laboratory, the Lab Approver User will have the ability to determine which person should be designated as the Official Contact. After an Official

Contact is assigned, that user cannot be deleted until the Lab Approver User has designated a new Official Contact. The Official Contact is the person from your laboratory that USEPA should contact regarding LT2 issues. Select the Official Contact for your laboratory by clicking the appropriate radio button under the "Official Contact" column in the contacts table and clicking the "UPDATE OFFICIAL CONTACT" link.

To delete a contact for your laboratory, click the trash can icon next to the contact name in the "Delete" column of the contacts table. Note: Since an Official Contact is required by the LT2 DCTS, the Official Contact cannot be deleted.

The LT2 DCTS also allows Lab Approver Users to update and add new contact information. Lab Users can only view this information. To edit information for a contact, click the pencil icon next to the contact name in the "Edit" column of the contacts table. To add a new contact for your laboratory, click the "INSERT NEW CONTACT" link. Figure 3-18 displays the screen used for updating and adding new contact information.

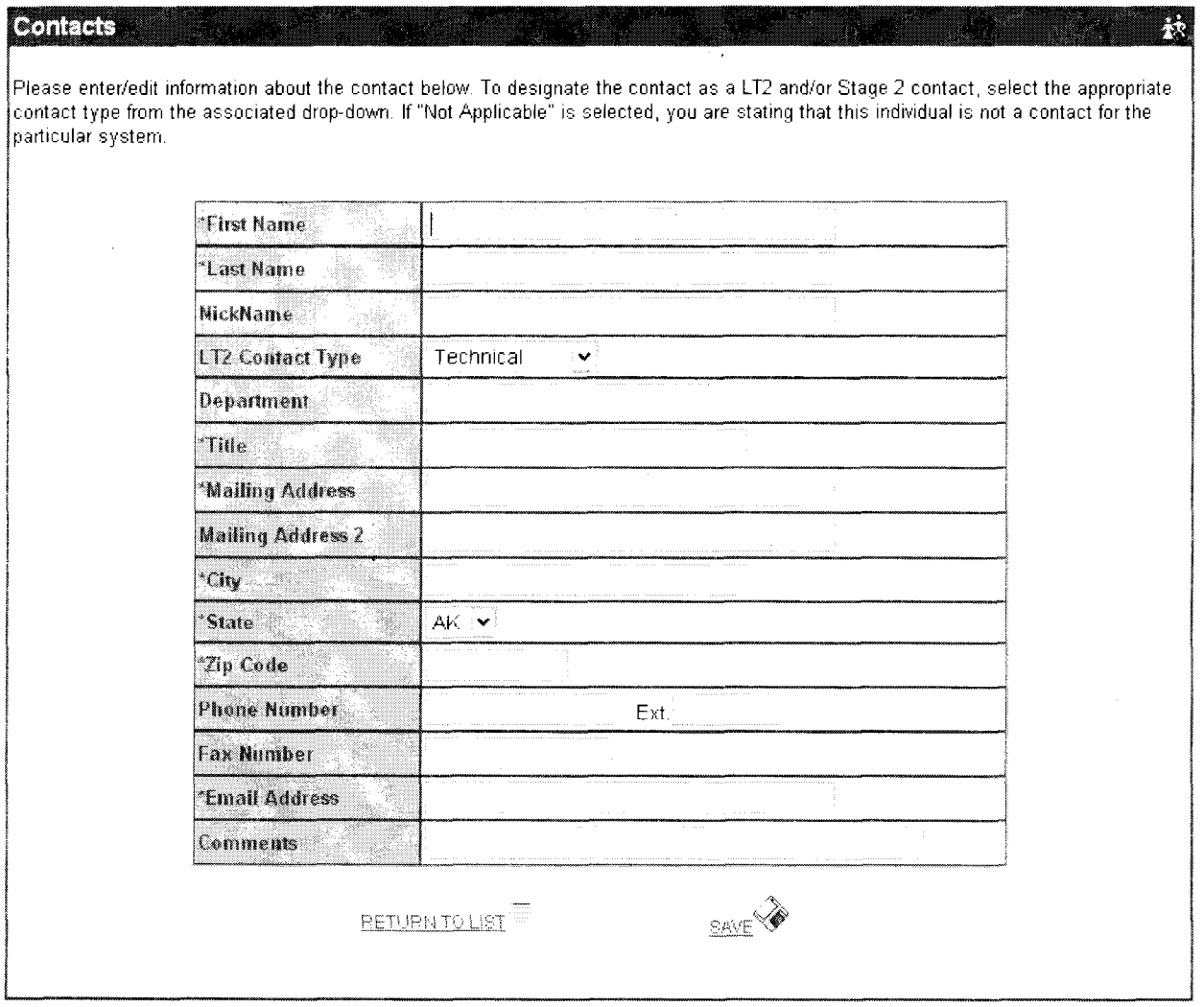


Figure 3-18. Contact Form

If you are editing contact information, the contact form will be populated with the current information stored in the database. You may simply update the field you would like to correct and click the "SAVE" link at the bottom of the screen.

If you are entering a new contact, you must enter values for all required fields marked with an asterisk. You may enter values for optional fields, as appropriate. When complete, click the "SAVE" link at the bottom of the screen.

You may exit the form using the following three methods:

- To return to the laboratory contact list without saving, click the "RETURN TO LIST" list.
- To save the contact information, click the "SAVE" link.
- If you make data entry errors, and would like to delete all information from the form and start over, click the "RETURN TO LIST" link.

Section 4. PWS User

This section provides instructions for the public water system (PWS) User. The basic PWS capabilities are shown in Figure 4-1.

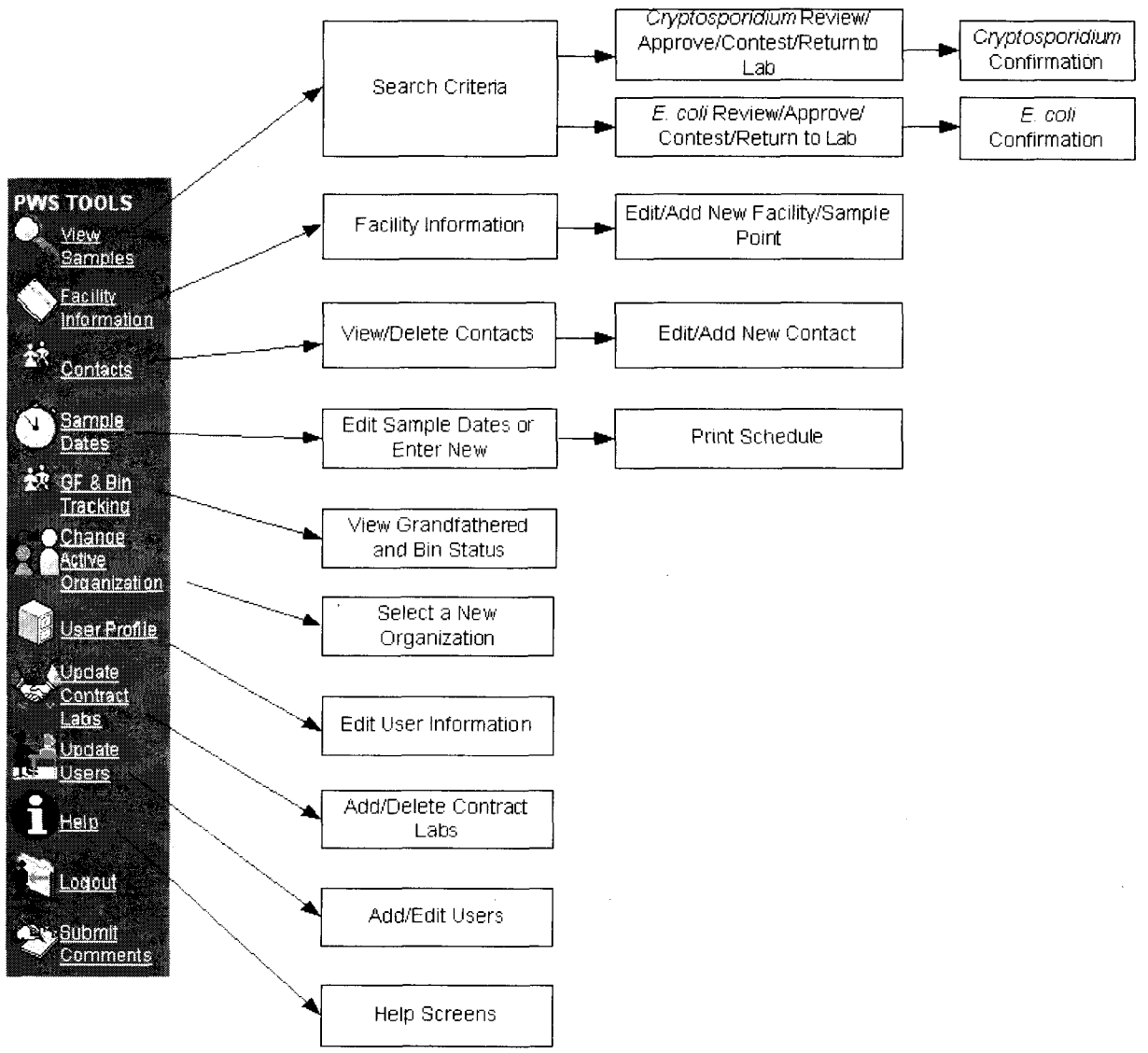


Figure 4-1. LT2 DCTS PWS User Basic Work Flow

An overview of the steps you must take to use the LT2 DCTS include the following:

- Request access by logging into the LT2 DCTS as discussed in Section 2.4
- Approve users requesting access as discussed in Section 2.3.3
- Update your user profile as discussed in Section 2.5
- Establish a sampling schedule for each facility, as discussed in Section 4.9
- Check that all facilities and sampling points are in the facility information and update as necessary as discussed in Section 4.8
- Update all PWS contacts as discussed in Section 4.10
- Select your contracting labs as discussed in Section 2.3.4
- Review all samples as they are submitted by your contracting labs as discussed in Section 4.2

All PWS functions described in this section are initiated by logging into the LT2 DCTS Home Page, available on the Web at http://www.epa.gov/safewater/lt2/index.html. When you, as a PWS User, log on to the LT2 DCTS, the LT2 DCTS will determine the list of organizations with which you are associated. In most cases, you will be associated with only one organization and will move directly to the search screen (Section 4.2). If you are registered for more than one organization, you must select the PWS you wish to access (Section 4.1).

4.1 Select Organization

The "Select Organization" screen is intended for those users who are associated with more than one organization. If you are only associated with one organization, you will not be directed to this screen after login. If you are registered for more than one organization, this screen will open automatically. You must select the organization you wish to access. Figure 4-2 displays the "Select Organization" screen.

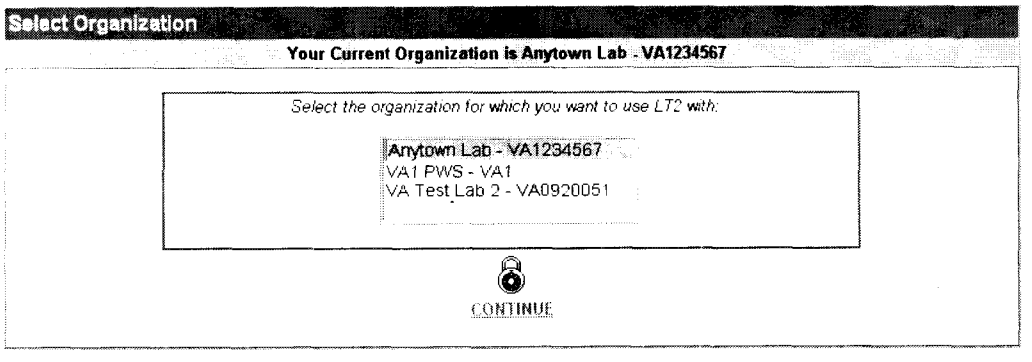


Figure 4-2. Select Organization Screen

After your initial log in, the LT2 DCTS will display a list of associated organizations and you will be required to select the organization for which you would like to edit/view/enter data. At any given point, you can only enter or review samples for one organization. To switch to another organization, click the "CHANGE ACTIVE ORGANIZATION" link that appears in the side navigation toolbar. The "Select Organization" screen will be displayed, and you may choose to work within a different organization. The organization that you are currently working under will be displayed at the top of each screen.

The LT2 DCTS will, by default, link you to the first organization that appears on your list. Clicking a new organization on your list can change this default. The page will refresh, and you will be associated with

the new organization. For example, by default you may be entered as Anytown Lab. However, you may wish to review samples for VA1 PWS. Select VA1 PWS by clicking on its name in the list box. The page will refresh and VA1 PWS will appear as the active organization at the top of the screen.

Click the "CONTINUE" link to complete the procedure and continue to the first page associated with the selected user role. The navigation toolbar will appear on the left side with the links appropriate to the selected user role.

4.2 View Samples and Search **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows PWSs to search for *Cryptosporidium* or *E. coli* samples already entered by laboratories associated with their utility. The search screen serves as an access point to view the existing sample data. After first selecting *Cryptosporidium* or *E. coli*, you can set search specifications for *Cryptosporidium* or *E. coli* data, PWS inventory data, status, lab approval date, and sample collection date. Figure 4-3 displays an example of the search screen.

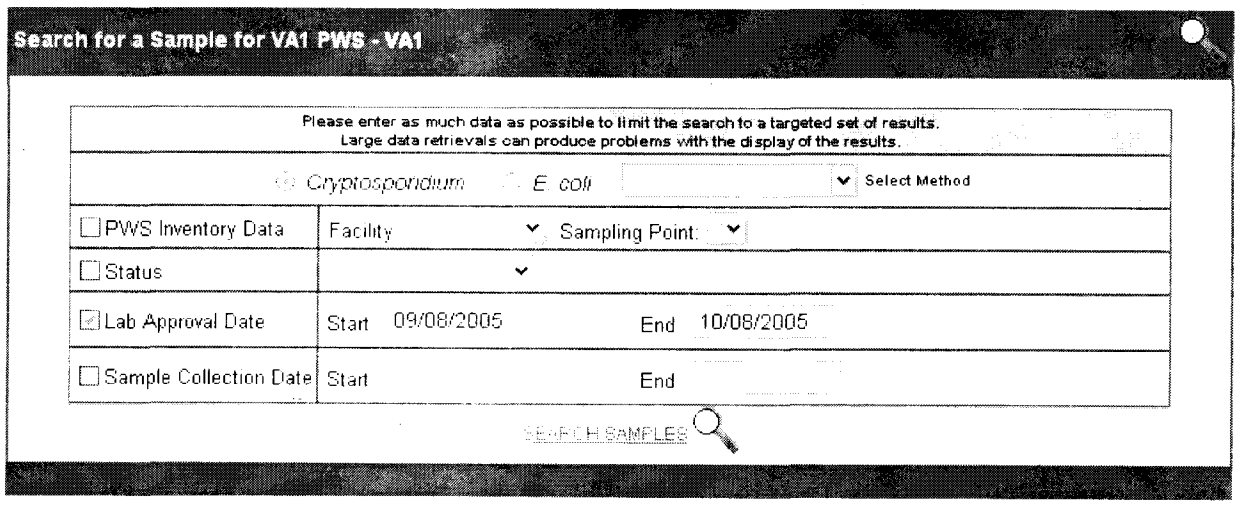


Figure 4-3. PWS Search Screen

From the search screen, you can gain access to any data that has been previously approved by a Lab Approver User. To search for a sample, first select either *Cryptosporidium* or *E. coli* at the top of the table by clicking the appropriate radio button. If *E. coli* is selected, choose the appropriate method type from the drop-down menu to the right of "*E. coli*," or select to search for all methods by selecting "All Methods" from the drop-down menu. Next, select one or more of the search specifications displayed in the table which follows by entering the criterion in the text box or picking the desired value from the drop-down menu to the right. The corresponding check box will automatically be selected. Click the check box to remove this item from your list of search criterion. After you have selected the analyte and search specifications, click the "SEARCH SAMPLES" link to display the search results. A listing of relevant samples will appear at the bottom of the screen with text indicating the number of samples that matched your search specifications. Up to 10 samples will be displayed at one time. If more than 10 samples match the search specifications, navigational buttons will be displayed to permit the user to click through the rest of the data. There are buttons to move to the next set of 10 samples (>), the last set of 10 samples (>|), the

previous set of 10 samples (<), and the first set of 10 samples (|<). If you chose to search for all *E. coli* methods, the method that was used for the sample will be color-coded in the search results:

- Yellow: 15-tube MPN
- Purple: Membrane Filtration
- Grey: ONPG-MUG, 51-well
- Pink: ONPG-MUG, 97-well

If you would like to modify your search, return to the top of the screen, modify the search specifications and click the "SEARCH SAMPLES" link again.

Search results are organized by five "status" categories, as displayed in Table 4-1 below:

Table 4-1. Status Categories

STATUS	DESCRIPTION
Pending approval	Samples that have been submitted by the laboratory, but that your PWS has not approved for release to USEPA.
Approved	Samples that have been approved by your PWS for submission to USEPA.
Returned to Lab	Samples that have been returned to the laboratory by the PWS for further action.
Contested	Samples that have been submitted by your PWS to USEPA not as approved samples, but as sample results that were generated, but that you contend are not valid for LT2 binning.
Not Reviewed	Samples that have not been reviewed by a PWS within the designated time period are automatically forwarded to USEPA/state. Flagged samples are excluded from this process and will remain at the PWS. The designated time period is defined as no later than 10 days after the end of the first month following the month in which the sample is collected (e.g. if the sample was collected April 16th, June 10th is the end of the designated time period).

Under each status, the data are initially sorted by "Lab Approval Date." You may also sort the data by clicking on any of the remaining column headings, including: Sample ID, Lab, PWS Facility, Sample Collection Point, and Sample Collection Date.

You can view up to four samples of the same analyte and method at a time by clicking the check boxes to the left of the samples, then clicking on the "REVIEW SELECTED SAMPLES" link. You may choose to approve, contest, or send the sample data back to the associated laboratory for modification. Approved or contested samples are submitted to the USEPA.

You may also print the search results using the "PRINT SEARCH RESULTS" Link. Note: Once the "PRINT SEARCH RESULTS" link is clicked and your printer's menu appears, set the print layout/orientation to "Landscape" in order to see the entirety of the search results.

To return to the top of the table of search results, click the "RETURN TO TOP OF RESULTS" link on the bottom of the page. Also, to perform a new search, click the "CHANGE SEARCH OPTIONS" link at the bottom of the screen to go back to the top of the page.

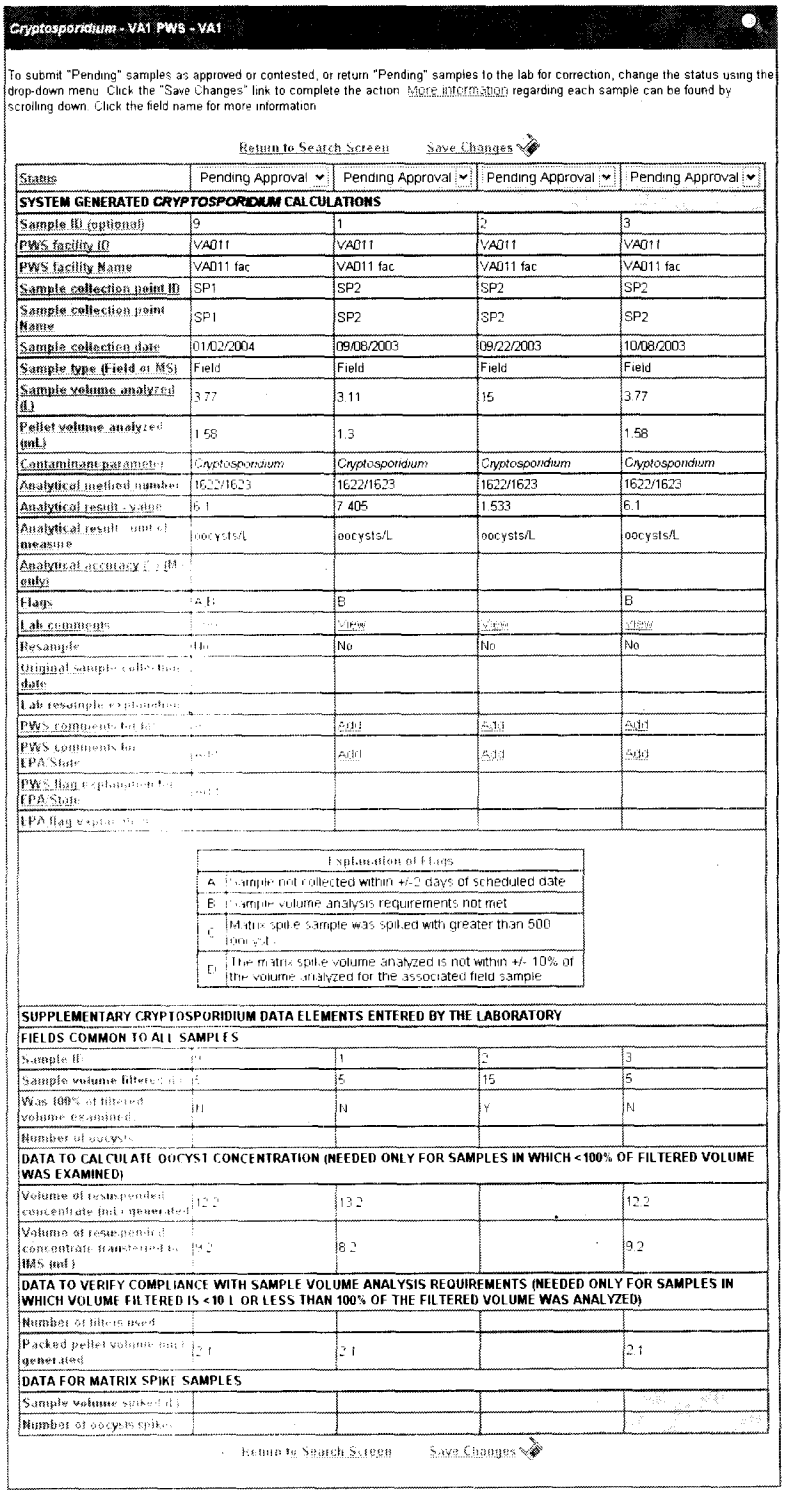
4.3 PWS *Cryptosporidium* Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows you to review *Cryptosporidium* sample results submitted by the laboratory. You may approve the results for submission to USEPA, contest the results for submission to USEPA as invalid, or return the results back to the laboratory for issue resolution. To do so, you can reach the *Cryptosporidium* review sample screen directly from the search screen. LT2 DCTS calculations are displayed at the top of the screen, with the raw data entered by the laboratory at the bottom. Figure 4-4 depicts the PWS *Cryptosporidium* Data Review Screen.

You may only review samples the laboratory has approved and submitted to the PWS. Up to four *Cryptosporidium* samples are displayed on this screen. Data for each sample are displayed in a different column. Sample results can only be viewed by the PWS; they cannot be edited in any way. However, if the sample is returned to the laboratory, the data can be edited by the laboratory if appropriate.

You can change the sample status by approving or contesting the sample, or you can choose to return the sample to the associated laboratory. The status of each sample is displayed at the top of each column, as displayed in Table 4-1.

The information displayed in the table at the top half of the data review page contains the final results for each sample, including sample identification information and the calculated concentration of *Cryptosporidium* in the sample. A description of each of these fields can be viewed by clicking on the field. For a written description refer to Section 3.3, *Cryptosporidium* Samples. The comments fields for the PWS User differ from those available to the Lab User. The "Lab Comments to PWS" field will not be displayed, instead a PWS User can view "Lab Comments" entered by a laboratory. A PWS User can add comments to the sample for laboratory or for USEPA/state viewing. This function works by clicking "ADD" for either "PWS Comments For Lab" or "PWS Comments for EPA/State" and entering the comments into the comments box that appears. After entering comments into the comments box, click "SAVE" to close the comment window and associate the comments with the sample. Note: the comments will not be saved until "SAVE CHANGES" is selected from the sample review screen. By clicking "CANCEL" in the comment box, the comment box will close, and any information entered will not be recorded to the sample.



Cryptosporidium - VA1 PWS - VA1

To submit "Pending" samples as approved or contested, or return "Pending" samples to the lab for correction, change the status using the drop-down menu. Click the "Save Changes" link to complete the action. More information regarding each sample can be found by scrolling down. Click the field name for more information.

Return to Search Screen Save Changes

Status	Pending Approval	Pending Approval	Pending Approval	Pending Approval
SYSTEM GENERATED *CRYPTOSPORIDIUM* CALCULATIONS				
Sample ID (optional)	9	1	2	3
PWS facility ID	VA011	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP1	SP2	SP2	SP2
Sample collection point Name	SP1	SP2	SP2	SP2
Sample collection date	01/02/2004	09/08/2003	09/22/2003	10/08/2003
Sample type (Field or MS)	Field	Field	Field	Field
Sample volume analyzed (L)	3.77	3.11	15	3.77
Pellet volume analyzed (mL)	1.58	1.3		1.58
Contaminant parameter	*Cryptosporidium*	*Cryptosporidium*	*Cryptosporidium*	*Cryptosporidium*
Analytical method number	1622/1623	1622/1623	1622/1623	1622/1623
Analytical result - value	6.1	7.405	1.533	6.1
Analytical result - unit of measure	oocysts/L	oocysts/L	oocysts/L	oocysts/L
Analytical accuracy (IS QA only)				
Flags	A B	B		B
Lab comments	---	View	View	View
Resample	No	No	No	No
Original sample collection date				
Lab resample explanation				
PWS comments for LT	---	Add	Add	Add
PWS comments for EPA State	---	Add	Add	Add
PWS flag explanation for EPA State	---			
EPA flag explanation				

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date
B	Sample volume analysis requirements not met
C	Matrix spike sample was spiked with greater than 500 oocysts
D	The matrix spike volume analyzed is not within +/- 10% of the volume analyzed for the associated field sample

SUPPLEMENTARY CRYPTOSPORIDIUM DATA ELEMENTS ENTERED BY THE LABORATORY				
FIELDS COMMON TO ALL SAMPLES				
Sample ID	9	1	2	3
Sample volume filtered (L)	15	15	15	15
Was 100% of filtered volume examined	N	N	Y	N
Number of oocysts				
DATA TO CALCULATE OOCYST CONCENTRATION (NEEDED ONLY FOR SAMPLES IN WHICH <100% OF FILTERED VOLUME WAS EXAMINED)				
Volume of resuspended concentrate (mL) generated	12.2	13.2		12.2
Volume of resuspended concentrate transferred to IMS (mL)	9.2	8.2		9.2
DATA TO VERIFY COMPLIANCE WITH SAMPLE VOLUME ANALYSIS REQUIREMENTS (NEEDED ONLY FOR SAMPLES IN WHICH VOLUME FILTERED IS <10 L OR LESS THAN 100% OF THE FILTERED VOLUME WAS ANALYZED)				
Number of filters used				
Packed pellet volume (mL) generated	2.1	2.1		2.1
DATA FOR MATRIX SPIKE SAMPLES				
Sample volume spiked (L)				
Number of oocysts spiked				

Return to Search Screen Save Changes

Figure 4-4. PWS Cryptosporidium Data Review Screen

The information displayed in the table at the bottom half of the data review page contains the raw data that were entered by the laboratory for the sample. These data are used by the LT2 DCTS to calculate final results, or verify compliance with LT2 monitoring requirements. These data may be helpful to you in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the fields. For a written description, refer to Section 3.3, *Cryptosporidium* Samples.

After you have verified that data reported by the laboratory are complete, have met method QC requirements, and that there are no remaining issues on the data, you can electronically approve the data and release it to USEPA by changing the status to "Approved." If the data are not adequate, or cannot be used for LT2 binning, it may be "Returned to Lab" or sent to the USEPA as "Contested", respectively. If a sample is "Returned to Lab" or sent to the USEPA as "Contested", a comment for the lab or the USEPA must be added to the sample before being sent to the receiving entity. If a sample was not collected within the valid sample collection window (+/- 2 days from a date on the sample schedule), flag A will display and comments must be entered in the "PWS flag explanation for EPA/State" field.

If flag B, C, or D are associated to the sample, it cannot be passed to USEPA or state for inclusion in the LT2 Bin. Instead, the sample must either remain at the PWS, or be marked as "Returned to Lab" for modification. Flags A and E do not automatically prohibit inclusion in the LT2 Bin and can be passed to USEPA and state for review. See Table 3-1 for a description of the flags. To change the status of a sample that is "Pending Approval", select the appropriate status in the drop-down menu in the "Status" row above the sample. After the appropriate status has been selected, click the "SAVE CHANGES" link.

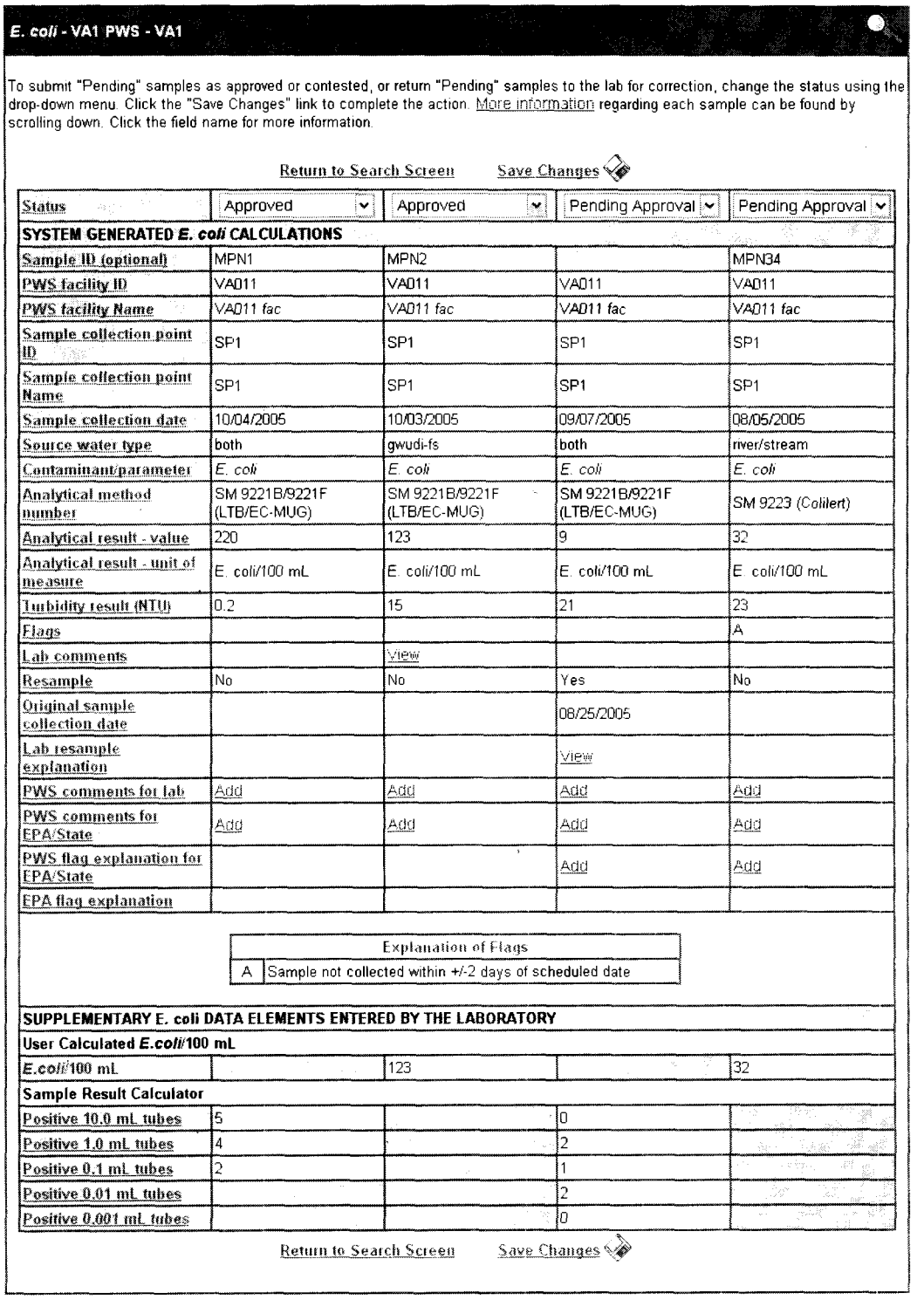
If a sample has already been approved, returned to the lab, contested, or not reviewed in time, its status cannot be changed.

Once a sample is reviewed, you will be directed to a confirmation screen indicating that: "The following *Cryptosporidium* sample was successfully submitted on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

4.4 PWS *E. coli* Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

The LT2 DCTS allows you to review *E. coli* sample results submitted by the laboratory. You may approve the results for submission to USEPA, contest the results for submission to USEPA as invalid, or return the results back to the laboratory for issue resolution. You can access the *E. coli* review sample screen directly from the search screen. LT2 DCTS calculations are displayed at the top of the screen, with the raw data entered by the laboratory at the bottom. Figures 4-5 through 4-8 depict the "PWS *E. coli* Data Review" screens.

You may only review samples the laboratory has approved and submitted to the PWS. Up to four *E. coli* samples are displayed on this screen. Data for each sample are displayed in a different column. Sample results can only be viewed by the PWS; they cannot be edited in any way. However, if the sample is returned to the laboratory, the data can be edited by the laboratory. For a detailed description of each type of sample status, review Section 4.3.



E. coli - VA1 PWS - VA1

To submit "Pending" samples as approved or contested, or return "Pending" samples to the lab for correction, change the status using the drop-down menu. Click the "Save Changes" link to complete the action. More information regarding each sample can be found by scrolling down. Click the field name for more information.

Return to Search Screen Save Changes

Status	Approved	Approved	Pending Approval	Pending Approval
SYSTEM GENERATED *E. coli* CALCULATIONS				
Sample ID (optional)	MPN1	MPN2		MPN34
PWS facility ID	VA011	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP1	SP1	SP1	SP1
Sample collection point Name	SP1	SP1	SP1	SP1
Sample collection date	10/04/2005	10/03/2005	09/07/2005	08/05/2005
Source water type	both	gwudi-fs	both	river/stream
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*	*E. coli*
Analytical method number	SM 9221B/9221F (LTB/EC-MUG)	SM 9221B/9221F (LTB/EC-MUG)	SM 9221B/9221F (LTB/EC-MUG)	SM 9223 (Colilert)
Analytical result - value	220	123	9	32
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	0.2	15	21	23
Flags				A
Lab comments		View		
Resample	No	No	Yes	No
Original sample collection date			08/25/2005	
Lab resample explanation			View	
PWS comments for lab	Add	Add	Add	Add
PWS comments for EPA/State	Add	Add	Add	Add
PWS flag explanation for EPA/State			Add	Add
EPA flag explanation				

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY				
User Calculated *E.coli*/100 mL				
E.coli/100 mL		123		32
Sample Result Calculator				
Positive 10.0 mL tubes	5		0	
Positive 1.0 mL tubes	4		2	
Positive 0.1 mL tubes	2		1	
Positive 0.01 mL tubes			2	
Positive 0.001 mL tubes			0	

Return to Search Screen Save Changes

Figure 4-5. PWS E. coli 15-tube MPN Method Data Review Screen

***E. coli* - VA1 PWS - VA1**

To submit "Pending" samples as approved or contested, or return "Pending" samples to the lab for correction, change the status using the drop-down menu. Click the "Save Changes" link to complete the action. More information regarding each sample can be found by scrolling down. Click the field name for more information.

Return to Search Screen Save Changes

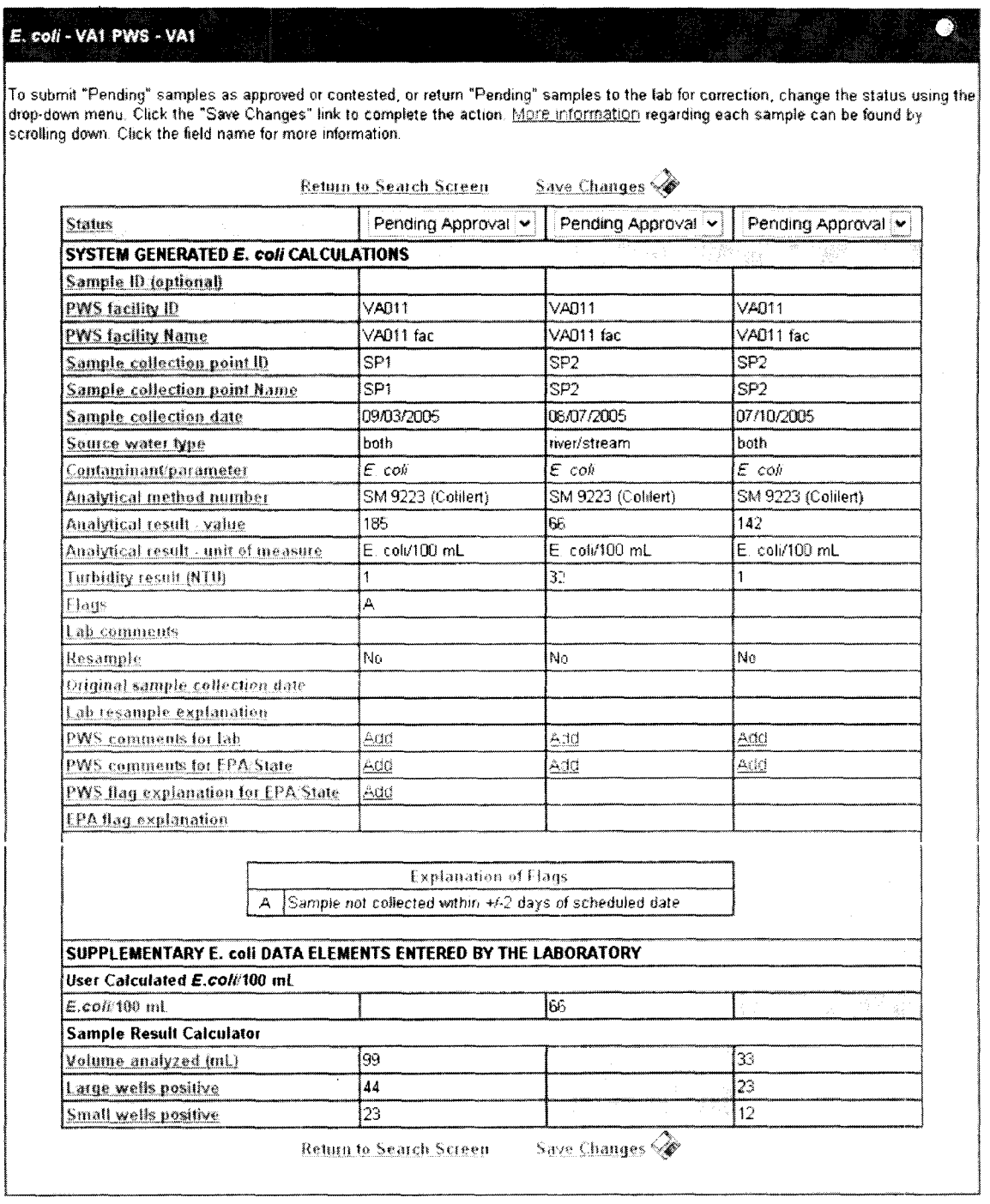
Status	Pending Approval	Pending Approval	Pending Approval
SYSTEM GENERATED *E. coli* CALCULATIONS			
Sample ID (optional)			
PWS facility ID	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP2	SP1	SP1
Sample collection point Name	SP2	SP1	SP1
Sample collection date	10/05/2005	10/05/2005	09/04/2005
Source water type	river/stream	both	gwudi-fs
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*
Analytical method number	SM 9223 (Colilert)	SM 9223 (Colilert)	SM 9223 (Colilert)
Analytical result - value	5	23	92
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	15	0.1	12
Flags			
Lab comments			
Resample	No	No	No
Original sample collection date			
Lab resample explanation			
PWS comments for lab	Add	Add	Add
PWS comments for EPA/State	Add	Add	Add
PWS flag explanation for EPA/State			
EPA flag explanation			

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY			
User Calculated *E.coli*/100 mL			
***E.coli*/100 mL**		23	
Sample Result Calculator			
Volume analyzed (mL)	68		55
Number of positive wells	3		32

Return to Search Screen Save Changes

Figure 4-6. PWS E. coli ONPG-MUG, 51-well Method Data Review Screen



E. coli - VA1 PWS - VA1

To submit "Pending" samples as approved or contested, or return "Pending" samples to the lab for correction, change the status using the drop-down menu. Click the "Save Changes" link to complete the action. More information regarding each sample can be found by scrolling down. Click the field name for more information.

Return to Search Screen Save Changes

Status	Pending Approval	Pending Approval	Pending Approval
SYSTEM GENERATED *E. coli* CALCULATIONS			
Sample ID (optional)			
PWS facility ID	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP1	SP2	SP2
Sample collection point Name	SP1	SP2	SP2
Sample collection date	09/03/2005	06/07/2005	07/10/2005
Source water type	both	river/stream	both
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*
Analytical method number	SM 9223 (Colilert)	SM 9223 (Colilert)	SM 9223 (Colilert)
Analytical result - value	185	66	142
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	1	32	1
Flags	A		
Lab comments			
Resample	No	No	No
Original sample collection date			
Lab resample explanation			
PWS comments for lab	Add	Add	Add
PWS comments for EPA State	Add	Add	Add
PWS flag explanation for EPA State	Add		
EPA flag explanation			

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY			
User Calculated *E.coli*/100 mL			
E.coli/100 mL		66	
Sample Result Calculator			
Volume analyzed (mL)	99		33
Large wells positive	44		23
Small wells positive	23		12

Return to Search Screen Save Changes

Figure 4-7. PWS E. coli ONPG-MUG, 97-well Method Data Review Screen

E. coli - VA1 PWS - VA1

To submit "Pending" samples as approved or contested, or return "Pending" samples to the lab for correction, change the status using the drop-down menu. Click the "Save Changes" link to complete the action. More information regarding each sample can be found by scrolling down. Click the field name for more information.

Return to Search Screen Save Changes

Status	Pending Approval	Pending Approval	Pending Approval
SYSTEM GENERATED *E. coli* CALCULATIONS			
Sample ID (optional)			MF3
PWS facility ID	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP2	SP2	SP1
Sample collection point Name	SP2	SP2	SP1
Sample collection date	09/06/2005	09/30/2005	07/05/2005
Source water type	gwudi-fs	both	river/stream
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*
Analytical method number	EPA 1603 (modified mTEC)	SM 9213D (mTEC)	EPA 1604 (MI Medium)
Analytical result - value	18	62	62
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	13	12	1
Flags		A	A
Lab comments			
Resample	No	No	No
Original sample collection date			
Lab resample explanation			
PWS comments for lab	Add	Add	Add
PWS comments for EPA/State	Add	Add	Add
PWS flag explanation for EPA/State		Add	Add
EPA flag explanation			

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY			
User Calculated *E.coli*/100 mL			
E.coli/100 mL			62
Sample Result Calculator			
Filter 1 volume (mL)	65	52	
CFU on Filter 1	3	32	
Filter 2 volume (mL)	32	34	
CFU on Filter 2	14	1	
Filter 3 volume (mL)			
CFU on Filter 3			
Filter 4 volume (mL)			
CFU on Filter 4			

Return to Search Screen Save Changes

Figure 4-8. PWS E. coli Membrane Filtration Method Data Review Screen

The information displayed in the table at the top half of the page contains the final results for each sample, including sample identification information and the calculated concentration of *E. coli* in the sample. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Sections 3.4 through 3.8 for a description of these fields. The comments fields for the PWS User differ from the Laboratory User. The "Lab Comments to PWS" field will not be displayed, instead a PWS User can view "Lab Comments" submitted by a laboratory. A PWS User can add comments to the sample for the laboratory or the USEPA/state to view. This function works by clicking "ADD" for either "PWS Comments for Lab" or "PWS Comments for EPA/State" and entering the comments into the comments box that appears. After entering comments into the comments box, click "SAVE" to save the comment to the sample. By clicking "CANCEL" in the comment box, the comment box will close, and any information entered will not be recorded to the sample.

The information displayed in the table at the bottom half of the page contains the raw data that was entered by the laboratory for the sample if the laboratory elected to use the LT2 DCTS to calculate results based on the primary data. These data may be helpful to you in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Sections 3.4 through 3.8 for a description of these fields.

After you have verified that data reported by the laboratory are complete, have met method QC requirements, and that there are no remaining issues for the data, you can electronically approve the data and release it to USEPA by changing the status to "Approved." If the data are not adequate, or cannot be used for LT2 binning, it may be "Returned to Lab" or sent to the USEPA as "Contested," respectively. If a sample is "Returned to Lab" or sent to the USEPA as "Contested", a comment for the laboratory or the USEPA must be added to the sample before being sent to the receiving entity. If a sample was not collected within the valid sample collection window (+/- 2 days from a date on the sample schedule; flag A will display), comments must be entered in the "PWS flag explanation for EPA/State" field.

To change the status of a sample that is "Pending Approval," select the appropriate status in the drop-down menu in the "Status" row above the sample. After the appropriate status has been selected, click the "SAVE CHANGES" link.

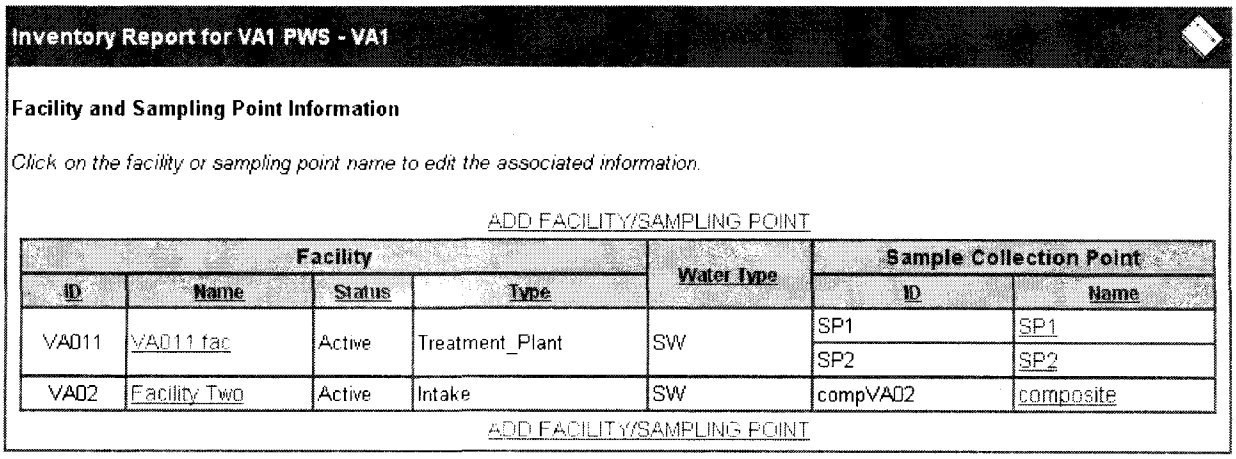
Note: If a sample has already been approved, returned to the lab, contested, or not reviewed in time, its status cannot be changed.

Once a sample is reviewed, you will be directed to a confirmation screen indicating that: "The following *E. coli* sample was successfully submitted on [date sent]." To navigate from this confirmation screen, use the main toolbar on the left.

4.5 PWS Facility Information

Information regarding the facility and sampling points for the PWS are detailed in a report generated by the LT2 DCTS. This function of the LT2 DCTS allows you to view, establish, or remove a relationship between your PWS, and its facilities and sampling points.

The "Facility Information" screen is accessed through the navigation toolbar's "Facility Information" button on the left side of the screen. Each facility's sampling points will be displayed alongside the corresponding facility. All data are organized in tabular format and can be sorted by clicking on the desired column heading. Figure 4-9 displays an example of the "Facility Information" screen.



Inventory Report for VA1 PWS - VA1

Facility and Sampling Point Information

Click on the facility or sampling point name to edit the associated information.

ADD FACILITY/SAMPLING POINT

Facility				Water Type	Sample Collection Point	
ID	Name	Status	Type		ID	Name
VA011	VA011 fac	Active	Treatment_Plant	SW	SP1	SP1
					SP2	SP2
VA02	Facility Two	Active	Intake	SW	compVA02	composite

ADD FACILITY/SAMPLING POINT

Figure 4-9. PWS Facility Information

Up to 10 facilities can be viewed at one time. If more than 10 facilities exist for this PWS, navigational buttons will be displayed to permit the user to click through the other data. There are buttons to move to the next set of 10 facilities (>), the last set of 10 facilities (>|), the previous set of 10 facilities (<), and the first set of 10 facilities (|<).

To edit information for a facility or sample collection point, click on the facility name or sample collection point name. To add a new facility or sample collection point for your PWS, click the "ADD FACILITY/SAMPLING POINT" link. To edit a previously entered facility, click the facility name. The "Add/Edit Facility/Sample Collection Point" screen of the LT2 DCTS is where the user can associate a facility and sample collection point to their particular PWS. You will either edit information for existing facilities and sample collection points, or enter information for new ones. Figure 4-10 displays an example of the "Add/Edit Facility/Sample Collection Point" screen.

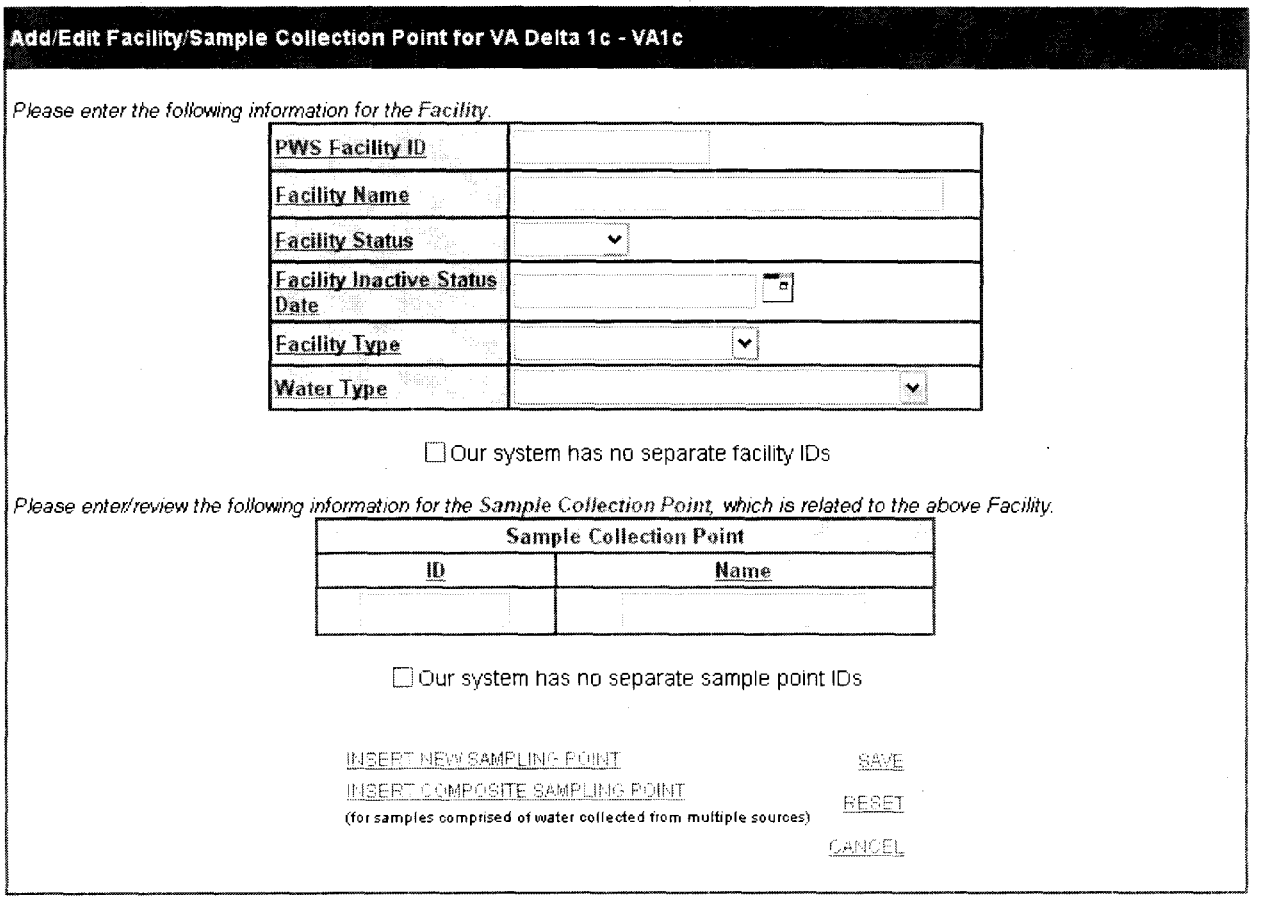


Figure 4-10. PWS Add/Edit Facility/Sample Collection Point Screen

To create a new, discrete sampling point for an existing facility (which designates a single sampling location, rather than a composite of sample volume from multiple sampling locations), click the "INSERT NEW SAMPLING POINT" link at the bottom of the screen and enter values for all fields.

To create a new, composite sampling point (which represents the combined volume of samples collected at multiple sampling locations), click the "INSERT COMPOSITE SAMPLING POINT" link at the bottom of the screen. The sampling point name and ID will be automatically generated, with values of composite and "comp" + "facility ID," respectively. Only one composite sampling point can be entered for each facility.

To save the new or changed facility or sampling point information, click the "SAVE" link. If you make data entry errors, and would like to delete all information from the form and start over, click the "RESET" link. To return to the inventory list without saving changes, click the "CANCEL" link.

If your PWS does not have separate facility IDs, mark the "Our system has no separate facility IDs" and click save. A default facility will be saved with a facility code of TP, facility name of Treatment Plant, sampling point code of SP, and sampling point name of Sampling Point.

If your PWS has separate facility IDs, but does not have a separate sample point ID, then enter the facility information and mark the "Our system has no separate sample point IDs" check box before clicking save.

The facility information you entered will be saved, along with default information for the sample collection point (SP, Sample Point).

WARNING: Once a facility and its sampling points are saved to the LT2 DCTS, the facility and sampling point IDs and names cannot be deleted. If you wish to change this information, you must either contact USEPA or you set the facility to an inactive status, and create a new active facility with the correct information. You can set a facility to inactive by selecting "Inactive" from the facility status drop-down menu, and entering the date that the facility became (or will become) inactive. The facility inactive status date must be after the last sample collection date listed in the LT2 DCTS for this facility.

4.6 PWS Sampling Schedule

The LT2 DCTS allows you to assign the dates that samples will be collected throughout the monitoring program. The sample date module is accessed through the navigation toolbar through the "SAMPLE DATES" link. After you specify a particular facility, the page will refresh to display the list of sample dates you have currently defined, (if sample date data has already been entered). Figure 4.11 displays an example of the "PWS Sampling Date Maintenance" screen.

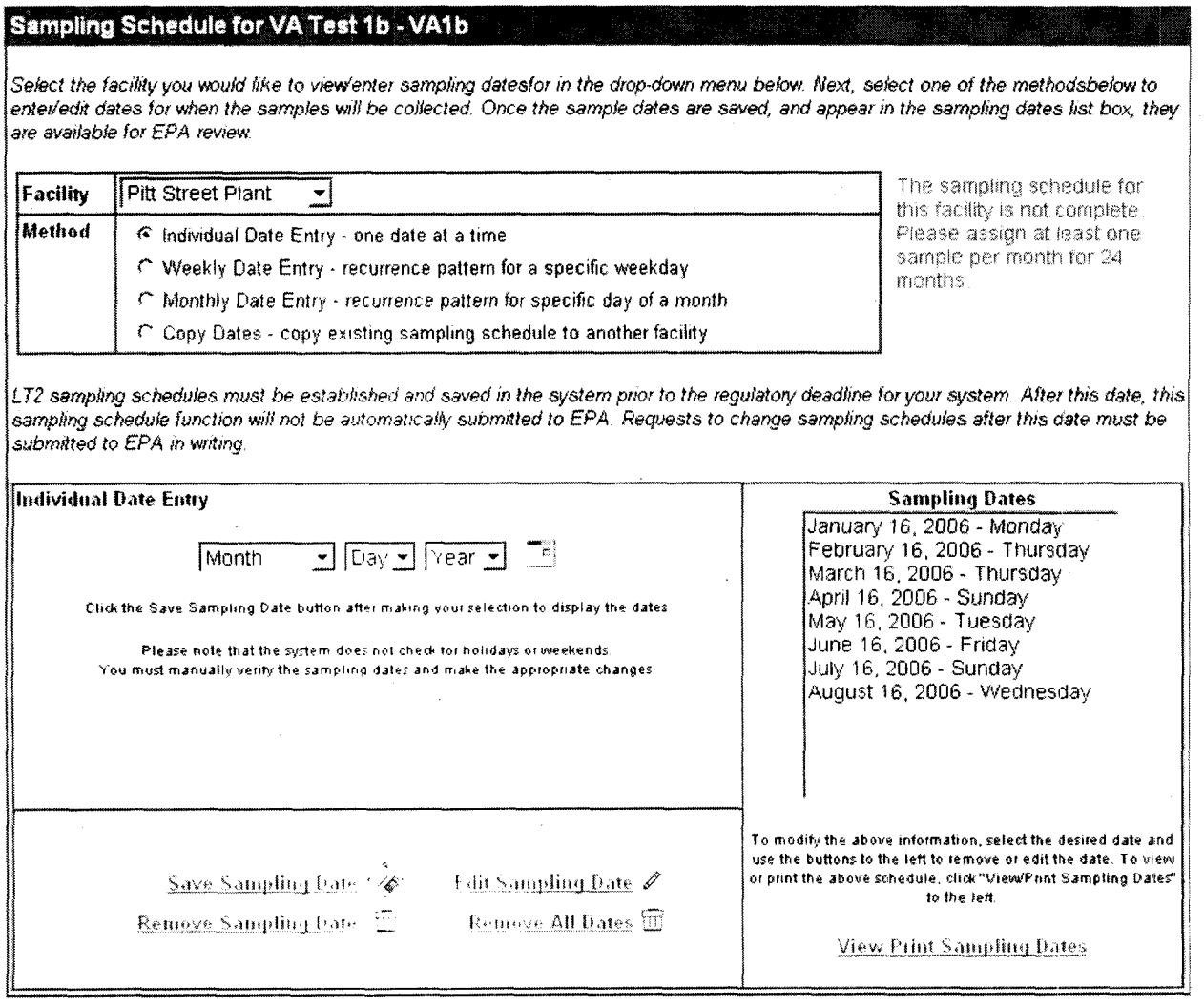


Figure 4-11. PWS Sampling Date Maintenance Screen

You have the ability to add or remove dates from the current list. Dates can be added through four methods: selecting individual dates, directing the LT2 DCTS to pick dates based on a "weekly recurrence pattern," directing the LT2 DCTS to pick dates based on a "monthly recurrence pattern," or by copying the schedule from one facility to another.

To set a sampling schedule, begin at the top of the screen by selecting the facility for which you are establishing the schedule. Then, determine which method (individual date entry, weekly date entry, monthly date entry, or copying another facility schedule) you will use to establish the schedule. Note: the weekly and monthly date entry selection may produce sample collection dates on weekends or holidays, and will need to be edited before it is finalized. You must pick at least one sample date per calendar month for the 24 month period in which you will be monitoring.

If you use the Individual Date Entry method, select individual dates using the drop-down menus for month, day, and year, and click "SAVE DATE" after each one. After each save, the date will appear in the window at the right. Review the resulting sampling date schedule that appears in the window at the right.

To change any dates that occur on weekends or holidays, select the date in the right window and click the "EDIT DATE" link to the left. You can also delete sampling dates by highlighting the desired dates (use CTRL or SHIFT to select multiple dates) and clicking the "REMOVE SAMPLING DATE" link. Or, click the "REMOVE ALL DATES" link to remove all dates.

If you use the Weekly or Monthly Date entry, enter the day, week, and/or month frequency of the schedule you would like to establish and the start and end dates of the monitoring period. Click "SAVE DATE" after you have made the desired selections. If you plan on collecting more than one sample per month, establish two sampling points - one for the first sampling date each month and another for the second sampling date each month. Review the resulting sampling date schedule that appears in the window at the right. To change any dates that occur on weekends or holidays, select the date in the window and click the "EDIT DATE" link to the left.

If you choose to apply a schedule from another facility, select the facility for which you have already established a schedule at the top of the screen. Then, select the "Copy Dates to" window at the bottom by selecting the radio button at the left of the table row. Select the facility and click the "SAVE" link to apply the same sampling dates. The new sampling dates will be added to the facility's existing schedule (they will not replace the existing schedule).

Note: Your sampling schedule is not final, and can be changed up to three months prior to the beginning of the LT2 monitoring period that pertains to your facility (see Table 4-2 below). At this point, the LT2 DCTS will submit the current version of the schedule you have established to USEPA. Make sure that your schedule is correct, has been reviewed by all required PWS staff, and has been confirmed with your *Cryptosporidium* and *E. coli* laboratory well before this time period. The sampling schedule must include at least one sample per month for 24 months. No changes can be made to the schedule without USEPA approval after it has been submitted. Beyond this date, all functionality will be removed and this component will only serve as reference information in a view only mode. If any changes are desired, you must contact USEPA.

After you have established your schedule, you may print the schedule by clicking the "PRINT SCHEDULE" link on the bottom right of the page. Figure 4-12 displays an example of the "Print Schedule" screen.

This screen allows you to view and print the sampling schedule established through the LT2 DCTS. After this screen generates, your printer window will pop-up to allow you to print.

Note: The recurrence pattern selection may produce sample collection dates on weekends or holidays, and will need to be edited before it is finalized.

Table 4-2. Sample Schedule Submission Deadline

SCHEDULE	SUBMISSION DEADLINE
1	7/1/2006
2	1/1/2007
3	1/1/2008
4 (*E. coli* monitoring)	7/1/2008
4 (*Cryptosporidium* monitoring)	1/1/2010

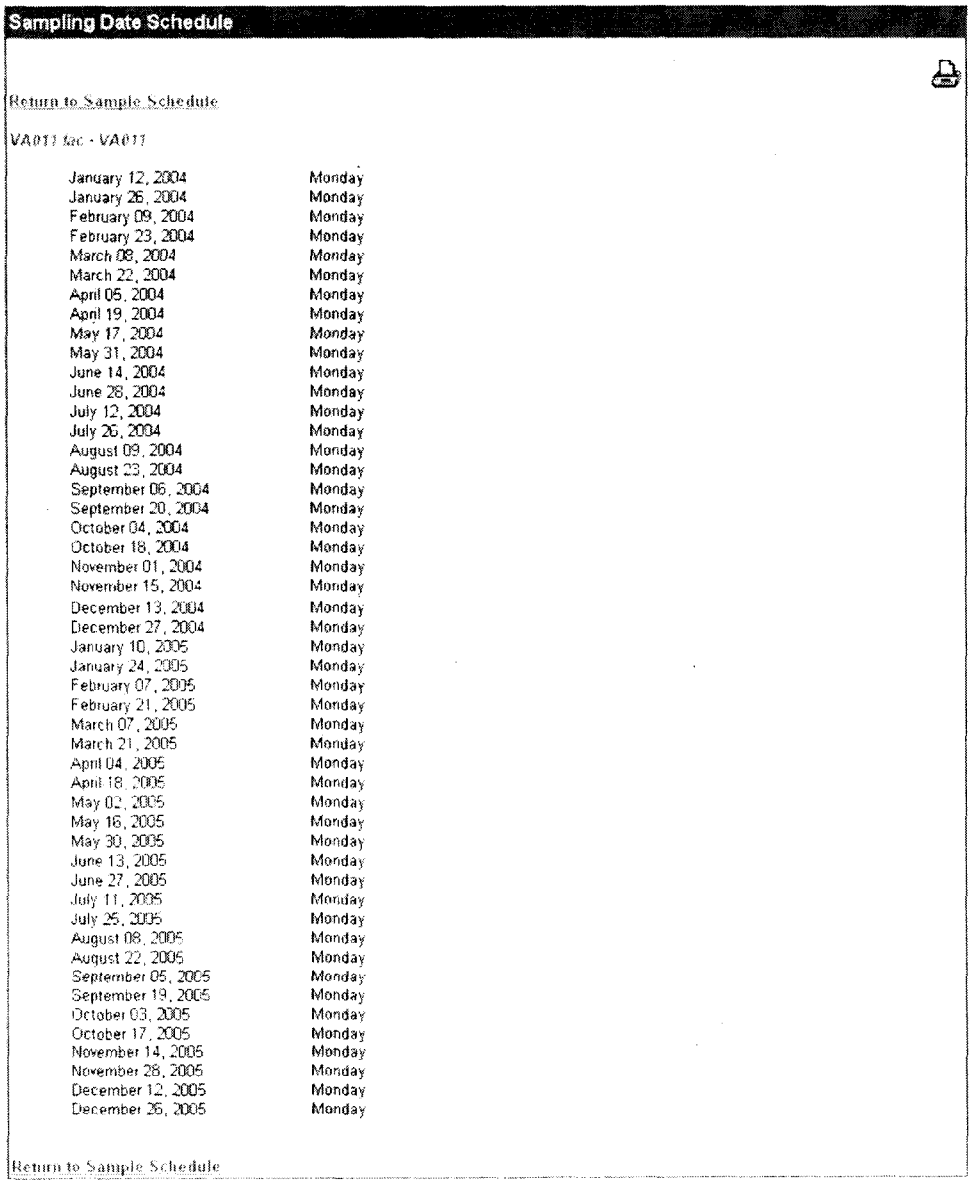
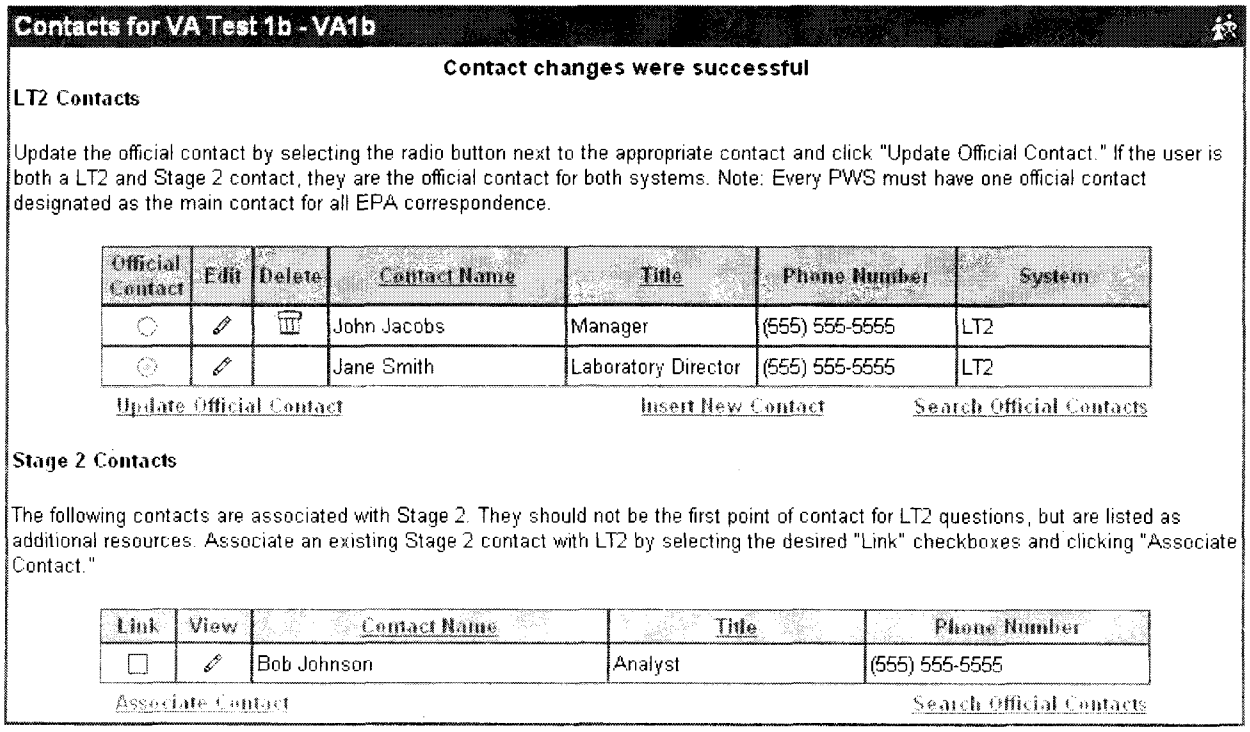


Figure 4-12. PWS Print Sampling Schedule Screen

4.7 PWS Contact List

The LT2 DCTS allows you to view the list of contacts for your PWS and your contract laboratories currently entered into the LT2 DCTS, select the Official Contact for the PWS, and update the contact list, as necessary. You are able to enter a new contact, delete contacts, or edit the existing contact information for your organization. New contacts entered into the LT2 DCTS will automatically be associated with the current PWS and will be visible only to users with permission to access data from this PWS including the USEPA and your contracting laboratories. PWS Users can also view contacts for their

supporting laboratories. Note: PWS Users do not have the ability to modify the laboratory contacts. Figure 4-13 displays an example of the "LT2 DCTS PWS Contact List."



Contacts for VA Test 1b - VA1b

Contact changes were successful

LT2 Contacts

Update the official contact by selecting the radio button next to the appropriate contact and click "Update Official Contact." If the user is both a LT2 and Stage 2 contact, they are the official contact for both systems. Note: Every PWS must have one official contact designated as the main contact for all EPA correspondence.

Official Contact	Edit	Delete	Contact Name	Title	Phone Number	System
○	✎	🗑	John Jacobs	Manager	(555) 555-5555	LT2
○	✎		Jane Smith	Laboratory Director	(555) 555-5555	LT2

Update Official Contact Insert New Contact Search Official Contacts

Stage 2 Contacts

The following contacts are associated with Stage 2. They should not be the first point of contact for LT2 questions, but are listed as additional resources. Associate an existing Stage 2 contact with LT2 by selecting the desired "Link" checkboxes and clicking "Associate Contact."

Link	View	Contact Name	Title	Phone Number
☐	✎	Bob Johnson	Analyst	(555) 555-5555

Associate Contact Search Official Contacts

Figure 4-13. PWS Contact List

When viewing PWS contacts, both the LT2 and Stage 2 contacts for the organization will be displayed. The Stage 2 contacts should not be your first point of contact for LT2. They are listed as an additional resource if the LT2 contact is not available. To associate a pre-existing Stage 2 contact with LT2, select the corresponding check box from the link column, and click the "ASSOCIATE CONTACT" link.

Every PWS must have an Official Contact identified in the LT2 DCTS. The Official Contact should be the person from your PWS that USEPA should contact regarding LT2 issues. The first contact entered into the LT2 DCTS will automatically be selected as the Official Contact. After an Official Contact is assigned, that user cannot be deleted until a new Official Contact has been designated. Select the Official Contact for your PWS by clicking the appropriate radio button under the "Official Contact" column in the contacts table and clicking the "UPDATE OFFICIAL CONTACT" link.

To delete a contact for your PWS, click the trash can icon next to the contact name in the "Delete" column of the contacts table. The contact will be removed from the LT2 list of contacts. If the contact was listed as both a Stage 2 and LT2 contact, the contact will remain on the Stage 2 list.

LT2 DCTS also allows you to update and add new contact information. To edit information for a contact, click the pencil icon next to the contact name in the "Edit" column of the contacts table. To add a new contact for your PWS, click the "INSERT NEW CONTACT" link. Figure 4-14 displays the screen for updating and adding new contact information.

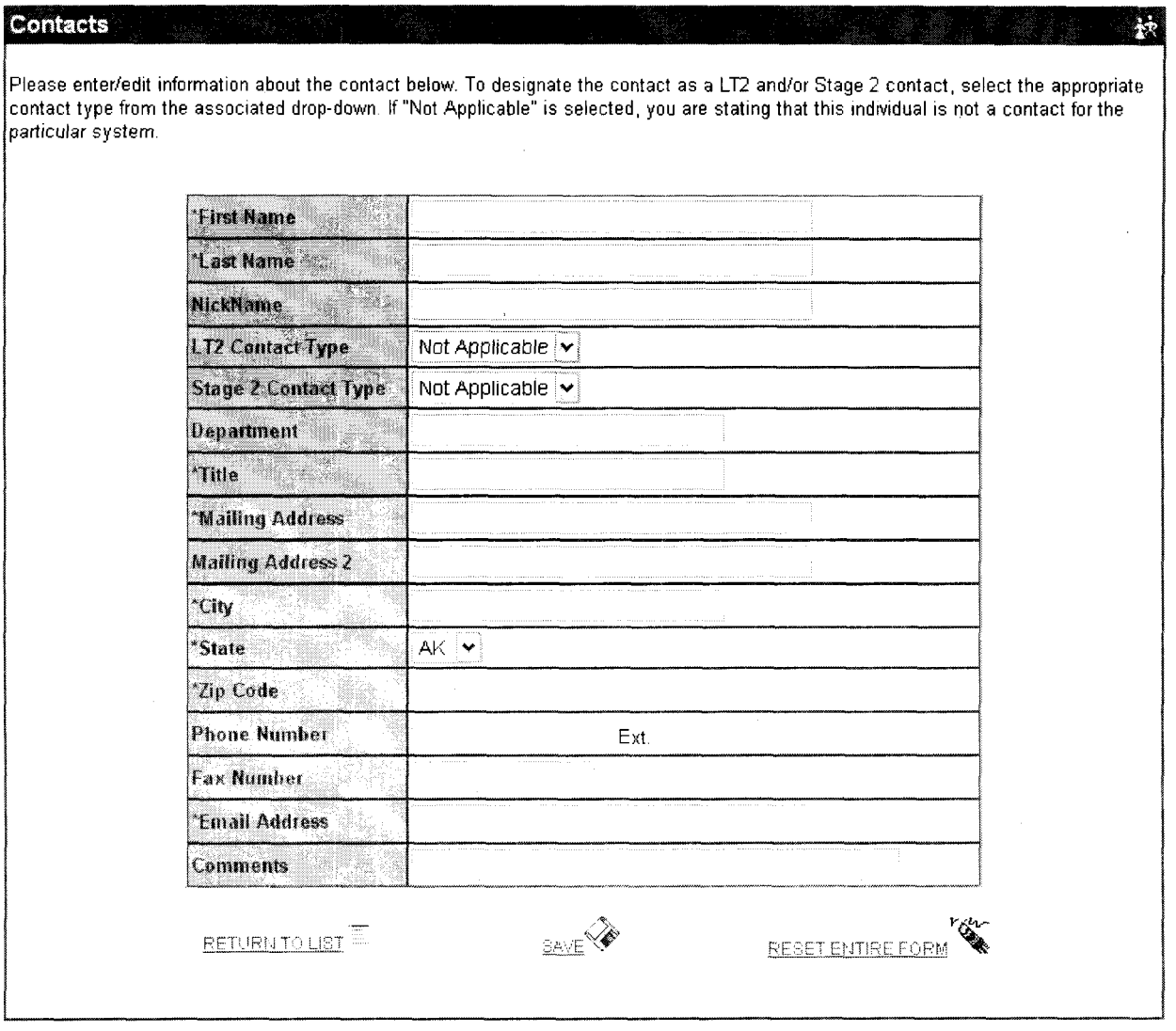


Figure 4-14. PWS Contact Form

If you are editing contact information, the contact form will be auto-populated with the current information stored in the database. You may simply update the field you would like to correct and click the "SAVE" link at the bottom of the screen.

If you are entering a new contact, you must enter values for all required fields marked with an asterisk. You must designate the contact as either a LT2 or Stage 2 contact (or both) by selecting from the appropriate dropdown menu. You may enter values for optional fields as appropriate. When completed click the "SAVE" link at the bottom of the screen.

You may exit the form using the following three methods:

- To return to the PWS contact list without saving, click the "return to list" link.
- To save the contact information, click the "SAVE" link.
- If you make data entry errors, and would like to delete all information from the form and start over, click the "RETURN TO LIST" link.

4.8 Grandfathering and Bin Status Tracking

The Grandfathering and Bin Status Tracking module provides PWS Users with the ability to track the status of their PWS facilities in the LT2 DCTS. Figure 4-15 displays the "GF Data and Sampling Plan" screen.

GF Data & Sampling Plan

Please select a Facility and click VIEW

Facility	in - Intake	VIEW

Currently viewing : Intake - In

1. PWS intends to submit grandfathered data

a. Notice of Intent to Grandfather submitted ☐

View Intent to Grandfather Form

b. Date EPA received Intent to Grandfather Form (mm/dd/yyyy) — This field cannot be edited by a PWS.

c. Number of grandfathered samples to be submitted

d. *Date range grandfathered samples* to be submitted(mm/dd/yyyy) Start: End:

e. PWS intends to submit additional samples ☐

Edit/View Sample Schedule — After viewing the schedule, please click on the back button of your browser to return to this page and retain the information you have entered.

f. *Number of additional samples to* be submitted

g. Upload grandfather data — This function is locked until an "Intent to Grandfather" form is received. Once EPA receives the form, you may upload your data

*Note: All grandfathered data must be submitted to EPA (via email or mail) either in MS Excel spreadsheet (.xls) or text file (.txt) format. Do not submit files in the .xml file format that is used in the lab sample upload module

Sending hardcopy grandfather data by mail ☐

2. EPA receipt of sample location plan — Not Received

a. Upload sample location plan — Browse... Please ensure the PWS ID and facility name are in the files you upload.

b. *Sending sample location* plan/schematic by mail ☐

3. EPA review of sample schedule — Not Received

4. PWS intends to waive monitoring and proceed to BIN 4 classification ☐

a. Date EPA received Intent to Waive Monitoring (mm/dd/yyyy) — This field cannot be edited by a PWS.

5. PWS has uncovered finished reservoirs — Yes

a. *Uncovered finished reservoirs* — Add a Reservoir...

Uncovered Finished Reservoir Name	Plan of Action	
South Reservoir	Cover	-

Note: Stage 1 Data (i.e. TTHM and HAA5 data) will not be dynamically loaded into this system. This data will be uploaded in a format that is outlined in guidance and on the attachment page of the IDSE Tool. Stage 1 compliance monitoring data should continue to be transferred to the Agency through SDWIS or another State database or through the normal mechanism that States employ.

If sending a hard copy by mail, please send it in the appropriate format (per note below) to IPMC at P.O. Box 98, Dayton, OH, 45401 or email the information to your state representative. The following items must be submitted as either a MS Word (.doc) or PDF file.

- Sample location plan/schematic
- A Notice of Intent to Provide Maximum Treatment (submit you intend to waive monitoring and proceed to BIN 4 classification)
- A plan of action for uncovered finished reservoirs (must be submitted to EPA within three years of rule promulgation)

SAVE

Figure 4-15. Grandfathering Data and Sampling Plan

Clicking the "Submit GF & Sampling Plan" link on the left toolbar will display the Grandfathering and Sample Location Tracking module. Choose the desired facility and click on the "VIEW" link to see the status of the facility.

The information is organized as follows:

- PWS intends to submit grandfathered data.
- USEPA receipt of sample location.
- USEPA review of sample schedule.
- PWS intends to waive monitoring and proceed to Bin Classification.

Note that as a PWS user, all sections are available for your review, but only the first two items are available for your modifications.

If your system intends to submit grandfathered data, provide answers to the "PWS intends to submit grandfathered data" section. You must submit the grandfathered samples prior to the compliance deadline listed in Table 4-3. You can either upload the data, email the data to your state representative, or mail a hard copy to Information Processing and Management Center (IPMC) at P.O. Box 98, Dayton, OH, 45401. You will not be able to review the sample data using the LT2 DCTS.

Table 4-3. Grandfathered Data Compliance Deadline

SCHEDULE	COMPLIANCE DEADLINE
1	12/1/2006
2	6/1/2007
3	6/1/2008
4	12/1/2008

If your system is submitting samples in addition to the grandfathered samples, be sure to enter the sample schedule, by either using the "SAMPLE DATES" link on the toolbar, or the "EDIT/VIEW SAMPLE SCHEDULE" within the first section.

Your system is also required to submit a sample location plan. It must be submitted prior to the compliance deadlines listed in Table 4-4. Like the grandfathered data, you can either upload the sample location plan, email it to your state representative, or mail a hard copy to IPMC at P.O. Box 98, Dayton, OH, 45401

Table 4-4. Sample Location Plan Compliance Deadline

SCHEDULE	SUBMISSION DEADLINE
1	7/1/2006
2	1/1/2007
3	1/1/2008
4 (*E. coli* monitoring)	7/1/2008
4 (*Cryptosporidium* monitoring)	1/1/2010

If your system intends to waive monitoring and proceed to BIN 4 classification, you must submit a Notice of Intent to Provide Maximum Treatment. Your system will not be approved until the proper documentation is received by IPMC. Please mail the appropriate notice to IPMC, P.O. Box 98, Dayton, OH 45401.

Section 5. EPA and State Users

This section provides screen-specific instructions for EPA and State Users. The basic EPA and State User capabilities are similar and displayed in Figures 5-1 and 5-2.

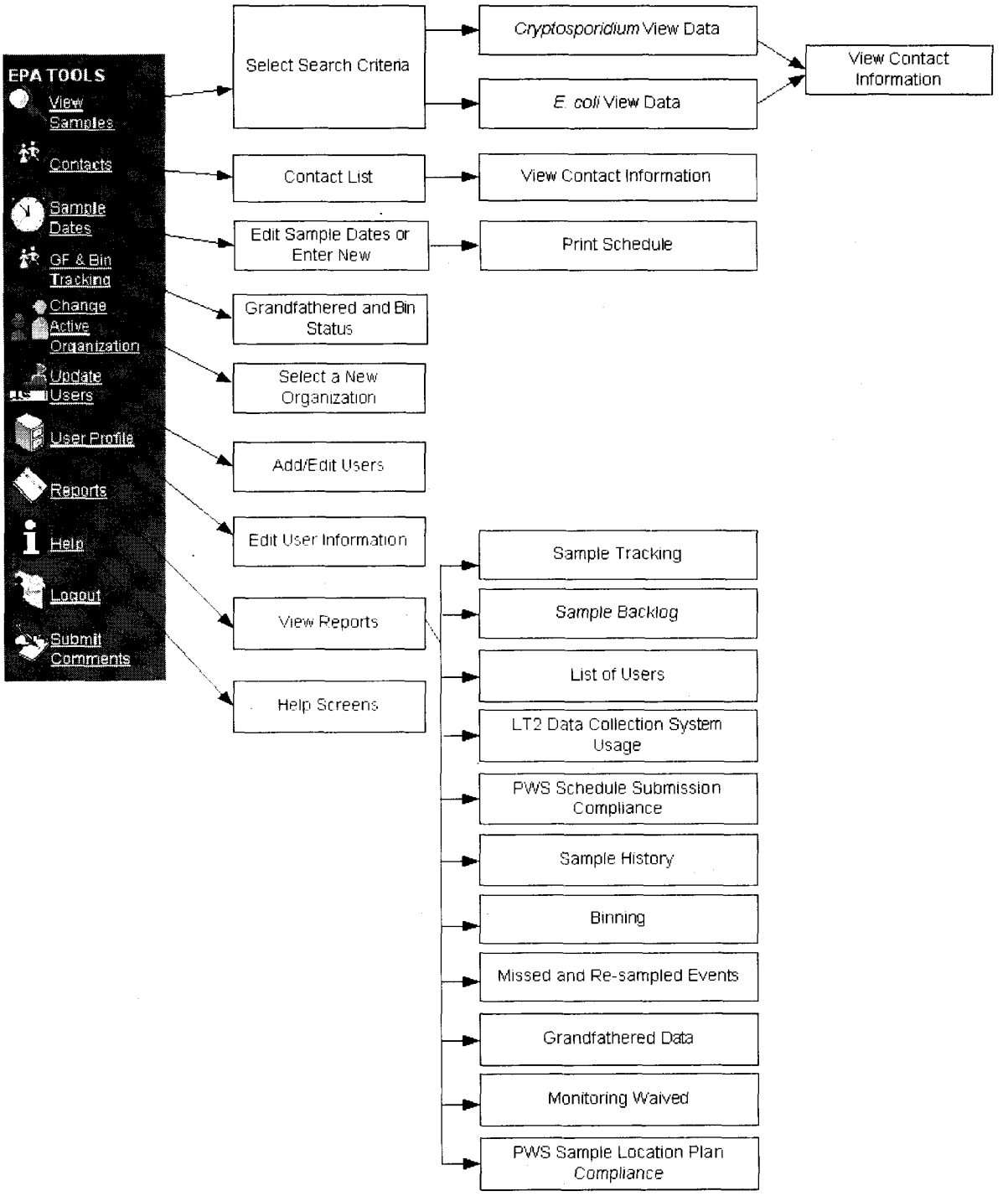


Figure 5-1. LT2 DCTS EPA User Basic Work Flow

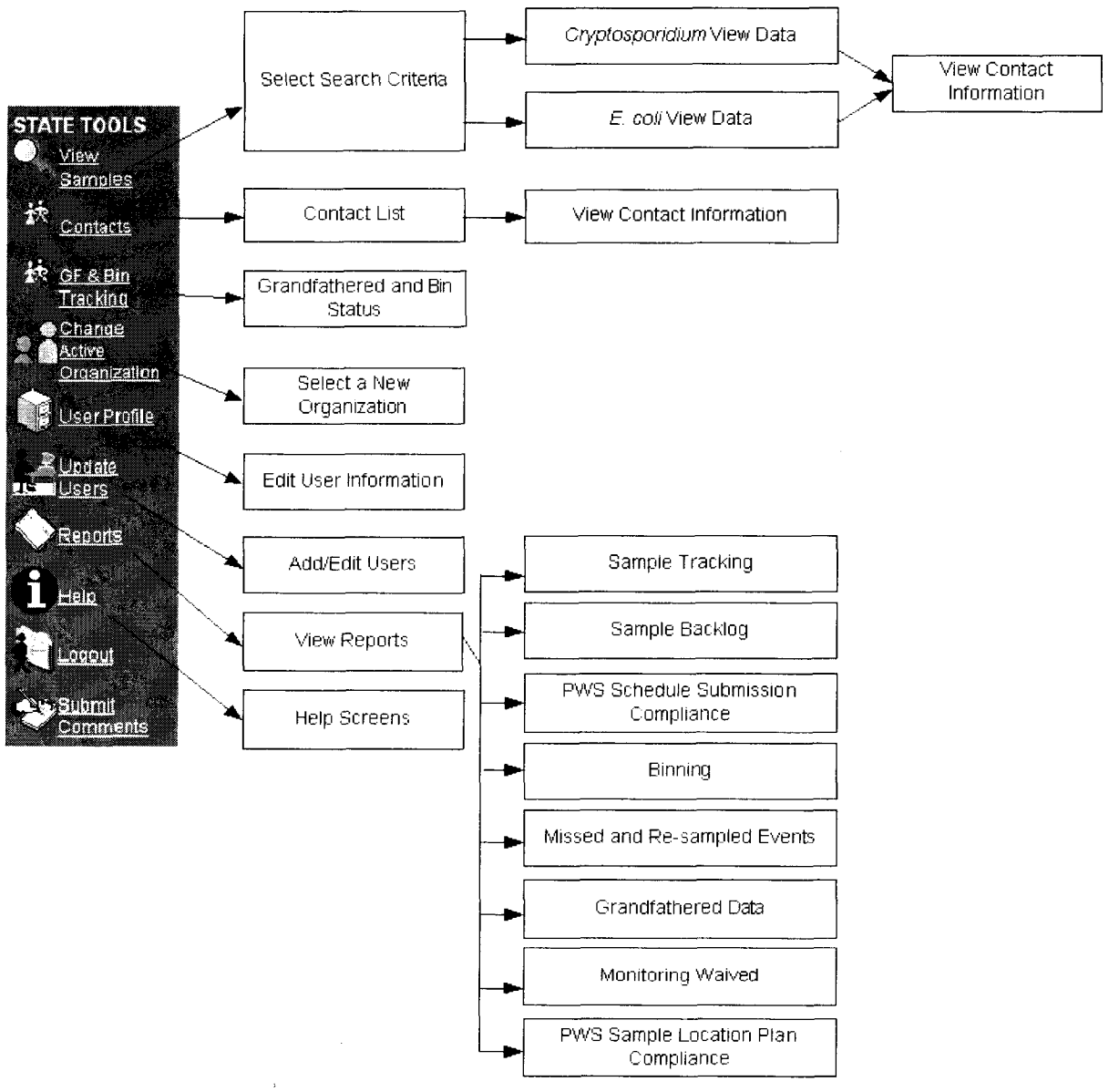


Figure 5-2. LT2 DCTS State User Basic Work Flow

All EPA and State functions described in this section are initiated by logging into the LT2 DCTS Home Page, available on the Web at http://www.epa.gov/safewater/lt2. When you login to the LT2 DCTS as a State or EPA User, the LT2 DCTS will advance directly to the "View Samples and Search" screen.

5.1 View Samples and Search - This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

The LT2 DCTS allows you to search for *Cryptosporidium* or *E. coli* samples submitted to USEPA by PWSs (State Users can only view sample results from PWSs in their state). The search screen serves as an access point to view the existing sample data. You can gain access to any data that has been approved or contested by the PWS. You can establish search specifications for *Cryptosporidium* or *E. coli* data, PWS Inventory Data, Lab, Status, PWS Review Date, and Sample Collection Date. Figure 5-3 displays an example of the search screen.

From the search screen, you can access any data that has been previously approved by the PWS User. To search for a sample, select either *Cryptosporidium* or *E. coli* at the top of the table by clicking the appropriate radio button. If *E. coli* is selected, choose the appropriate method type from the drop-down menu to the right of "*E. coli*," or select "All Methods" to view all *E. coli* methods. Next, select one or more of the search specifications displayed in the table which follows by entering the criterion in the text box or picking the desired value from the drop-down menu to the right. The corresponding check box will automatically be selected. Click the check box to remove this item from your list of search criterion.

After you have selected the analyte and search specifications, click the "SEARCH SAMPLES" link to display the search results. A listing of relevant samples will appear at the bottom of the screen with text indicating the number of samples that matched your search specifications. Up to 10 samples will be displayed at one time. If more than 10 samples match the search specifications, navigational buttons will be displayed to permit the user to click through the rest of the data. There are buttons to move to the next set of 10 samples (>), the last set of 10 samples (>|), the previous set of 10 samples (<), and the first set of 10 samples (|<). If you chose to search for all *E. coli* methods, the method that was used for the sample will be color coded in the search results:

Yellow: 15-tube MPN

Purple: Membrane Filtration

Grey: ONPG-MUG, 51-well

Pink: ONPG-MUG, 97-well

If you would like to modify your search, return to the top of the screen, modify the search information and click the "SEARCH SAMPLES" link again.

Search results are organized in the table by five categories:

Approved - Samples that have been approved by a PWS for submission to USEPA.

Contested - Samples that have been submitted by a PWS to USEPA not as approved samples, but as sample results that were generated, but that the PWS contends are not valid for LT2 binning.

EPA Approved - Flagged samples that have been approved by a PWS and further approved by USEPA and state.

EPA Invalidated - Flagged samples that were approved by a PWS, but rejected by USEPA and state.

Not Reviewed - Samples that have not been reviewed by a PWS within the designated time period (no later than 10 days after then end of the first month following the month in which the sample is collected) are automatically forwarded to USEPA/state. Flagged samples are excluded from this process and will remain at the PWS.

Under each status, the data are sorted by default according to "PWS Review Date." You may also sort the data by clicking on the column headings including Sample ID, Lab, PWS ID, PWS Facility ID, Sample Collection Point, and Sample Collection Date.

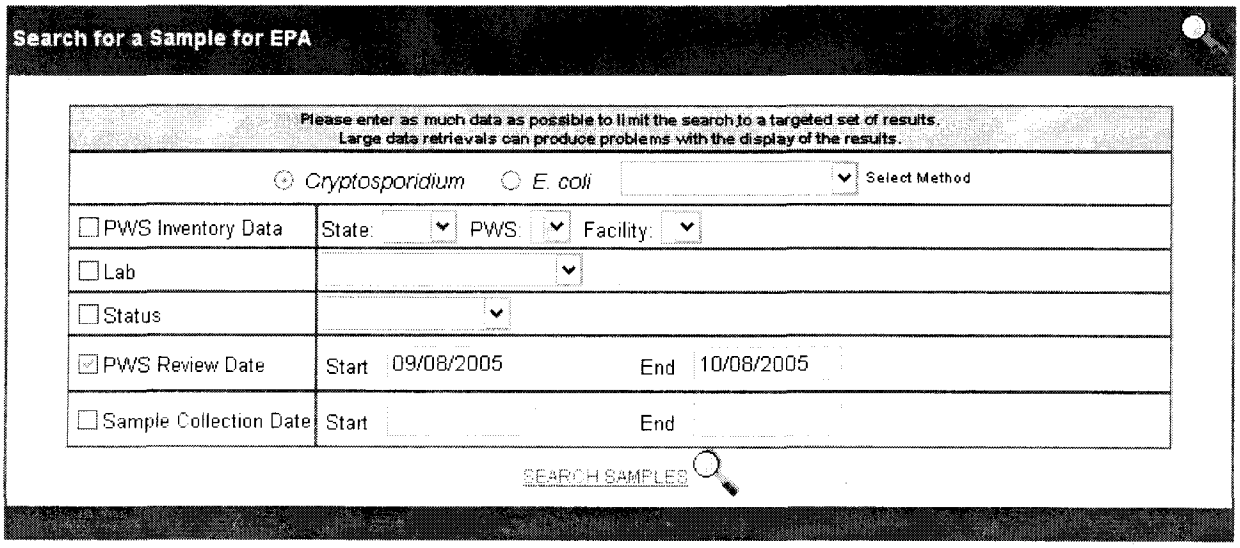


Figure 5-3. State or EPA Search

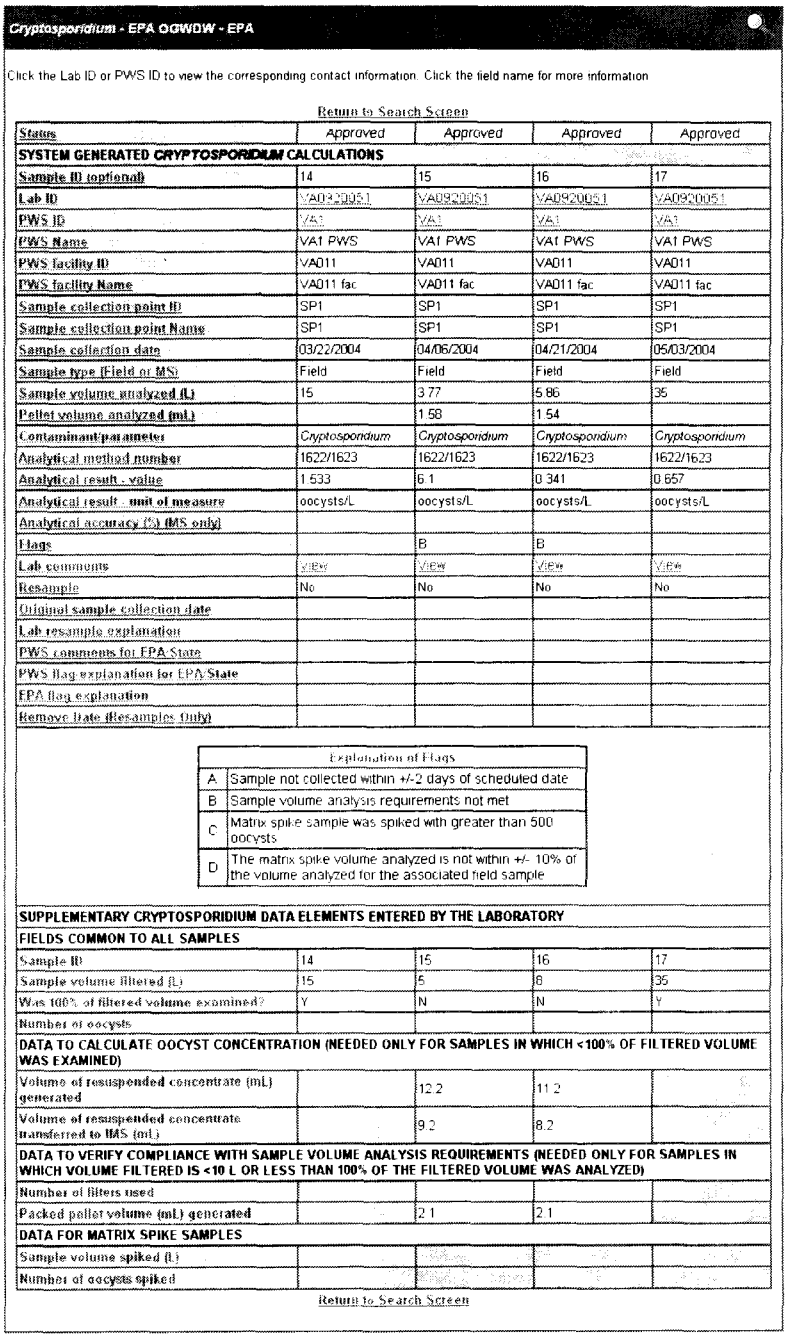
You can view up to four samples of the same analyte and method at a time by clicking the boxes to the left of the samples, then clicking on the "REVIEW SAMPLES" link. If multiple *E. coli* samples are selected, they must all be of the same method type. You may also print the search results using the "PRINT SEARCH RESULTS." Once the "PRINT SEARCH RESULTS" link is clicked, and your printer's menu appears, set the print layout/orientation to "Landscape" in order to see the entirety of the search results.

To return to the first record in your search, click the "RETURN TO TOP OF RESULTS" link on the bottom of the screen. To perform a new search, click the "CHANGE SEARCH OPTIONS" link at the bottom of the screen to go back to the top of the page.

Note: State Users can access data only from PWSs in their state.

5.2 EPA and State *Cryptosporidium* Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

You can reach the *Cryptosporidium* review sample screen directly from the search screen. Figure 5-4 displays the "LT2 DCTS *Cryptosporidium* Sample Results" screen.



Cryptosporidium - EPA OGWDW - EPA

Click the Lab ID or PWS ID to view the corresponding contact information. Click the field name for more information

Return to Search Screen

Status	Approved	Approved	Approved	Approved
SYSTEM GENERATED *CRYPTOSPORIDIUM* CALCULATIONS				
Sample ID (optional)	14	15	16	17
Lab ID	VA0920051	VA0920051	VA0920051	VA0920051
PWS ID	VA1	VA1	VA1	VA1
PWS Name	VA1 PWS	VA1 PWS	VA1 PWS	VA1 PWS
PWS facility ID	VA011	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP1	SP1	SP1	SP1
Sample collection point Name	SP1	SP1	SP1	SP1
Sample collection date	03/22/2004	04/06/2004	04/21/2004	05/03/2004
Sample type (Field or MS)	Field	Field	Field	Field
Sample volume analyzed (L)	15	3.77	5.86	35
Pellet volume analyzed (mL)		1.58	1.54	
Contaminant/parameter	*Cryptosporidium*	*Cryptosporidium*	*Cryptosporidium*	*Cryptosporidium*
Analytical method number	1622/1623	1622/1623	1622/1623	1622/1623
Analytical result - value	1.533	6.1	0.341	0.657
Analytical result - unit of measure	oocysts/L	oocysts/L	oocysts/L	oocysts/L
Analytical accuracy (%) (MS only)				
Flags		B	B	
Lab comments	VIEW	VIEW	VIEW	VIEW
Resample	No	No	No	No
Original sample collection date				
Lab resample explanation				
PWS comments for EPA/State				
PWS flag explanation for EPA/State				
EPA flag explanation				
Remove Date (Resamples Only)				

Explanation of Flags

A	Sample not collected within +/-2 days of scheduled date
B	Sample volume analysis requirements not met
C	Matrix spike sample was spiked with greater than 500 oocysts
D	The matrix spike volume analyzed is not within +/- 10% of the volume analyzed for the associated field sample

SUPPLEMENTARY CRYPTOSPORIDIUM DATA ELEMENTS ENTERED BY THE LABORATORY				
FIELDS COMMON TO ALL SAMPLES				
Sample ID	14	15	16	17
Sample volume filtered (L)	15	5	8	35
Was 100% of filtered volume examined?	Y	N	N	Y
Number of oocysts				
DATA TO CALCULATE OOCYST CONCENTRATION (NEEDED ONLY FOR SAMPLES IN WHICH <100% OF FILTERED VOLUME WAS EXAMINED)				
Volume of resuspended concentrate (mL) generated		12.2	11.2	
Volume of resuspended concentrate transferred to IMS (mL)		9.2	8.2	
DATA TO VERIFY COMPLIANCE WITH SAMPLE VOLUME ANALYSIS REQUIREMENTS (NEEDED ONLY FOR SAMPLES IN WHICH VOLUME FILTERED IS <10 L OR LESS THAN 100% OF THE FILTERED VOLUME WAS ANALYZED)				
Number of filters used				
Packed pellet volume (mL) generated		2.1	2.1	
DATA FOR MATRIX SPIKE SAMPLES				
Sample volume spiked (L)				
Number of oocysts spiked				

Return to Search Screen

Figure 5-4. Cryptosporidium Sample Results

You may only review samples the PWS has approved, contested, or did not review within the required timeframe (no later than 10 days after then end of the first month following the month in which the sample is collected). You cannot edit the data or change the status of the result unless the sample is a flagged due to falling outside of the sample schedule (Flag A).

Up to four *Cryptosporidium* samples are displayed on this screen. Data for each sample are displayed in a separate column. The information displayed in the table in the top half of the page contains the final results for each sample, including sample identification information and the calculated concentration of *Cryptosporidium* in the sample. A description of each of these fields can be viewed by clicking on the field. For a written description, refer to Section 3.3, *Cryptosporidium* Samples. The comments displayed to EPA and State Users are different from those seen by Laboratory Users. The "Lab Comments to PWS" field will be replaced by the "PWS Comments for EPA," which show any comments sent from the PWS concerning the sample.

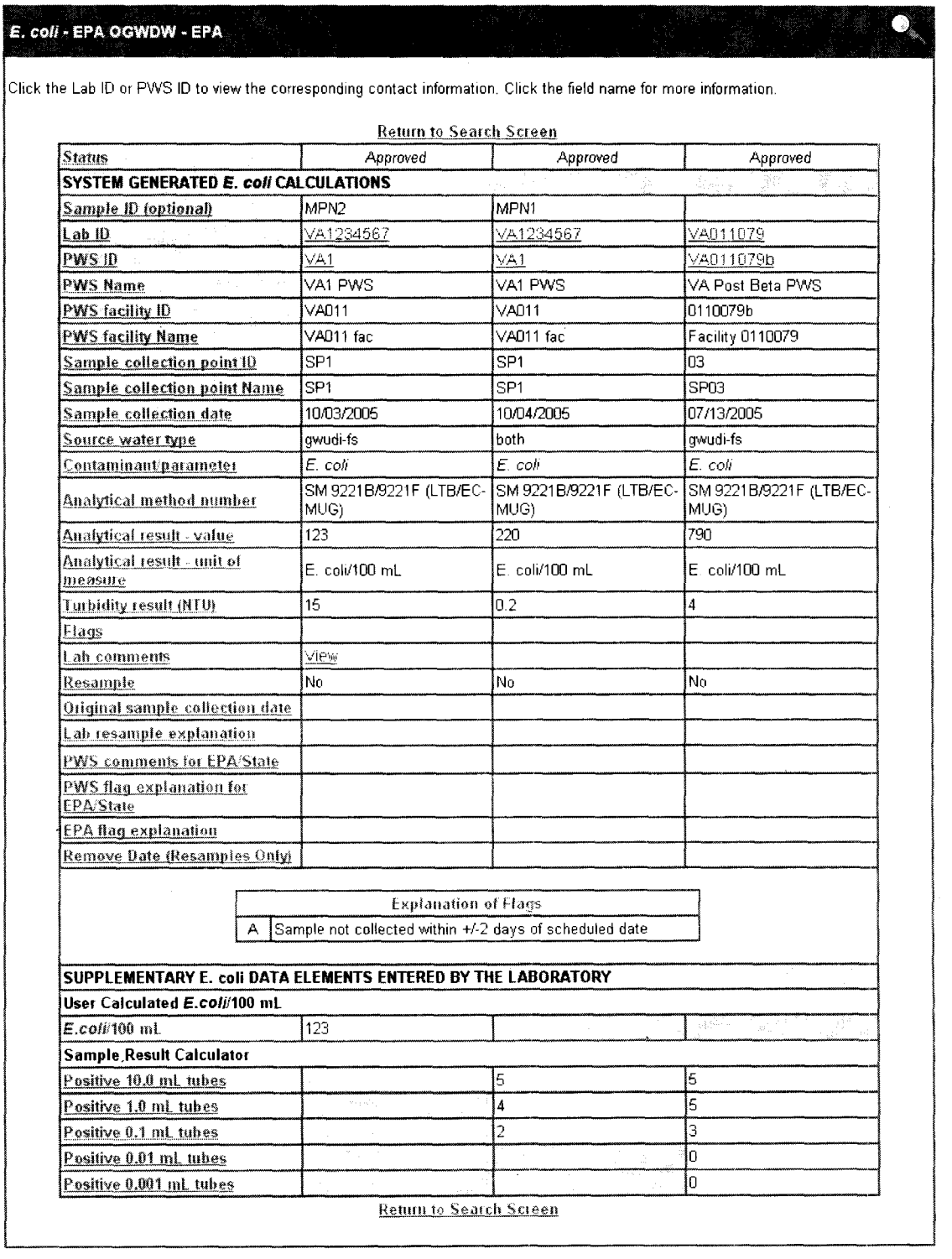
The information displayed in the table in the bottom half of the page contains the fields that were entered by the laboratory for the sample to calculate final results, or to verify compliance with LT2 monitoring requirements. These elements may be helpful in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the field; information is also provided in Section 3.3 of this manual.

If Flag A applies to the sample, you will be permitted to review the data and modify the sample status to either "EPA Approved" or "EPA Invalidated". You will be required to enter comments in "EPA Flag Explanation" as well as select the date you wish to remove from the sample schedule using the "Remove Date" field. The date removed should match the date of the original sample that was collected. Click the "SAVE CHANGES" link to save the updated sample status.

5.3 EPA and State *E. coli* 15-tube MPN Data Review

This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.

You can access the *E. coli* 15-tube MPN review sample screen directly from the search screen. Figure 5-5 displays the "LT2 DCTS *E. coli* 15-tube MPN Sample Results" screen.



E. coli - EPA OGWDW - EPA

Click the Lab ID or PWS ID to view the corresponding contact information. Click the field name for more information.

Return to Search Screen

Status	Approved	Approved	Approved
SYSTEM GENERATED *E. coli* CALCULATIONS			
Sample ID (optional)	MPN2	MPN1	
Lab ID	VA1234567	VA1234567	VA011079
PWS ID	VA1	VA1	VA011079b
PWS Name	VA1 PWS	VA1 PWS	VA Post Beta PWS
PWS facility ID	VA011	VA011	0110079b
PWS facility Name	VA011 fac	VA011 fac	Facility 0110079
Sample collection point ID	SP1	SP1	03
Sample collection point Name	SP1	SP1	SP03
Sample collection date	10/03/2005	10/04/2005	07/13/2005
Source water type	gwudi-fs	both	gwudi-fs
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*
Analytical method number	SM 9221B/9221F (LTB/EC-MUG)	SM 9221B/9221F (LTB/EC-MUG)	SM 9221B/9221F (LTB/EC-MUG)
Analytical result - value	123	220	790
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	15	0.2	4
Flags			
Lab comments	View		
Resample	No	No	No
Original sample collection date			
Lab resample explanation			
PWS comments for EPA/State			
PWS flag explanation for EPA/State			
EPA flag explanation			
Remove Date (Resamples Only)			

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY			
User Calculated *E.coli*/100 mL			
***E.coli*/100 mL**	123		
Sample Result Calculator			
Positive 10.0 mL tubes		5	5
Positive 1.0 mL tubes		4	5
Positive 0.1 mL tubes		2	3
Positive 0.01 mL tubes			0
Positive 0.001 mL tubes			0

Return to Search Screen

Figure 5-5. E. coli 15-tube MPN Method Sample Results

You may only review samples the PWS approved, contested, or did not review within the required timeframe (no later than 10 days after then end of the first month following the month in which the sample is collected). You cannot change the status or edit the data unless the sample is a flagged due to falling outside of the sample schedule (Flag A).

Up to four *E. coli* samples are displayed on this screen. Data for each sample are displayed in a separate column. The information displayed in the table in the top half of the page contains the final results for each sample, including sample identification information and the calculated concentration of *E. coli* in the sample. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.4 in this manual for a description of these fields. The comments displayed to EPA and State Users are different from those seen by Laboratory Users. The "Lab Comments to PWS" field will be replaced by the "PWS Comments for EPA" field, which will show any comments sent from the PWS concerning the sample.

The information displayed in the table at the bottom half of the page contains the fields that were entered by the laboratory for the sample, to calculate final results, or to verify compliance with LT2 monitoring requirements. These elements may be helpful in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.4 in this manual for a description of these fields.

If flag A applies to the sample, you will be permitted to review the data and modify the sample status to either "EPA Approved" or "EPA Invalidated". You will be required to enter comments in "EPA Flag Explanation" as well as select the date you wish to remove from the sample schedule using the Remove Date field. The date removed should match the date of the original sample that was collected. Click the "SAVE CHANGES" link to save the updated sample status.

5.4 EPA and State *E. coli* ONPG-MUG, 51-well Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

You can access the *E. coli* ONPG-MUG, 51-well review sample screen directly from the search screen. Figure 5-6 displays the "LT2 DCTS *E. coli* ONPG-MUG, 51-well Sample Results" screen.

E. coli - EPA OGWDW - EPA

Click the Lab ID or PWS ID to view the corresponding contact information. Click the field name for more information.

Return to Search Screen

Status	Approved	Approved	Contested
SYSTEM GENERATED *E. coli* CALCULATIONS			
Sample ID (optional)		Oct4	
Lab ID	VA1234567	VA1234567	VA1234567
PWS ID	VA1	VA1	VA1
PWS Name	VA1 PWS	VA1 PWS	VA1 PWS
PWS facility ID	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP1	SP2	SP1
Sample collection point Name	SP1	SP2	SP1
Sample collection date	10/05/2005	10/05/2005	09/04/2005
Source water type	both	river/stream	gwudi-fs
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*
Analytical method number	SM 9223 (Colilert)	SM 9223 (Colilert)	SM 9223 (Colilert)
Analytical result - value	23	5	92
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	0.1	15	12
Flags			
Lab comments			
Resample	No	No	No
Original sample collection date			
Lab resample explanation			
PWS comments for EPA/State			View
PWS flag explanation for EPA/State			
EPA flag explanation			
Remove Date (Resamples Only)			

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY			
User Calculated *E.coli*/100 mL			
E.coli/100 mL	23		
Sample Result Calculator			
Volume analyzed (mL)		68	55
Number of positive wells		3	32

Return to Search Screen

Figure 5-6. E. coli ONPG-MUG, 51-well Method Sample Results

You may only review samples the PWS approved, contested, or did not review within the required timeframe (no later than 10 days after then end of the first month following the month in which the sample is collected). You cannot change the status or edit the data unless the sample is a flagged due to falling outside of the sample schedule (Flag A).

Up to four *E. coli* samples are displayed on this screen. Data for each sample are displayed in a separate column. The information displayed in the table in the top half of the page contains the final results for each sample, including sample identification information and the calculated concentration of *E. coli* in the sample. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.5 in this manual for a description of these fields. The comments displayed to EPA and State Users are different from those seen by Lab Users. The "Lab Comments to PWS" field will be replaced by the "PWS Comments for EPA" field, which will show any comments sent from the PWS concerning the sample.

The information displayed in the table in the bottom half of the page contains the fields that were entered by the laboratory for the sample, to calculate final results, or to verify compliance with LT2 monitoring requirements. These elements may be helpful in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.5 in this manual for a description of these fields.

If flag A applies to the sample, you will be permitted to review the data and modify the sample status to either "EPA Approved" or "EPA Invalidated". You will be required to enter comments in "EPA Flag Explanation" as well as select the date you wish to remove from the sample schedule using the Remove Date field. The date removed should match the date of the original sample that was collected. Click the "SAVE CHANGES" link to save the updated sample status.

5.5 EPA and State *E. coli* ONPG-MUG, 97-well Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

You can access the *E. coli* ONPG-MUG, 97-well review sample screen directly from the search screen. Figure 5-7 displays the "LT2 DCTS *E. coli* ONPG-MUG, 97-well Sample Results" screen.

E. coli - VA1 PWS - VA1

To submit "Pending" samples as approved or contested, or return "Pending" samples to the lab for correction, change the status using the drop-down menu. Click the "Save Changes" link to complete the action. More information regarding each sample can be found by scrolling down. Click the field name for more information.

Return to Search Screen Save Changes

Status	Pending Approval	Pending Approval	Pending Approval
SYSTEM GENERATED *E. coli* CALCULATIONS			
Sample ID (optional)			
PWS facility ID	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP1	SP2	SP2
Sample collection point Name	SP1	SP2	SP2
Sample collection date	09/03/2005	08/07/2005	07/10/2005
Source water type	both	river/stream	both
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*
Analytical method number	SM 9223 (Colilert)	SM 9223 (Colilert)	SM 9223 (Colilert)
Analytical result - value	185	66	142
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	1	32	1
Flags	A		
Lab comments			
Resample	No	No	No
Original sample collection date			
Lab resample explanation			
PWS comments for lab	Add	Add	Add
PWS comments for EPA/State	Add	Add	Add
PWS flag explanation for EPA/State	Add		
EPA flag explanation			

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY			
User Calculated *E.coli*/100 mL			
E.coli/100 mL		66	
Sample Result Calculator			
Volume analyzed (mL)	99		33
Large wells positive	44		23
Small wells positive	23		12

Return to Search Screen Save Changes

Figure 5-7. E. coli ONPG-MUG, 97-well Method Sample Results

You may only review samples the PWS approved, contested, or did not review within the required timeframe (no later than 10 days after then end of the first month following the month in which the sample is collected). You cannot change the status or edit the data unless the sample is a flagged due to falling outside of the sample schedule (Flag A).

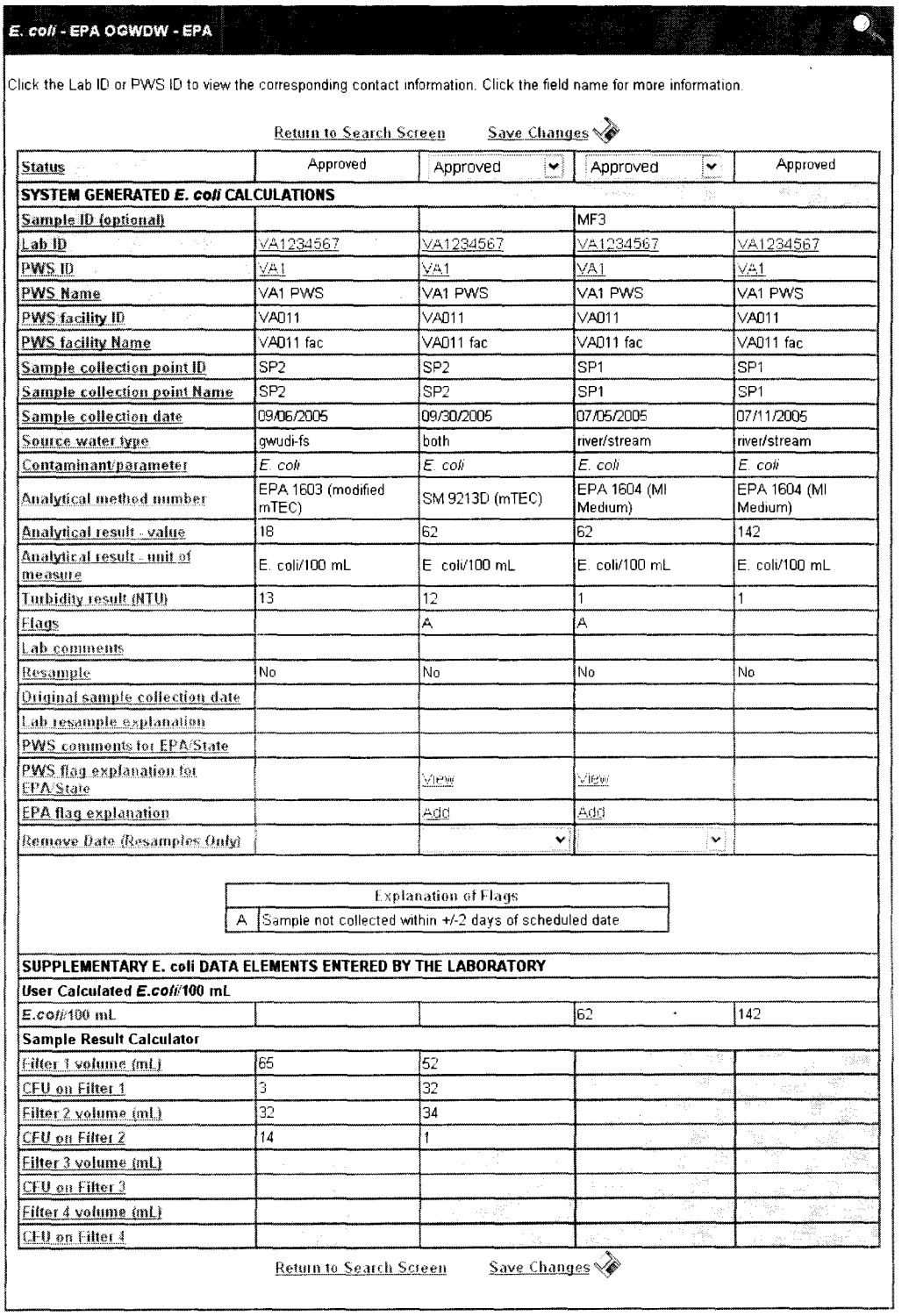
Up to four *E. coli* samples are displayed on this screen. Data for each sample are displayed in a separate column. The information displayed in the table in the top half of the page contains the final results for each sample, including sample identification information and the calculated concentration of *E. coli* in the sample. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.6 in this manual for a description of these fields. The comments displayed to EPA and State Users are different from those seen by Laboratory Users. The "Lab Comments to PWS" field will be replaced by the "PWS Comments for EPA" field, which will show any comments sent from the PWS concerning the sample.

The information displayed in the table in the bottom half of the page contains thefields that were entered by the laboratory for the sample, to calculate final results, or to verify compliance with LT2 monitoring requirements. These elements may be helpful in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.6 in this manual for a description of these fields.

If flag A applies to the sample, you will be permitted to review the data and modify the sample status to either "EPA Approved" or "EPA Invalidated". You will be required to enter comments in "EPA Flag Explanation" as well as select the date you wish to remove from the sample schedule using the Remove Date field. The date removed should match the date of the original sample that was collected. Click the "SAVE CHANGES" link to save the updated sample status.

5.6 EPA and State *E. coli* Membrane Filtration Data Review **This section will be updated when the functionality becomes available in the next release of the LT2 DCTS.**

You can access the *E. coli* membrane filtration procedure review sample screen directly from the search screen. Figure 5-8 displays the "LT2 DCTS *E. coli* Membrane Filtration Procedure Sample Results" screen.



E. coli - EPA OGWDW - EPA

Click the Lab ID or PWS ID to view the corresponding contact information. Click the field name for more information.

Return to Search Screen Save Changes

Status	Approved	Approved	Approved	Approved
SYSTEM GENERATED *E. coli* CALCULATIONS				
Sample ID (optional)			MF3	
Lab ID	VA1234567	VA1234567	VA1234567	VA1234567
PWS ID	VA1	VA1	VA1	VA1
PWS Name	VA1 PWS	VA1 PWS	VA1 PWS	VA1 PWS
PWS facility ID	VA011	VA011	VA011	VA011
PWS facility Name	VA011 fac	VA011 fac	VA011 fac	VA011 fac
Sample collection point ID	SP2	SP2	SP1	SP1
Sample collection point Name	SP2	SP2	SP1	SP1
Sample collection date	09/06/2005	09/30/2005	07/05/2005	07/11/2005
Source water type	gwudi-fs	both	river/stream	river/stream
Contaminant/parameter	*E. coli*	*E. coli*	*E. coli*	*E. coli*
Analytical method number	EPA 1603 (modified mTEC)	SM 9213D (mTEC)	EPA 1604 (MI Medium)	EPA 1604 (MI Medium)
Analytical result - value	18	62	62	142
Analytical result - unit of measure	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL	E. coli/100 mL
Turbidity result (NTU)	13	12	1	1
Flags		A	A	
Lab comments				
Resample	No	No	No	No
Original sample collection date				
Lab resample explanation				
PWS comments for EPA/State				
PWS flag explanation for EPA/State		View	View	
EPA flag explanation		Add	Add	
Remove Date (Resamples Only)				

Explanation of Flags	
A	Sample not collected within +/-2 days of scheduled date

SUPPLEMENTARY E. coli DATA ELEMENTS ENTERED BY THE LABORATORY				
User Calculated *E.coli*/100 mL				
E.coli/100 mL			62	142
Sample Result Calculator				
Filter 1 volume (mL)	65	52		
CFU on Filter 1	3	32		
Filter 2 volume (mL)	32	34		
CFU on Filter 2	14	1		
Filter 3 volume (mL)				
CFU on Filter 3				
Filter 4 volume (mL)				
CFU on Filter 4				

Return to Search Screen Save Changes

Figure 5-8. E. coli Membrane Filtration Method Sample Results

You may only review samples the PWS approved, contested, or did not review within the required timeframe (no later than 10 days after then end of the first month following the month in which the sample is collected). You cannot change the status or edit the data unless the sample is a flagged due to falling outside of the sample schedule (Flag A).

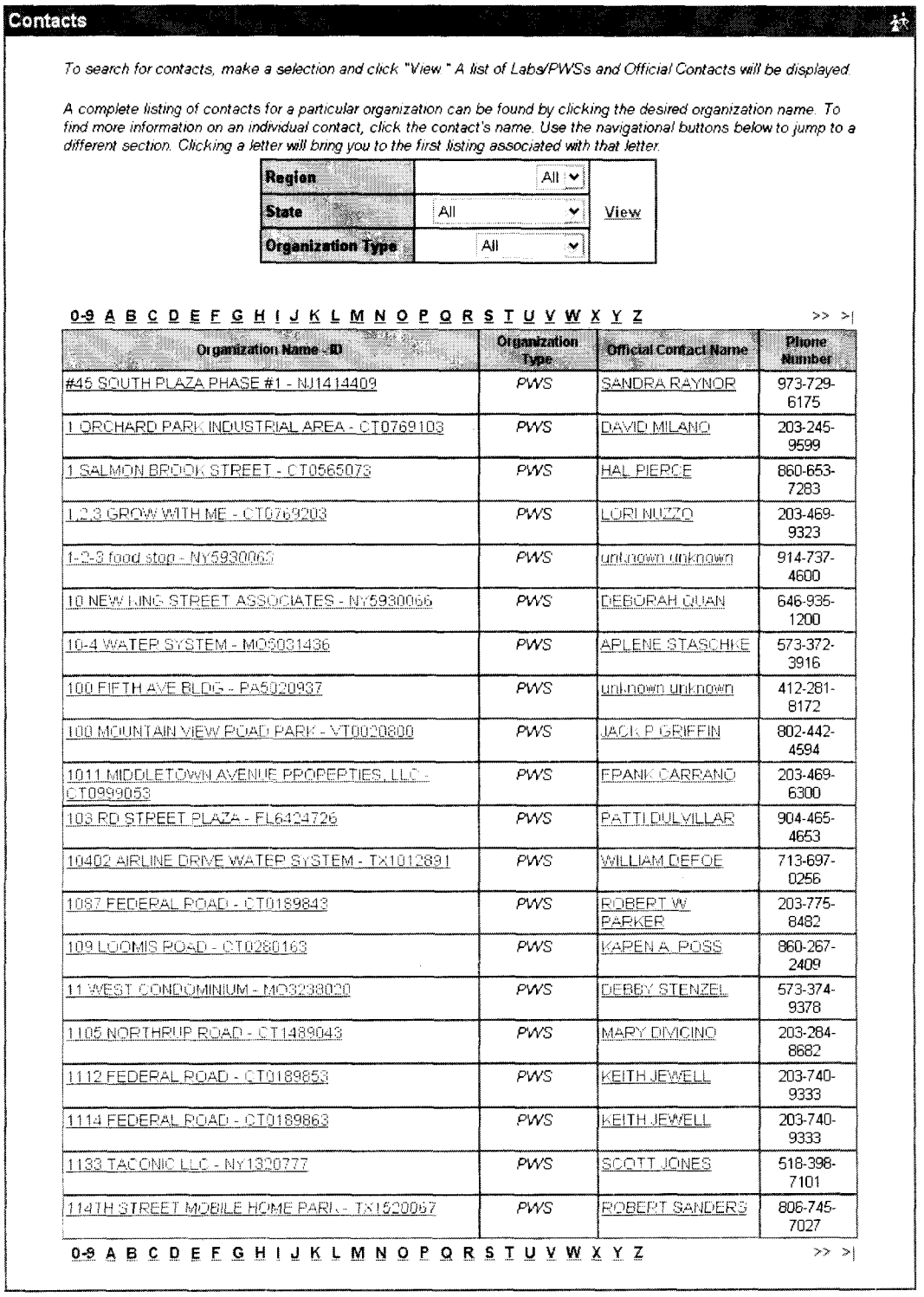
Up to four *E. coli* samples are displayed on this screen. Data for each sample are displayed in a separate column. The information displayed in the table in the top half of the page contains the final results for each sample, including sample identification information and the calculated concentration of *E. coli* in the sample. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.7 in this manual for a description of these fields. The comments displayed to EPA and State Users are different from those seen by Lab Users. The "Lab Comments to PWS" field will be replaced by the "PWS Comments for EPA" field, which will show any comments sent from the PWS concerning the sample.

The information displayed in the table in the bottom half of the page contains the fields that were entered by the laboratory for the sample, to calculate final results, or to verify compliance with LT2 monitoring requirements. These elements may be helpful in evaluating the final results that appear in the top table. A description of each of these fields can be viewed by clicking on the field itself. Alternatively, you can refer to Section 3.7 of this manual for a description of these fields.

If flag A applies to the sample, you will be permitted to review the data and modify the sample status to either "EPA Approved" or "EPA Invalidated". You will be required to enter comments in "EPA Flag Explanation" as well as select the date you wish to remove from the sample schedule using the Remove Date field. The date removed should match the date of the original sample that was collected. Click the "SAVE CHANGES" link to save the updated sample status.

5.7 EPA and State Official Contact List

The LT2 DCTS allows you to search for laboratory or PWS contacts. Figure 5-9 displays the EPA and State "Contact List" screen.



Contacts

To search for contacts, make a selection and click "View." A list of Labs/PWSs and Official Contacts will be displayed.

A complete listing of contacts for a particular organization can be found by clicking the desired organization name. To find more information on an individual contact, click the contact's name. Use the navigational buttons below to jump to a different section. Clicking a letter will bring you to the first listing associated with that letter.

Region	All	View
State	All	
Organization Type	All	

0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z >> >|

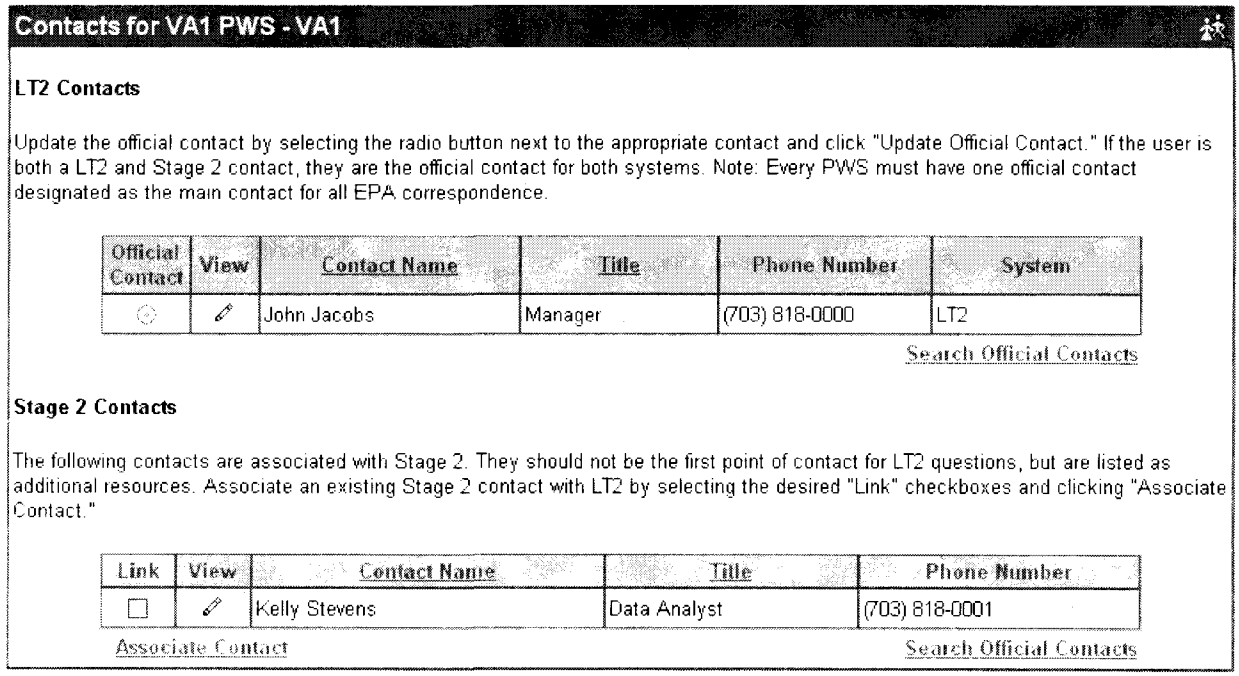
Organization Name - ID	Organization Type	Official Contact Name	Phone Number
#45 SOUTH PLAZA PHASE #1 - NJ1414409	PWS	SANDRA RAYNOR	973-729-6175
1 ORCHARD PARK INDUSTRIAL AREA - CT0769103	PWS	DAVID MILANO	203-245-9599
1 SALMON BROOK STREET - CT0565073	PWS	HAL PIERCE	860-653-7283
1,2,3 GROW WITH ME - CT0769203	PWS	LORI NUZZO	203-469-9323
1-2-3 food stop - NY5930060	PWS	unknown unknown	914-737-4600
10 NEW KING STREET ASSOCIATES - NY5930066	PWS	DEBORAH QUAN	646-935-1200
10-4 WATER SYSTEM - MO5031436	PWS	APLENE STASCHKE	573-372-3916
100 FIFTH AVE BLDG - PA5020937	PWS	unknown unknown	412-281-8172
100 MOUNTAIN VIEW ROAD PARK - VT0020800	PWS	JACK P GRIFFIN	802-442-4594
1011 MIDDLETOWN AVENUE PROPERTIES, LLC - CT0999053	PWS	FRANK CARRANO	203-469-6300
103 RD STREET PLAZA - FL6424726	PWS	PATTI DULVILLAR	904-465-4653
10402 AIRLINE DRIVE WATER SYSTEM - TX1012891	PWS	WILLIAM DEFOE	713-697-0256
1087 FEDERAL ROAD - CT0189843	PWS	ROBERT W PARKER	203-775-8482
109 LOOMIS ROAD - CT0280163	PWS	KAREN A. POSS	860-267-2409
11 WEST CONDOMINIUM - MO3238020	PWS	DEBBY STENZEL	573-374-9378
1105 NORTHRUP ROAD - CT1489043	PWS	MARY DIVICINO	203-284-8682
1112 FEDERAL ROAD - CT0189853	PWS	KEITH JEWELL	203-740-9333
1114 FEDERAL ROAD - CT0189863	PWS	KEITH JEWELL	203-740-9333
1133 TACONIC LLC - NY1320777	PWS	SCOTT JONES	518-398-7101
114TH STREET MOBILE HOME PARK - TX1520067	PWS	ROBERT SANDERS	806-745-7027

0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z >> >|

Figure 5-9. EPA or State Contact List Screen

Search for laboratory or PWS contacts by selecting the Region, State, and/or Organization Type from the appropriate drop-down menus at the top of the page, then click "VIEW" to display the list of contacts. To search the list by laboratory or PWS name, use the letters above the table to display laboratories or PWSs that begin with that letter.

To display a complete listing of contacts for a laboratory or PWS, click the organization name. Figure 5-10 displays an example of the PWS details contact screen.



Contacts for VA1 PWS - VA1

LT2 Contacts

Update the official contact by selecting the radio button next to the appropriate contact and click "Update Official Contact." If the user is both a LT2 and Stage 2 contact, they are the official contact for both systems. Note: Every PWS must have one official contact designated as the main contact for all EPA correspondence.

Official Contact	View	Contact Name	Title	Phone Number	System
○	✎	John Jacobs	Manager	(703) 818-0000	LT2

Search Official Contacts

Stage 2 Contacts

The following contacts are associated with Stage 2. They should not be the first point of contact for LT2 questions, but are listed as additional resources. Associate an existing Stage 2 contact with LT2 by selecting the desired "Link" checkboxes and clicking "Associate Contact."

Link	View	Contact Name	Title	Phone Number
☐	✎	Kelly Stevens	Data Analyst	(703) 818-0001

Associate Contact Search Official Contacts

Figure 5-10. PWS Details Contact Screen for EPA and State Users

When viewing PWS contacts, both the LT2 and Stage 2 contacts for the organization will be displayed. The Stage 2 contacts should not be your first point of contact for LT2. They are listed as an additional resource if the LT2 contact is not available. To associate a pre-existing Stage 2 contact with LT2, select the corresponding check box from the link column, and click the "ASSOCIATE CONTACT" link.

To display complete information for a contact, click on the contact name. Figure 5-11 displays an example of the contact details screen.

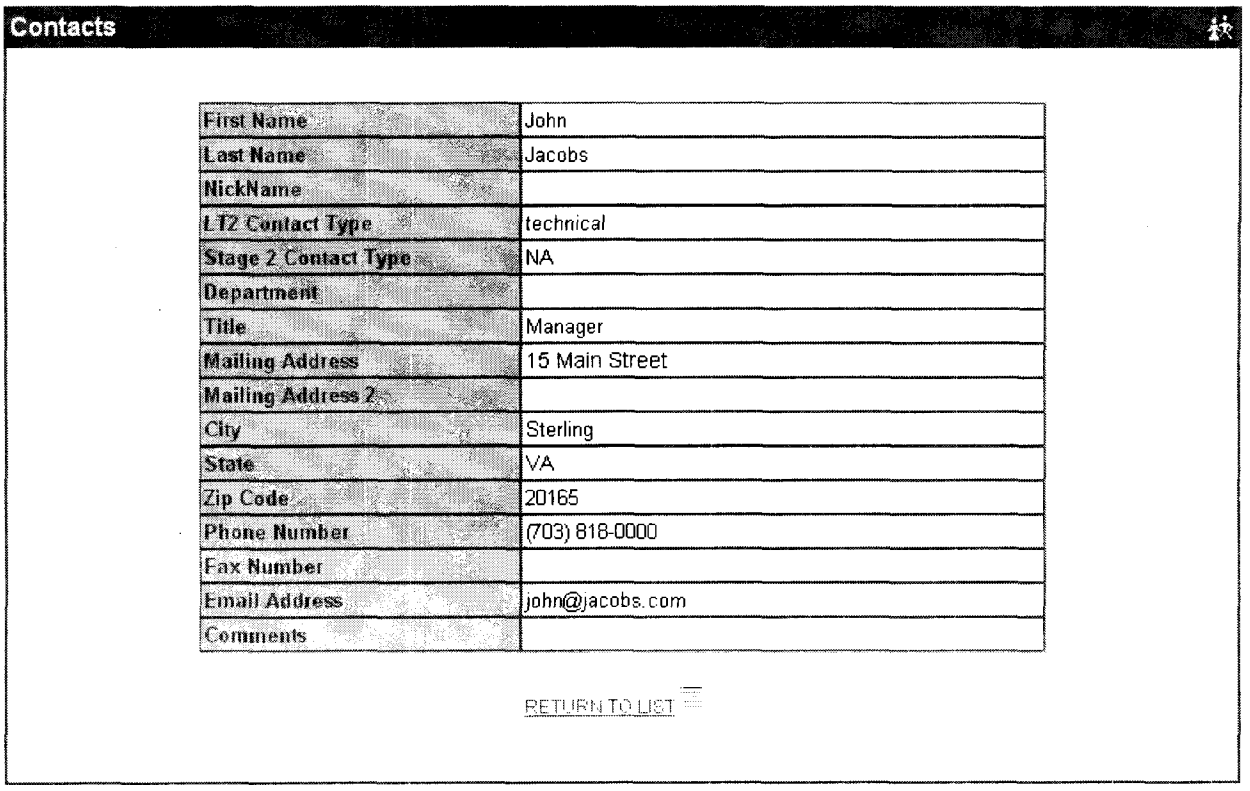


Figure 5-11. Contact Details Screen for EPA and State User

5.8 Grandfathering and Sampling Plan Tracking

EPA and State Users have the ability to track the status of a PWS facility in the LT2 DCTS. EPA and State Users can modify the data in the following categories:

- PWS intends to submit grandfathered data;
- USEPA receipt of sample location;
- USEPA review of sample schedule; and
- PWS intends to waive monitoring and proceed to Bin Classification.

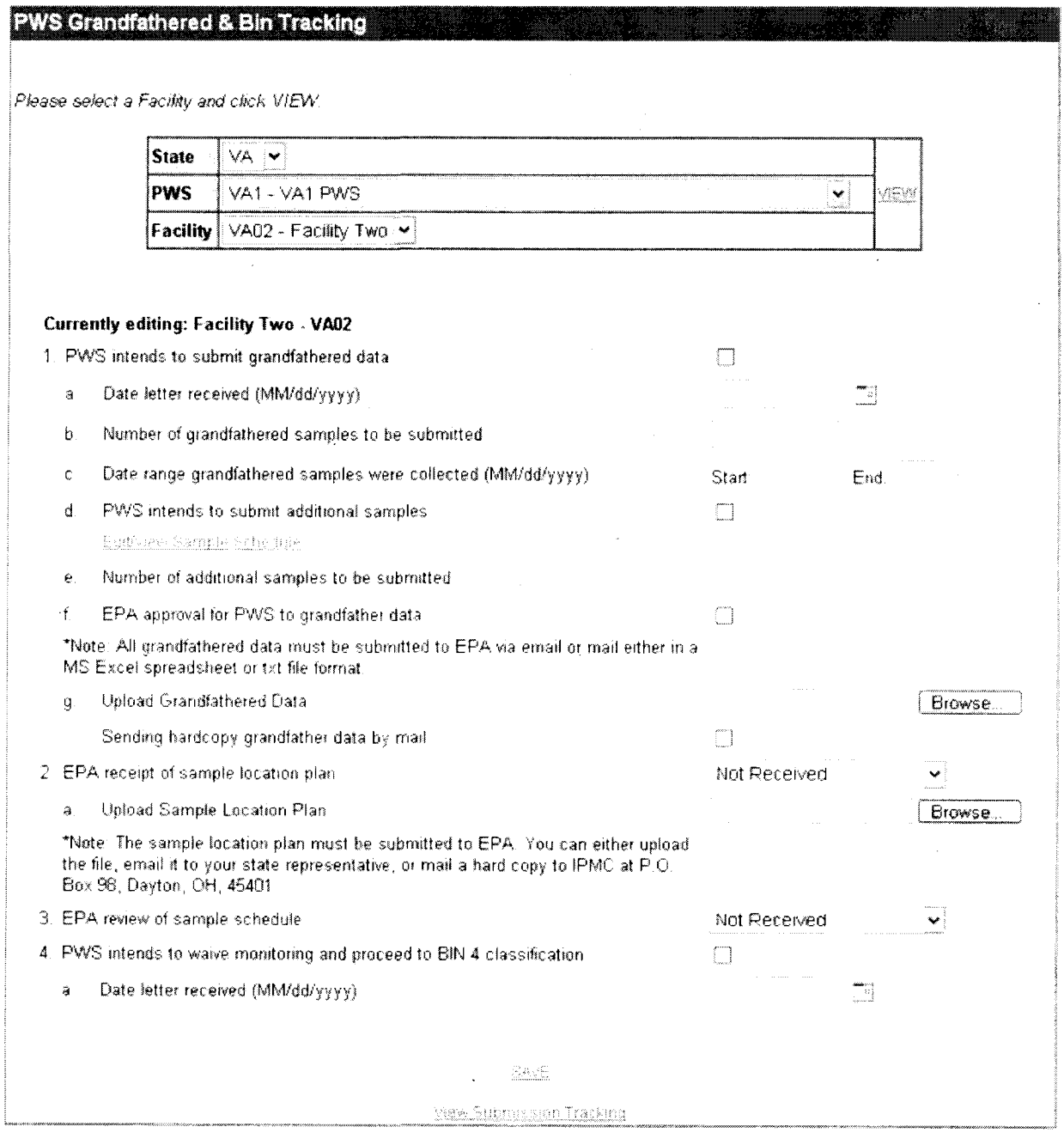


Figure 5-12. Grandfathering and Sampling Plan Tracking

Clicking the "SUBMIT GF & SAMPLE LOCATION" link on the left toolbar will display the Grandfathering and Sample Location Tracking module. Choose the appropriate State from the drop-down menu, then choose the appropriate PWS and finally choose the Facility. Click on the "VIEW" link to review/edit the status of the facility. Figure 5-12 displays the "GF Data & Sampling Plan" screen.

To upload grandfathered data or a sample location plan (as submitted by the PWS), use the appropriate browse button to search for the desired file. Click "SAVE" to upload the files. To view a status of previously submitted files, click the "VIEW SUBMISSION TRACKING" link to proceed to the Submission Tracking module in the Stage 2 application.

5.9 Reports – Not all the listed reports are available for the first release of the LT2 DCTS

EPA and State Users have the ability to view reports generated by the LT2 database. The reports are accessed by clicking the "REPORTS" link on the left toolbar. Figure 5-13 displays the "Report List" screen.

The reports available for EPA Users are as follows:

- **Sample Tracking** - Displays the number of sample results submitted and reviewed.
- **Sample Backlog** - Displays the number of sample results pending laboratory approval and PWS review.
- **List of Users** - Displays a listing of LT2 DCTS users and their role, grouped by organization.
- **LT2 Data Collection System Usage** - Displays the number of organizations that have accessed the LT2 Data Collection System, as well as those organizations that have not used the LT2 DCTS.
- **PWS Schedule Submission Compliance** - Displays the number of active facilities for each PWS that have/have not submitted a complete sample schedule to the LT2 DCTS.
- **Sample History** - Displays sample results that have been returned to the laboratory from the PWS as part of the sample review process.
- **Binning Reports** - Allows the EPA User to view the list of PWS facilities with current *Cryptosporidium* bin values of at least 0.075 oocysts/L, the list of current bin values for all PWS facilities, or the current bin value of a specific PWS.
- **Missed and Re-Sampled Events** - Displays a list of PWSs that have missed a sampling date and/or submitted a resample.
- **Grandfathered Data** - Displays a list of PWSs intending to submit grandfathered data.
- **Monitoring Waived** - Displays a list of PWSs who have waived monitoring and who are intending to waive monitoring.
- **PWS Sample Location Plan Compliance** - Displays a list of sample location plans not received.

State Users have the ability to review a subset of these reports. All data displayed is applicable to PWS utilities within their state jurisdiction. The reports available to State Users are as follows:

- **Sample Tracking** - Displays the number of sample results submitted and reviewed.
- **Sample Backlog** - Displays the number of sample results pending laboratory approval and PWS review.
- **PWS Schedule Submission Compliance** - Displays the number of active facilities for each PWS that have/have not submitted a complete sample schedule to the LT2 DCTS.
- **Sample History** - Displays sample results that have been returned to the laboratory from the PWS as part of the sample review process.
- **Binning Reports** - Allows the user to view the list of PWS facilities with current *Cryptosporidium* bin values of at least 0.075 oocysts/L, the list of current bin values for all PWS facilities, or the current bin value of a specific PWS.

- **Missed and Re-Sampled Events** - Displays a list of PWSs that have missed a sampling date and/or submitted a resample.
- **Grandfathered Data** - Displays a list of PWSs intending to submit grandfathered data.
- **Monitoring Waived** - Displays a list of PWSs who have waived monitoring and who are intending to waive monitoring.
- **PWS Sample Location Plan Compliance** - Displays a list of sample location plans not received.

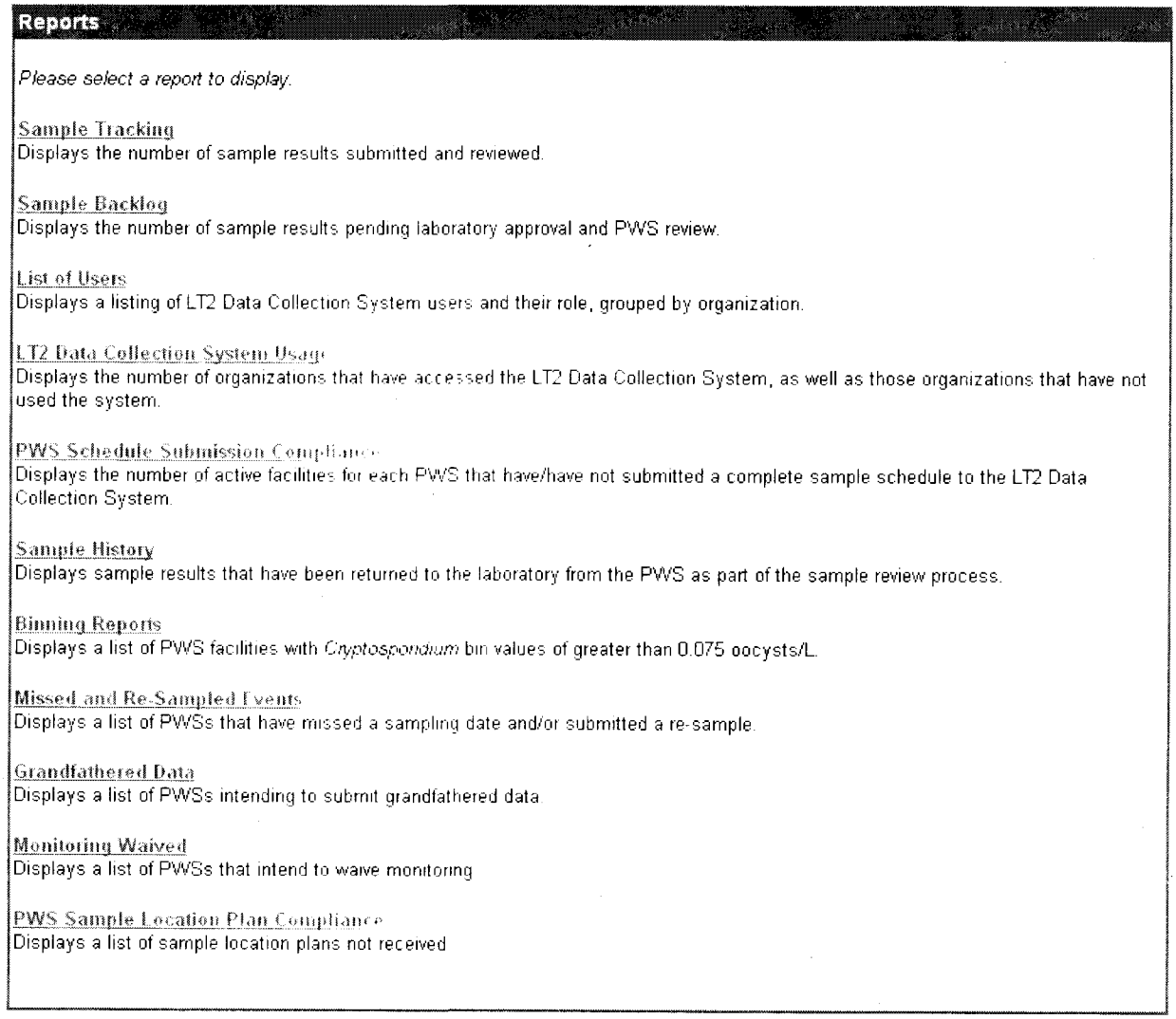


Figure 5-13. Reports List for the EPA User

Section 6. XML Submission Process

The XML data upload module of the LT2 DCTS was created to assist those laboratories who regularly submit a large volume of sample data. Submitting sample data on an individual basis would be a daunting task. If a laboratory is already tracking their sample data within a database, there is no need to duplicate this data entry within the LT2 DCTS. Instead, the laboratory can generate an XML file based on their sample data. The Lab User can upload this single file to the LT2 DCTS, replacing the data entry with a few simple clicks.

6.1 Who should consider submitting data using XML?

The LT2 DCTS users that may benefit from using the XML upload function include the following:

Commercial laboratories that need to submit a high volume of sample results to the LT2 DCTS.

Laboratories that are already tracking their sample data in an electronic source, such as a laboratory information management system (LIMS) or another database, that is maintained by an experienced database administrator.

USEPA assistance for those interested in using XML uploads is available through a USEPA-developed tool that automatically extracts data from the laboratory's relational database and creates an XML file that meets the specified document type definition (DTD) requirements. This tool would require an initial mapping of the laboratory's database to the LT2 database structure. Assistance is available from LT2 Technical Support, at stage2mdbp@epa.gov, or the LT2 Hotline, at 1-888-LT2-0020.

6.2 The XML Process

The Lab Data Upload module allows the Lab User to upload an XML file via a web form. The LT2 DCTS will process the file and populate the database with the data from the XML file. After the file is uploaded, the user will receive a confirmation message. The samples will be available for review through the Search screen.

Only Lab Users have the ability to submit electronic files to the LT2 DCTS. Since files will contain data about the sample and the analytical results, it will replace the need for the laboratory to manually enter sample data.

The laboratory will have the ability to pre-approve samples by populating the status field in the XML file. After the data passes LT2 verification checks, the samples will be sent directly to the PWS for review, eliminating the need for a Lab Approver User to access LT2 and individually verify samples. This will provide labs with greater efficiency than the manual entry process. Only Lab Approver Users will be permitted to upload samples in "lab approved" status.

6.2.1 Timing of Transactions

Regardless of the upload time, each file submitted will generate a confirmation record appearing during the user's upload session. This record will indicate the success or failure of the file and detail the exact data errors if the file failed.

Note: The user must keep the web browser open during the upload validation and should not navigate to any other page.

A limited number of samples can be included in a XML file. Since there are a minimal number of data elements tracked by the LT2 DCTS, the space required for each sample is relatively small. However, the larger the XML file, the longer it will take to process the information. It may be more practical to limit the

size of XML files, which will expedite the upload process. *Cryptosporidium* laboratories may consider uploading by 20-sample quality control (QC) batch.

6.2.2 Document Structure

The LT2 DCTS's XML implementation uses DTDs developed specifically for submitting analytical results for water samples. The DTDs describe the format and the data elements required for submitting valid, formatted monitoring data and analytical results in XML format to the LT2 System. There is one DTD for submitting *Cryptosporidium* sample results, and a separate DTD that includes all four *E. coli* methods. These DTDs are included in Appendix A.

Table 6-1 provides a brief description of the field names, descriptions, and types that will be provided by *Cryptosporidium* laboratories and indicates whether the element is required or optional.

Table 6-1. Cryptosporidium Data Elements

Data Element Name	Data Element Description	Field Type	Requirement
CRYPTO_SAMPLES Information			
PWS_ID	Public Water System ID number	VARCHAR(9)	Required
FACILITY_ID	Public Water System facility ID number	VARCHAR(15)	Required
SAMPLE_POINT_ID	Sampling point ID number	VARCHAR(20)	Required
SAMPLE Information			
ANALYTE	Designates file as *Cryptosporidium* sample	VARCHAR(15)	Required
LAB_SAMPLE_ID	Sample identification number	VARCHAR(20)	Required
SAMPLE_COLLECTION_DATE	Sample collection date (Date format is 'DD/MM/YY'), lower bound of 01/01/99 and upper bound of current date	DATE	Required
DATE_FORMAT	Description of the date format using pre-set symbols	VARCHAR	Required
CRYPTO Information			
SAMPLE_VOL_EXAMINED	Designates whether 100% of the sample volume was filtered	VARCHAR(1)	Required
ANALYSIS_TYPE	Sample analysis type	VARCHAR(10)	Required
SAMPLE_VOLUME_FILTERED	Sample volume filtered (L), may be reported to the nearest hundredth and must be greater than 0	NUMBER(20,8)	Required
NO_OF_CRYPTO	Total number of oocysts	NUMBER(7)	Required

Data Element Name	Data Element Description	Field Type	Requirement
	from all slides, that meet fluorescence, size, and shape criteria under IFA and cannot be ruled out using DAPI or DIC, must be whole number greater than or equal to 0		
RESUSPENDED_CONC_VOL	Volume of resuspended concentrate (mL) generated, must be a whole number	NUMBER(20,8)	Required if SAMPLE_VOL_EXAMINED = N
RESUSPENDED_CONC_VOL_IMS	Volume of resuspended concentrate (mL) transferred to IMS, must be a whole number	NUMBER(20,8)	Required if SAMPLE_VOL_EXAMINED = N
NUM_FILTERS	Number of filters used, must be a whole number greater than or equal to 0	NUMBER	Required if (SAMPLE_VOL_EXAMINED = N) OR (SMAPLE_VOL_FILTERED <10)
PELLET_VOLUME	Pellet volume (mL) generated, may be reported to the nearest hundredth	NUMBER(20,8)	Required if (SAMPLE_VOL_EXAMINED = N) OR (SMAPLE_VOL_FILTERED <10)
SAMPLE_VOLUME_SPIKED	Sample volume spiked (L), may be reported to the nearest hundredth	NUMBER(20,8)	Required if ANALYSIS_TYPE = MS
NO_OF_CRYPTO_SPIKE	Estimated number of oocysts spiked, may be reported to the nearest hundredth	VARCHAR	Optional
VALID_STATUS_CODE	The status of the sample	VARCHAR(20)	Optional
LAB_COMMENT	Comments regarding the sample data	VARCHAR(4000)	Optional
RESAMPLE	Displays whether the sample is a resample	VARCHAR(1)	Required
ORIG_SAMPLE_COLLECTION_DATE	The date the original sample was collected	DATE	Required if RESAMPLE = 1
LAB_RESAMPLE_EXPLANATION	The lab's justification as to why the resample was collected	VARCHAR(4000)	Required if RESAMPLE = 1

Table 6-2 provides a brief description of the field names, descriptions, and types that will be provided by *E. coli* laboratories and indicates whether the element is required or optional. Shaded rows are elements that may be required, depending on the sample and whether the laboratory enters the final result into the LT2 DCTS or enters primary measurements into the LT2 DCTS for automatic calculation of the final result.

Table 6-2. E. coli Data Elements

Data Element Name	Data Element Description	Field Type	Requirement
ECOLI_SAMPLES Information			
PWS_ID	Public Water System ID number	VARCHAR(9)	Required
FACILITY_ID	Public Water System facility ID number	VARCHAR(15)	Required
SAMPLE_POINT_ID	Sampling point ID number	VARCHAR(20)	Required
SAMPLE Information			
ANALYTE	Designates file as *E. coli* sample	VARCHAR(15)	Required
LAB_SAMPLE_ID	Sample identification number	VARCHAR(20)	Required
SAMPLE_COLLECTION_DATE	Sample collection date (Date format is 'DD/MM/YY'), lower bound of 01/01/99 and upper bound of current date	DATE	Required
DATE_FORMAT	Description of the date format using pre-set symbols	VARCHAR	Required
ECOLI Information			
ANALYTICAL_MEHTOD_NUMBER	Analytical method number	VARCHAR(40)	Required
SOURCE_WATER_TYPE	Source water type	VARCHAR(20)	Required
TURBIDITY_VALUE	Turbidity result - must be greater than or equal to 0 and may be reported to the hundredth	NUMBER(5)	Required for filtered systems with a population greater than 10,000
SAMPLE_CALC	*E. coli* 100 mL (*option of entering this value of the primary measurements below*), maybe reported to the nearest tenth	NUMBER(20)	Required if primary measurements (shaded in gray) not entered below
FILTER1_VOLUME	Filter 1: mL of sample filtered, must be greater than 0 and may be reported to 6 decimal places	NUMBER(14,4)	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = Membrane Filtration)
FILTER1_CFU	Filter 1: Number of *E. coli* colony forming units (CFU), must be a whole number	NUMBER	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = Membrane Filtration)

Data Element Name	Data Element Description	Field Type	Requirement
FILTER2_VOLUME	Filter 2: mL of sample filtered; must be greater than 0 and may be reported to 6 decimal places	NUMBER(14,4)	Required if FILTER2_CFU != NULL
FILTER2_CFU	Filter 2: Number of *E. coli* colony forming units (CFU); must be a whole number	NUMBER	Required if FILTER2_VOLUME != NULL
FILTER3_VOLUME	Filter 3: mL of sample filtered; must be greater than 0 and may be reported to 6 decimal places	NUMBER(14,4)	Required if FILTER3_CFU != NULL
FILTER3_CFU	Filter 3: Number of *E. coli* colony forming units (CFU); must be a whole number	NUMBER	Required if FILTER3_VOLUME != NULL
FILTER4_VOLUME	Filter 4: mL of sample filtered; must be greater than 0 and may be reported to 6 decimal places	NUMBER(14,4)	Required if FILTER4_CFU != NULL
FILTER4_CFU	Filter 4: Number of *E. coli* colony forming units (CFU); must be a whole number	NUMBER	Required if FILTER4_VOLUME != NULL
VOLUME_ANALYZED	mL of sample added to tray; must be greater than 0 and may be reported to decimal places	NUMBER(14,4)	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = ONPG-MUG, 97-well or ONPG-MUG, 51-well)
COLIFORM_LARGE_WELLS	Large wells positive: Total coliform positive and UV fluorescence; must be a whole number between 0 and less than or equal to 49	NUMBER	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = ONPG-MUG, 97-well)
COLIFORM_SMALL_WELLS	Small wells positive: Total coliform positive and UV fluorescence; must be a whole number between 0 and less than or equal to 48	NUMBER	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = ONPG-MUG, 97-well)
COLIFORM_POSITIVE	Number of wells positive: Total coliform positive and UV fluorescence; must be a whole number between 0 and less than or equal to 51	NUMBER	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = ONPG-MUG, 51-well)
POSITIVE_10_TUBES	Number of positive tubes 10.0 mL; must be a whole number, less than or equal to 5	NUMBER(1)	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = 15-tube MPN)

Data Element Name	Data Element Description	Field Type	Requirement
POSITIVE_1_TUBES	Number of positive tubes 1.0 mL; must be a whole number, less than or equal to 5	NUMBER(1)	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = 15-tube MPN)
POSITIVE_01_TUBES	Number of positive tubes 0.1 mL; must be a whole number, less than or equal to 5	NUMBER(1)	Required if (SAMPLE_CALC = NULL) and (METHOD_TYPE = 15-tube MPN)
POSITIVE_001_TUBES	Number of positive tubes 0.01 mL; must be a whole number, less than or equal to 5	NUMBER(1)	Optional
POSITIVE_0001_TUBES	Number of positive tubes 0.001 mL; must be a whole number, less than or equal to 5	NUMBER(1)	Optional
VALID_STATUS_CODE	The status of the sample	VARCHAR(20)	Optional
LAB_COMMENT	Comments regarding the sample data	VARCHAR(4000)	Optional
METHOD_TYPE	The method used to analyze this *E. coli* sample	VARCHAR	Required
RESAMPLE	Displays whether the sample is a resample	VARCHAR(1)	Required
ORIG_SAMPLE_COLLECTION_DATE	The date the original sample was collected	DATE	Required if RESAMPLE = 1
LAB_RESAMPLE_EXPLANATION	The lab's justification as to why the resample was collected	VARCHAR(4000)	Required if RESAMPLE = 1

On the LT2 DCTS data entry screens, certain data elements are selected through drop-down menus where the user selects from a list of possible choices. For these data elements, one of the possible choices must be entered for the upload to work correctly. Listed in Table 6-3 are the acceptable values for these *Cryptosporidium* and *E. coli* data elements. Note: all data elements are case-sensitive.

Table 6-3. Acceptable Data Element Values

Analyte	Data Element Name	Acceptable Values
Both	ANALYTE	Crypto, Ecoli
Cryptosporidium	SAMPLE_VOL_ANALYZED	Y/N, y/n, 1/0, T/F, t/f
Cryptosporidium	ANALYTICAL_METHOD_NUMBER	Field, MS
E. coli - Membrane Filtration	ANALYTICAL_METHOD_NUMBER	9213D (mTEC), SM 9222B/9222G (mENDO/NA-MUG), SM 9222B/9222G (LesENDO/NA-MUG), EPA 1603 (modified mTEC), EPA 1604 (MI Medium), mColiBlue-24
E. coli - 15-tube MPN	ANALYTICAL_METHOD_NUMBER	SM 9223 (Colilert), SM 9223 (Colilert-18), SM 9221B/9221F (LTB/EC-MUG)
E. coli - ONPG-MUG, 51-well	ANALYTICAL_METHOD_NUMBER	SM 9223 (Colilert), SM 9223 (Colilert-18)
E. coli - ONPG-MUG, 97-well	ANALYTICAL_METHOD_NUMBER	SM 9223 (Colilert), SM 9223 (Colilert-18)
E. coli - all methods	SOURCE_WATER_TYPE	reservoir/lake, river/stream, both, GWUDI-FS, GWUDI-LR
E. coli - all methods	METHOD_TYPE	Membrane Filtration; 15-tube MPN; ONPG-MUG; 51-well, ONPG-MUG, 97-well
Both	VALID_STATUS_CODE	entered, lab approved

6.2.3 Legal and Security Considerations

If you choose to submit data via an XML file, that file will be the "official" copy of the data. The web entry forms provide the user with a warning, reminding the user that the sample data must be compliant with certain standards. It is assumed that the laboratory will adhere to the same standards when uploading their XML files. These standards are discussed as follows, by analyte.

Cryptosporidium - Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering *Cryptosporidium* sample data into the LT2 DCTS: all holding times for the sample were met; the sample was received by the laboratory in acceptable condition; and results for the associated method blank, OPR, and positive and negative staining controls were acceptable (EPA Method 1622/1623).

E. coli - Do not enter data for samples that did not meet QC requirements. You are acknowledging the following by entering *E. coli* sample data into the LT2 DCTS: all holding and incubation times and temperatures for the sample were met; the sample was received by the laboratory in acceptable condition; all method-specified QC requirements were met; and all QA/QC criteria and procedures specified in the Manual for the Certification of Laboratories Analyzing Drinking Water (EPA 815-B-97-001) were followed.

The XML file may be submitted with the sample in "lab approved" status. It is assumed that the laboratory is acknowledging that the following if this status is chosen:

Cryptosporidium - By delivering these *Cryptosporidium* monitoring results to the PWS, you are verifying that the results were generated in accordance with all Method 1622/1623 and LT2 rule QC requirements (these criteria are specified in Appendix B).

E. coli - By delivering these *E. coli* monitoring results to the PWS, you are verifying that the results were generated in accordance with all method and LT2 rule QC requirements (these criteria are specified in Appendix C and Appendix D).

If the file is successfully uploaded with a "lab approved" status, all the enclosed samples will move directly to the PWS review process.

6.3 User Process

After an XML file is generated, it can be uploaded through the LT2 website. Users will see a link to "UPLOAD SAMPLES" when they select "CREATE NEW SAMPLES" from the navigation toolbar on the left hand side. Figure 6-1 displays the "Create New Sample" screen.

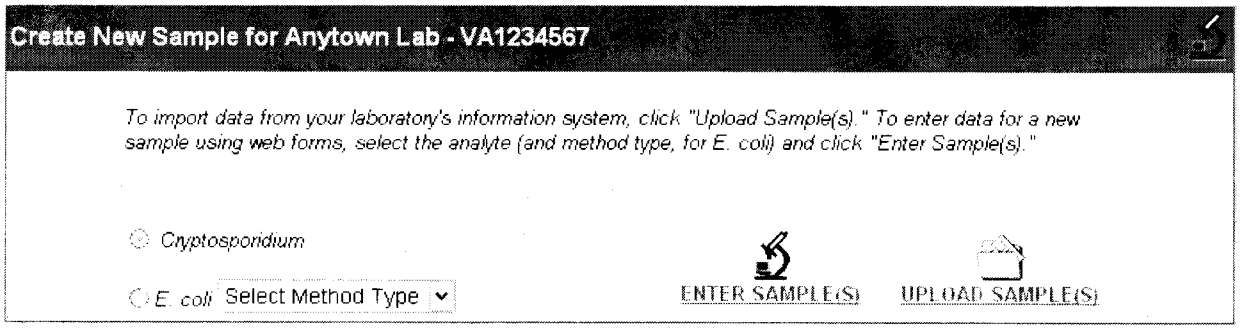


Figure 6-1. Create New Sample Screen

Lab Users that wish to upload XML files from their LIMS or data tracking systems, and that do not have a user-friendly means to convert data from their system to XML for upload should contact the LT2 Hotline, at 1-888-LT2-0020, for assistance. In addition to specific support, the LT2 Hotline staff also can provide free USEPA software for mapping a laboratory's internal database fields to the LT2 DCTS's DTD, and for translating the data to XML format for upload.

The user will then choose the "UPLOAD SAMPLE(S)" link on the right. After arriving at the "Lab Upload" page (Figure 6-2), the user can upload file(s) by clicking the "BROWSE" button. If the user knows the location of the file, they may opt to directly key this information into the text box. Otherwise, the web browser's default directory will be displayed, allowing the user to locate the desired file. The user will select the XML file from their computer to upload and click the "OPEN" button to commit the selection. After the file is selected, the user will click the "UPLOAD FILE" link to import the sample information.

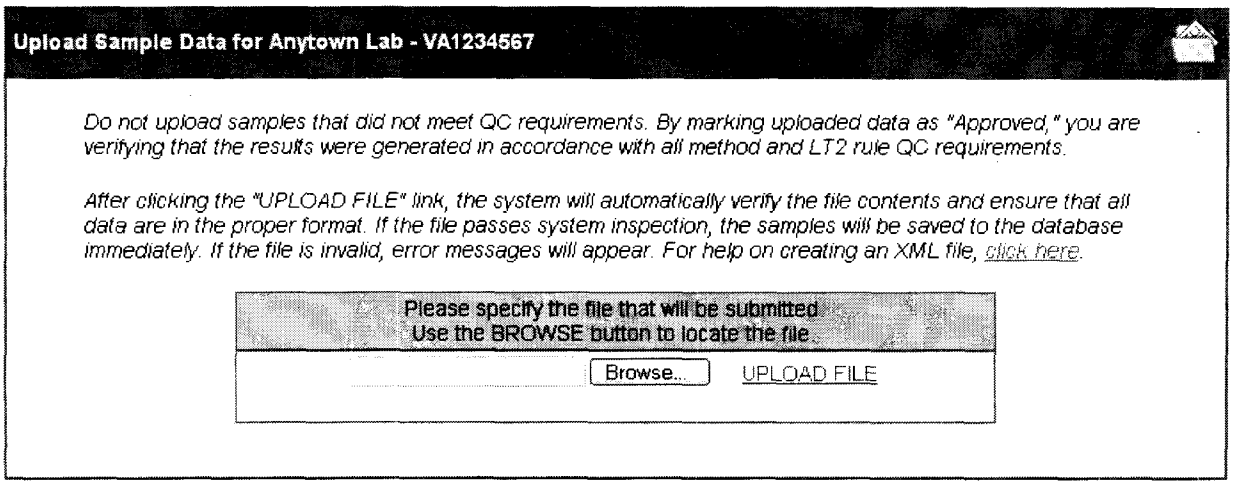


Figure 6-2. Lab Upload

Once the "UPLOAD FILE" link is clicked, the LT2 DCTS begins validating the XML file. The user must wait for the file to be validated before proceeding to other parts of the LT2 DCTS.

If the XML file passes all validation checks, the data will be loaded to the database, and the XML upload page will refresh to show the resulting success message (Figure 6-3). The samples are then available for review through the search module. If the XML file does not pass all validation checks, the XML upload page will refresh to display a list of errors (Figure 6-4). Details will describe the exact sample where an error occurred, as well as the data field containing the error. If there is an error in just one of many samples contained in the file, the entire file will be rejected.

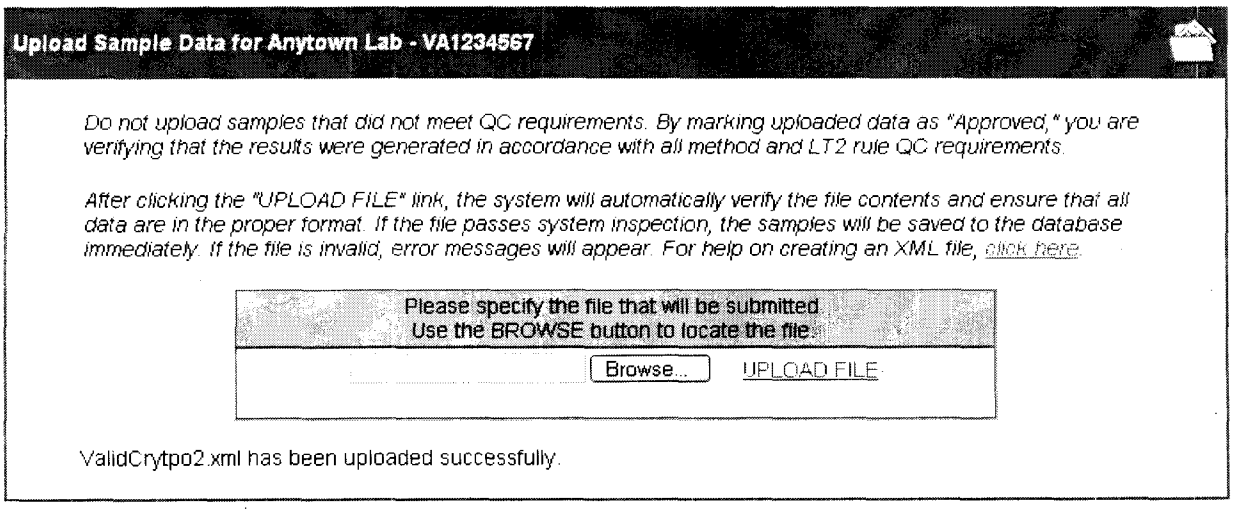


Figure 6-3. Lab Upload – Successful Upload

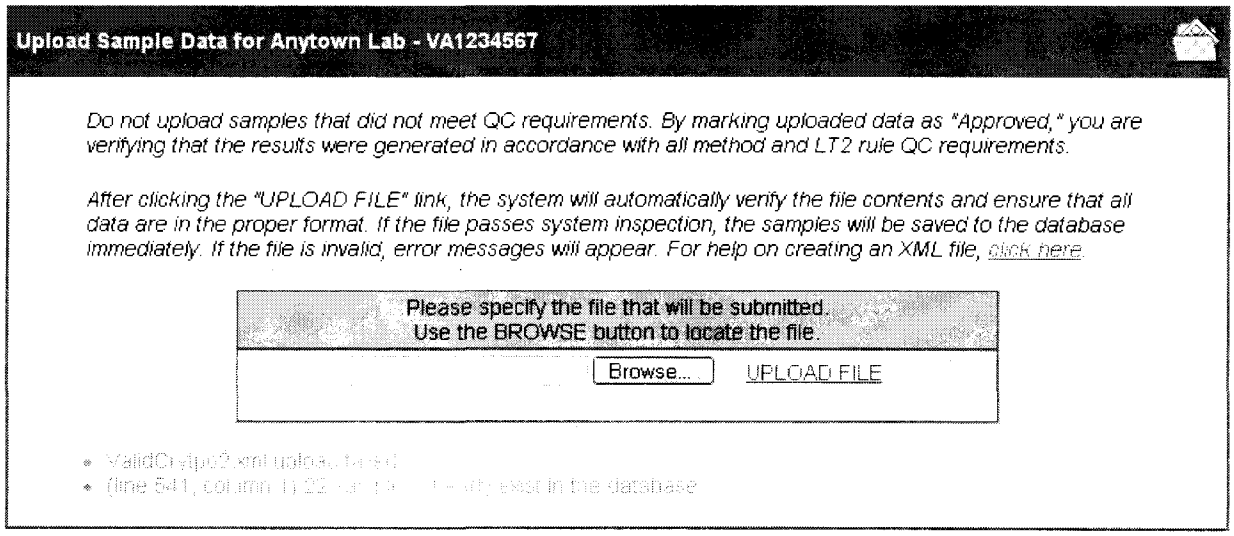


Figure 6-4. Lab Upload – Failed Upload

6.4 LT2 XML Data Flow

To create an XML document, first identify the data fields in your database that will be extracted for transmission to the LT2 DCTS. This involves reviewing the list of LT2 data elements for *Cryptosporidium* or *E. coli* and then mapping them to your database by identifying the appropriate database name, table name, and field name used to store each element. Someone familiar with the structure of the database and the location of the necessary reporting fields for LT2 should be involved in this step.

Next, extract the necessary data from your laboratory's database. Most XML transformation products have the capability of communicating directly with databases and when supplied with a DTD and mapping information, can extract data straight from the database tables into a new XML file. Your XML software provider or LIMS developer should be consulted about the capabilities of the software. Also, consider the ability of the software to validate the XML documents. Validation ensures that the XML document conforms to XML specifications and DTD rules. When an architecture for extracting the data has been determined, the data must be parsed into an XML document according to the LT2 DTD. The LT2 DTDs are provided in Appendix A.

The validated XML document is uploaded to the LT2 DCTS as described in Section 6.2. The LT2 DCTS will send the XML file to the LT2 parser for validation and entry into LT2. If errors prevent the processing of the submission, an error message will be displayed on the screen, and the entire file will be rejected. After making necessary corrections, the data can be resubmitted. After the data elements are loaded into LT2, you will be able to view the data through the LT2 search function.

If "entered" ("Pending Approval" status) is recorded in the status element, you will be able to make changes to the data. If "lab approved" is recorded in the status element, and you have the correct user rights, the data will be automatically sent to the PWS, and the LT2 DCTS date will be marked as the date the laboratory approved the sample. At this point, the laboratory can no longer edit the information. These samples can be viewed from the laboratory's search screen, but changes cannot be made. If the status element was left blank, the sample would be automatically placed in "Pending Approval" status. The Lab Approver User would need to enter the LT2 DCTS and manually approve the sample for PWS review.

Note: *Cryptosporidium* MS samples cannot be submitted in the "lab approved" status, since the user needs to verify that the MS sample is associated with a field sample. Any MS sample submitted in the "Lab Approved" status will be switched to the "Entered" status. The Lab Approver User must log in to the LT2 DCTS to manually approve these MS samples for PWS review.

6.5 Error Corrections and Resubmissions

When the LT2 DCTS determines that the XML file is not valid, a detailed error log will be displayed. The message will detail the information that is incorrect or missing. It is the user's responsibility to make the necessary changes before resubmitting the data to LT2.

Errors could occur because a sample did not pass verification checks. The following lists the verification checks for both *Cryptosporidium* and *E. coli* samples.

6.5.1 *Cryptosporidium* and *E. coli* Verification Rules

- SAMPLE_COLLECTION_DATE has an upper bound of January 1, 2009
- SAMPLE_COLLECTION_DATE and ORIG_SAMPLE_COLLECTION_DATE must not be prior to January 1, 1999
- SAMPLE_COLLECTION_DATE must be equal to or prior to the current date
- If supplied, ORIG_SAMPLE_COLLECTION_DATE must be less than the SAMPLE_COLLECTION_DATE
- SAMPLE_COLLECTION_DATE and ORIG_SAMPLE_COLLECTION_DATE will be saved as (MM/DD/YY)
- ANALYTE is 'Crypto' or 'Ecoli'
- ANALYTE is not null
- SAMPLE_COLLECTION_DATE is not null
- VALID_STATUS_CODE can be null, 'lab approved', or 'entered'
- If VALID_STATUS_CODE is null, then the VALID_STATUS_CODE should be written as 'entered'
- If VALID_STATUS_CODE = 'lab approved' then the LAB_APPROVAL_DATE should be written as the LT2 DCTS date
- If (VALID_STATUS_CODE = 'lab approved' AND USER_ORGANIZATION.USER_ROLE = 'lab_edit') then VALID_STATUS_CODE is saved as 'entered' and LAB_APPROVAL_DATE is null
- If a facility is inactive (FACILITY.STATUS = 'Inactive'), then the SAMPLE_COLLECTION_DATE must be less than the inactivity date (FACILITY.INACTIVE_DATE)
- Sample cannot already exist in the database. This is based on combination of PWS, facility, sampling point, sample collection date, sample type (MS or field), and analyte (*Cryptosporidium* or *E. coli*)
- RESAMPLE must be in (1, 0, 'Y', 'N', 'y', 'n', 'T', 'F', 't', 'f')
- If RESAMPLE in (1, 'Y', 'y', 'T', 't')) then ORIGINAL_SAMPLE_COLLECTION_DATE and LAB_RESAMPLE_EXPLANATION are required
- Data type and length constraints are met, including the minimum and maximum length
- All required data elements have been supplied
- All numerical data are indeed numerical

6.5.2 *Cryptosporidium* Verification Rules

- The SAMPLE_VOLUME_FILTERED cannot be null and must be greater than 0 and entered to the nearest hundredth
- NO_OF_CRYPTO must be a whole number greater than or equal to zero
- ANALYSIS_TYPE cannot be null and must be either 'MS' or 'Field'
- If ANALYSIS_TYPE = 'MS' another sample (with the same PWS, FACILITY, SAMPLING_POINT, SAMPLE_COLLECTION_DATE) should exist where ANALYSIS_TYPE = 'Field'

- If ANALYSIS_TYPE = 'MS', then VALID_STATUS_CODE must be saved as 'entered' regardless of what the user submitted
- If ANALYSIS_TYPE = 'MS', then SAMPLE_VOLUME_SPIKED and NO_OF_CRYPTO_SPIKE cannot be null
- If ANALYSIS_TYPE = 'MS', then SAMPLE_VOLUME_FILTERED must be less than or equal to SAMPLE_VOL_SPIKED
- If ANALYSIS_TYPE = 'MS', then NO_OF_CRYPTO_SPIKE must be a whole number greater than or equal to zero and entered to the nearest hundredth
- If ANALYSIS_TYPE = 'MS', then SAMPLE_VOLUME_SPIKED must be greater than zero
- SAMPLE_VOL_EXAMINED cannot be null and must be one of these ('1', '0', 'Y', 'N', 'y', 'n', 'T', 'F', 't', 'f')
- If SAMPLE_VOL_EXAMINED is ('0', 'N', 'n', 'F', 'f') then RESUSPENDED_CONC_VOL_IMS, RESUSPENDED_CONC_VOL, NUM_FILTERS, and PELLET_VOLUME cannot be null
- If SAMPLE_VOL_EXAMINED is ('0', 'N', 'n', 'F', 'f') or SAMPLE_VOLUME_FILTERED is less than 10 then PELLET_VOLUME must be greater than 0 and reported to the nearest tenth
- If SAMPLE_VOL_EXAMINED is ('0', 'N', 'n', 'F', 'f') then SAMPLE_VOLUME_SPIKED must be greater than 0 and reported to the nearest hundredth
- If SAMPLE_VOL_EXAMINED is ('0', 'N', 'n', 'F', 'f') then RESUSPENDED_CONC_VOL must be greater than or equal to 0 and entered to the nearest tenth
- If SAMPLE_VOL_EXAMINED is ('0', 'N', 'n', 'F', 'f') then RESUSPENDED_CONC_VOL_IMS must be greater than or equal to 0 and entered to the nearest tenth
- If SAMPLE_VOL_EXAMINED is ('0', 'N', 'n', 'F', 'f') then RESUSPENDED_CONC_VOL_IMS must be equal to or less than RESUSPENDED_CONC_VOL
- If SAMPLE_VOLUME_FILTERED is less than 10, then NUM_FILTERS and PELLET_VOLUME cannot be null
- If SAMPLE_VOLUME_FILTERED is less than 10 then NUM_FILTERS must be a whole number greater than or equal to 0
- RESUSPENDED_CONC_VOL_IMS, RESUSPENDED_CONC_VOL, NUM_FILTERS, PELLET_VOLUME, NO_OF_CRYPTO_SPIKE, NO_OF_CRYPTO, SAMPLE_VOLUME_FILTERED, SAMPLE_VOLUME_SPIKED must be numeric

6.5.3 *E. coli* Verification Rules

- METHOD_TYPE cannot be null and must be either 'Membrane Filtration', '15-Tube MPN', 'ONPG-MUG, 97-well' or 'ONPG-MUG, 51-well'
- ANALYTICAL_METHOD_NUMBER cannot be null
- If METHOD_TYPE = 'ONPG-MUG, 97-well' or 'ONPG-MUG, 51-well', ANALYTICAL_METHOD_NUMBER must be either 'SM 9223 (Colilert)' or 'SM 9223 (Colilert-18)'
- If METHOD_TYPE = '15-Tube MPN', ANALYTICAL_METHOD_NUMBER must be either 'SM 9223 (Colilert)', 'SM 9221B/9221F (LTB/EC-MUG)' or 'SM 9223 (Colilert-18)'
- If METHOD_TYPE = 'Membrane Filtration', ANALYTICAL_METHOD_NUMBER must be either 'SM 9213D (mTEC)', 'SM 9222B/9222G (mENDO/NA-MUG)', 'SM 9222B/9222G (LesENDO/NA-MUG)', 'SM 9222D/9222G (mFC/NA-MUG)', 'EPA 1603 (modified mTEC)', 'EPA 1604 (MI Medium)', or 'mColiBlue-24'
- TURBIDITY_VALUE cannot be null and must be greater than or equal to zero if the PWSs is a filtered system with a population greater than 10,000
- SOURCE_WATER_TYPE cannot be null and must be either 'Lake/Reservoir', 'Flowing Stream', or 'Both FS and L/R'

- If METHOD_TYPE = 'ONPG-MUG, 97-well' and SAMPLE_CALC is null then VOLUME_ANALYZED, COLIFORM_LARGE_WELLS, and COLIFORM_SMALL_WELLS cannot be null
- If METHOD_TYPE = 'ONPG-MUG, 51-well' and SAMPLE_CALC is null then VOLUME_ANALYZED and COLIFORM_POSITIVE cannot be null
- If METHOD_TYPE = '15-Tube MPN' and SAMPLE_CALC is null then POSITIVE_10_TUBES, POSITIVE_1_TUBES, POSITIVE_01_TUBES cannot be null.
- If METHOD_TYPE = '15-Tube MPN' and SAMPLE_CALC is null then POSITIVE_10_TUBES, POSITIVE_1_TUBES, POSITIVE_01_TUBES, POSITIVE_001_TUBES, and POSITIVE_0001_TUBES can be entered.
- If METHOD_TYPE = 'Membrane Filtration' and SAMPLE_CALC is null then one pair of FILTER_VOLUME and FILTER_CFU must be supplied
- If METHOD_TYPE = 'Membrane Filtration' and SAMPLE_CALC is null then FILTER1_VOLUME, FILTER1_CFU, FILTER2_VOLUME, FILTER2_CFU, FILTER3_VOLUME, FILTER3_CFU, FILTER4_VOLUME and FILTER4_CFU can be entered
- If METHOD_TYPE = 'Membrane Filtration', SAMPLE_CALC is null and a value is supplied for a FILTER_VOLUME then the corresponding FILTER_CFU cannot be null
- If METHOD_TYPE = 'Membrane Filtration', SAMPLE_CALC is null and a value is supplied for a FILTER_CFU then the corresponding FILTER_VOLUME cannot be null
- If required, FILTER_VOLUME must be greater than 0 and less than or equal to 100
- If required, FILTER_CFU must be a whole number
- VOLUME_FILTERED for membrane filtration methods cannot exceed 100 mL
- If required, COLIFORM_POSITIVE, COLIFORM_LARGE_WELLS, and COLIFORM_SMALL_WELLS must be a whole number greater than 0
- If required, COLIFORM_POSITIVE must be less than or equal to 51
- If required, COLIFORM_LARGE_WELLS must be less than or equal to 49
- If required, COLIFORM_SMALL_WELLS must be less than or equal to 48
- If required, VOLUME_ANALYZED must be greater than 0 and less than or equal to 100
- If required, POSITIVE_10_TUBES, POSITIVE_1_TUBES, POSITIVE_01_TUBES, POSITIVE_001_TUBES, and POSITIVE_0001_TUBES must have a whole number value of ('0', '1', '2', '3', '4', '5')

Section 7. Legal and Security Considerations

This section focuses on legal and security considerations for all user types to ensure security and reliability of the user accounts and data submitted through the LT2 DCTS. By using web forms or the XML upload process to submit LT2 data, the DCTS reduces the burden on reporting facilities and responsible environmental agencies for collecting and report data and keeping records. The reduced burden is a result of eliminating labor, time, and other costs associated with submitting data on paper. It is important to note, however, that electronic reporting does not alleviate or alter a submitter's responsibilities or liabilities.

7.1 Application Location

The LT2 DCTS is hosted on USEPA's Research Triangle Park (RTP) database and Internet Web servers. All users access the LT2 DCTS directly through the USEPA servers via their Internet connection and Web browser. The LT2 DCTS is hosted within a secure environment and monitored by USEPA's National Technology Services Division (NTSD). The LT2 DCTS was designed and developed in accordance with all USEPA policies and procedures for public access databases intended for release into the central environment.

7.2 LT2 User Responsibilities

The USEPA relies on all LT2 users to ensure that the data are protected from loss, misuse, and unauthorized access or modification. Users are required to behave in an ethical and trustworthy manner. Users should not attempt to perform actions or processing for which they do not have authorization. Actions related to LT2 database administration are tracked using audit trails.

Update authority at the PWS and Laboratory is controlled by the individual organizations. Enforcement of security for these facilities is not an EPA responsibility. All LT2 users are responsible and accountable for the use of the data either through direct access or via applications the users develop.

7.3 Passwords

Each individual is responsible for maintaining the integrity of his/her own User Name and Password. Transactions made with your User Name and Password are considered approved and submitted by you. If you believe your User Name or Password has been compromised, email LT2 Technical Support, at stage2mdbp@epa.gov, or contact the LT2 Hotline, at 1-888-LT2-0020.

Users can help ensure the integrity of their passwords by taking the following precautions:

- Change your passwords every 30 days
- Use passwords containing at least eight characters, including letters and numbers
- Do not use family names, birthdays, words describing personal interests or facets of your life that could be guessed, or words found in a dictionary
- Use a different password than those used within the last eight versions of your password
- Control access to your PC workstation and logout whenever leaving your machine.

7.4 Record Keeping

USEPA recommends that you keep a copy of all transactions (including the time and date) sent to and received from USEPA or in accordance with your policies and procedures. These transactions may

include submissions, receipt acknowledgments, error messages, resubmissions, and transmissions. The saved copies are your audit trail for submissions to USEPA.

The LT2 rule will require laboratories to keep hardcopies of all quality control (QC) data for all data submitted. Laboratories may only submit data to the LT2 DCTS that has met all of the QC requirements. Common business practice is to back up and archive your electronic data in case the system fails. As technology progresses and you upgrade, you may want to consider backward compatibility for document retrieval. You also should consider keeping more than one copy as a backup in case the hardware or software fails, a virus attacks, or other technological anomalies occur.

Appendix A. LT2 Data Collection System XML DTD

Cryptosporidium DTD

<?xml version="1.0" encoding="UTF-8"?>

<!-- In the XMl file a DATE_FORMAT element needs to define the format of the dates in your xml file the Format syntax will specify a time date pattern as the following table will show

Symbol	Meaning	Presentation	Example
G	era designator	(Text)	AD
Y	year	(Number)	1996
M	month in year	(Text & Number)	July & 07
D	day in month	(Number)	10
H	hour in am/pm (1 ~ 12)	(Number)	12
H	hour in day (0 ~ 23)	(Number)	0
M	minute in hour	(Number)	30
S	second in minute	(Number)	55
S	millisecond	(Number)	978
E	day in week	(Text)	Tuesday
D	day in year	(Number)	189
F	day of week in month	(Number)	2 (2nd Wed in July)
W	week in year	(Number)	27
W	week in month	(Number)	2
A	am/pm marker	(Text)	PM
K	hour in day (1~24)	(Number)	24
K	hour in am/pm (0~11)	(Number)	0
Z	time zone	(Text)	Pacific Standard Time
'	escape for text	(Delimiter)	
"	single quote	(Literal)	'

Format Pattern	Result
"yyyy-MM-dd G 'at' hh:mm:ss z"	2002-07-10 AD at 15:08:56 PDT
"EEE, MMM d, "yy"	Wed, July 10, '96
"h:mm a"	12:08 PM
"hh 'o"clock' a, zzzz"	12 o'clock PM, Pacific Daylight Time
"K:mm a, z"	0:00 PM, PST
"yyyyy.MMMMM.dd GGG hh:mm aaa"	1996.July.10 AD 12:08 PM

-->

<!ELEMENT CRYPTO_SAMPLES (PWS+)>

<!ELEMENT PWS (FACILITY+)>

<!ELEMENT FACILITY (SAMPLING_POINT+)>

<!ELEMENT SAMPLING_POINT (SAMPLE+)>

<!ELEMENT SAMPLE (ANALYTE, LAB_SAMPLE_ID?, SAMPLE_COLLECTION_DATE,DATE_FORMAT, CRYPTO+, VALID_STATUS_CODE?,LAB_COMMENT?, RESAMPLE, ORIG_SAMPLE_COLLECTION_DATE?, LAB_RESAMPLE_EXPLANATION?)>

<!ELEMENT ANALYTE (#PCDATA)>

<!ELEMENT LAB_SAMPLE_ID (#PCDATA)>

<!ELEMENT SAMPLE_COLLECTION_DATE (#PCDATA)>

<!ELEMENT DATE_FORMAT (#PCDATA)>

<!ELEMENT CRYPTO (SAMPLE_VOL_EXAMINED?, ANALYSIS_TYPE?, SAMPLE_VOLUME_FILTERED?, NO_OF_CRYPTO?, RESUSPENDED_CONC_VOL?, RESUSPENDED_CONC_VOL_IMS?, NUM_FILTERS?, PELLET_VOLUME?, SAMPLE_VOLUME_SPIKED?, NO_OF_CRYPTO_SPIKE?)>

<!ELEMENT SAMPLE_VOL_EXAMINED (#PCDATA)>

<!ELEMENT ANALYSIS_TYPE (#PCDATA)>

<!ELEMENT SAMPLE_VOLUME_FILTERED (#PCDATA)>

<!ELEMENT NO_OF_CRYPTO (#PCDATA)>

<!ELEMENT RESUSPENDED_CONC_VOL (#PCDATA)>

<!ELEMENT RESUSPENDED_CONC_VOL_IMS (#PCDATA)>

<!ELEMENT NUM_FILTERS (#PCDATA)>

<!ELEMENT PELLET_VOLUME (#PCDATA)>

<!ELEMENT SAMPLE_VOLUME_SPIKED (#PCDATA)>

<!ELEMENT NO_OF_CRYPTO_SPIKE (#PCDATA)>

<!ELEMENT VALID_STATUS_CODE (#PCDATA)>

<!ELEMENT LAB_COMMENT (#PCDATA)>

<!ELEMENT RESAMPLE (#PCDATA)>

<!ELEMENT ORIG_SAMPLE_COLLECTION_DATE (#PCDATA)>

<!ELEMENT LAB_RESAMPLE_EXPLANATION (#PCDATA)>

<!ATTLIST PWS PWS_CODE CDATA #REQUIRED>

<!ATTLIST FACILITY FACILITY_CODE CDATA #REQUIRED>

<!ATTLIST SAMPLING_POINT SAMPLING_POINT_CODE CDATA #REQUIRED >

E. coli DTD

<?xml version="1.0" encoding="UTF-8"?>

<!-- In the XMl file a DATE_FORMAT element needs to define the format of the dates in your xml file the Format syntax will specify a time date pattern as the following table will show

Symbol	Meaning	Presentation	Example
G	era designator	(Text)	AD
Y	year	(Number)	1996
M	month in year	(Text & Number)	July & 07
D	day in month	(Number)	10
H	hour in am/pm (1 ~ 12)	(Number)	12
H	hour in day (0 ~ 23)	(Number)	0
M	minute in hour	(Number)	30
S	second in minute	(Number)	55
S	millisecond	(Number)	978
E	day in week	(Text)	Tuesday
D	day in year	(Number)	189
F	day of week in month	(Number)	2 (2nd Wed in July)
W	week in year	(Number)	27
W	week in month	(Number)	2
A	am/pm marker	(Text)	PM
K	hour in day (1~24)	(Number)	24
K	hour in am/pm (0~11)	(Number)	0
Z	time zone	(Text)	Pacific Standard Time
'	escape for text	(Delimiter)	
''	single quote	(Literal)	'

Format Pattern	Result
"yyyy-MM-dd G 'at' hh:mm:ss z"	2002-07-10 AD at 15:08:56 PDT
"EEE, MMM d, "yy"	Wed, July 10, '96
"h:mm a"	12:08 PM
"hh 'o"clock' a, zzzz"	12 o'clock PM, Pacific Daylight Time
"K:mm a, z"	0:00 PM, PST
"yyyyy.MMMMM.dd GGG hh:mm aaa"	1996.July.10 AD 12:08 PM

-->

<!ELEMENT ECOLI_SAMPLES (PWS+)>
<!ELEMENT PWS (FACILITY+)>
<!ELEMENT FACILITY (SAMPLING_POINT+)>
<!ELEMENT SAMPLING_POINT (SAMPLE+)>

<!ELEMENT SAMPLE (ANALYTE, LAB_SAMPLE_ID?, SAMPLE_COLLECTION_DATE,DATE_FORMAT, ECOLI+, VALID_STATUS_CODE?, LAB_COMMENT?, RESAMPLE, ORIG_SAMPLE_COLLECTION_DATE?, LAB_RESAMPLE_EXPLANATION?)>

<!ELEMENT ANALYTE (#PCDATA)>

<!ELEMENT LAB_SAMPLE_ID (#PCDATA)>

<!ELEMENT SAMPLE_COLLECTION_DATE (#PCDATA)>

<!ELEMENT DATE_FORMAT (#PCDATA)>

<!ELEMENT ECOLI (ANALYTICAL_METHOD_NUMBER?, SOURCE_WATER_TYPE, TURBIDITY_VALUE?, SAMPLE_CALC?, FILTER1_VOLUME?, FILTER1_CFU?, FILTER2_VOLUME?, FILTER2_CFU?, FILTER3_VOLUME?, FILTER3_CFU?, FILTER4_VOLUME?, FILTER4_CFU?, VOLUME_ANALYZED?, COLIFORM_LARGE_WELLS?, COLIFORM_SMALL_WELLS?, COLIFORM_POSITIVE?, POSITIVE_10_TUBES?, POSITIVE_1_TUBES?, POSITIVE_01_TUBES?, POSITIVE_001_TUBES?, POSITIVE_0001_TUBES?,METHOD_TYPE)>

<!ELEMENT ANALYTICAL_METHOD_NUMBER (#PCDATA)>

<!ELEMENT SOURCE_WATER_TYPE (#PCDATA)>

<!ELEMENT TURBIDITY_VALUE (#PCDATA)>

<!ELEMENT SAMPLE_CALC (#PCDATA)>

<!ELEMENT FILTER1_VOLUME (#PCDATA)>

<!ELEMENT FILTER1_CFU (#PCDATA)>

<!ELEMENT FILTER2_VOLUME (#PCDATA)>

<!ELEMENT FILTER2_CFU (#PCDATA)>

<!ELEMENT FILTER3_VOLUME (#PCDATA)>

<!ELEMENT FILTER3_CFU (#PCDATA)>

<!ELEMENT FILTER4_VOLUME (#PCDATA)>

<!ELEMENT FILTER4_CFU (#PCDATA)>

<!ELEMENT VOLUME_ANALYZED (#PCDATA)>

<!ELEMENT COLIFORM_LARGE_WELLS (#PCDATA)>

<!ELEMENT COLIFORM_SMALL_WELLS (#PCDATA)>

<!ELEMENT COLIFORM_POSITIVE (#PCDATA)>

<!ELEMENT POSITIVE_10_TUBES (#PCDATA)>

<!ELEMENT POSITIVE_1_TUBES (#PCDATA)>

<!ELEMENT POSITIVE_01_TUBES (#PCDATA)>

<!ELEMENT POSITIVE_001_TUBES (#PCDATA)>

<!ELEMENT POSITIVE_0001_TUBES (#PCDATA)>

<!ELEMENT METHOD_TYPE (#PCDATA)>

<!ELEMENT VALID_STATUS_CODE (#PCDATA)>

<!ELEMENT LAB_COMMENT (#PCDATA)>

<!ELEMENT RESAMPLE (#PCDATA)>

<!ELEMENT ORIG_SAMPLE_COLLECTION_DATE (#PCDATA)>

<!ELEMENT LAB_RESAMPLE_EXPLANATION (#PCDATA)>

<!ATTLIST PWS PWS_CODE CDATA #REQUIRED>

<!ATTLIST FACILITY FACILITY_CODE CDATA #REQUIRED>

<!ATTLIST SAMPLING_POINT SAMPLING_POINT_CODE CDATA #REQUIRED >

Appendix B. Requirements Checklist for *Cryptosporidium* Sample Results Entered into the LT2 Data Collection System

No.	Factor	Requirement	✔
General Requirements			
1	Sample condition upon receipt	The sample temperature upon receipt for the sample was between 0°C and 8°C, and the sample was not frozen	
2	Sample volume	The volume analyzed for the sample was at least 10 L *OR* at least 2 mL of packed pellet volume was analyzed *OR* 2 filters were used and clogged and 100% of the volume filtered was analyzed	
Holding Time Requirements			
3	Sample collection	The elution step for the sample was initiated within 96 hours of sample collection (if shipped to the laboratory as a bulk sample) or filtration (if filtered in the field)	
4	Sample processing	The sample was processed (eluted, concentrated, purified, and applied to the slide) in one working day	
5	Sample drying	The slide(s) for the sample were stained within 72 hours of application of the sample to the slide	
6	Sample examination	The slide(s) for the sample were examined within 7 days of staining	
Quality Control (QC) Sample Requirements			
7	QC batch	The ongoing precision and recovery (OPR) and method blank samples associated with the sample are associated with no more than 20 field and matrix spike samples and no more than a week of samples	
8	Method blank results	The method blank sample for the QC batch was acceptable (no *Cryptosporidium* oocysts or potentially interfering materials were found in the method blank)	
9	OPR sample results	The OPR sample for the QC batch was acceptable (recovery was at least 24%)	
10	Spike levels for OPR	The associated OPR was spiked with no more than 500 oocysts	
11	Spike materials for OPR	The spiking suspension used for the associated OPR was flow-cytometer sorted	
Staining Control Requirements			
12	Staining control frequency	A positive and negative staining control slide is associated with the slide for this sample	
13	Positive staining control result	The positive staining control for this sample is acceptable (it contained oocysts within the expected range and at the appropriate fluorescence for both FITC and DAPI)	
14	Negative staining control result	The negative staining control for this sample is acceptable (it did not contain any oocysts)	
Matrix Spike (MS) Sample Requirements			
15	Sample volume	The same sample volume was analyzed for the MS sample and the associated, unspiked field sample	
16	Method version	The same method version (filter, IMS, staining kit) was used for the MS sample and the associated, unspiked field sample	
17	Spike amount for MS	The MS sample was spiked with no more than 500 oocysts	
18	Spike materials for MS	The spiking suspension used for the MS was flow-cytometer sorted	

Appendix C. Requirements Checklist for Most Probable Number *E. coli* Sample Results Entered into the LT2 Data Collection System

No.	Factor	Check sample results to verify that:	✔
Sample Condition			
1	Sample condition upon receipt	The sample temperature upon receipt for the sample was between 0°C and 10°C, and the sample was not frozen or leaking	
Holding Time and Temperature			
2	Holding time and temperature	The sample was analyzed within 24 hours of sample collection and maintained at <10°C, but not freezing, between collection and analysis	
General Quality Control			
3	Dilution/rinse water sterility check	The dilution/rinse water sterility check was acceptable (target organism or potentially interfering materials were not found in the sterility check)	
4	Media sterility check	The media sterility check was acceptable (target organism or potentially interfering materials were not found in the sterility check)	
5	Positive/negative controls	The positive/negative controls were acceptable	
6	Media storage specifications	The media storage specifications were not exceeded	
Most Probable Number QC Specifications			
7	Incubation time and temperature	The following incubation time and temperature requirements were not exceeded: Colilert 24 - 28 hours at 35°C±0.5°C Colilert-18 18 -22 hours at 35°C±0.5°C LTB 24±2 or 48±3 hours at 35°C±0.5°C EC-MUG 24±2 hours at 44.5°C±0.2°C	
8	Preparation blank	The preparation blank was not contaminated with the target organism	
9	Verification of positive results	The verifications, performed in accordance with method-specific requirements, were acceptable	

Appendix D. Requirements Checklist for Membrane Filtration *E. coli* Sample Results Entered into the LT2 Data Collection System

No.	Factor	Check sample results to verify that:	✔
Sample Condition			
1	Sample condition upon receipt	The sample temperature upon receipt for the sample was between 0°C and 10°C, and the sample was not frozen or leaking	
Holding Time and Temperature			
2	Holding time and temperature	The sample was analyzed within 24 hours of sample collection and maintained at <10°C, but not freezing, between collection and analysis	
General Quality Control			
3	Dilution/rinse water sterility check	The dilution/rinse water sterility check was acceptable (target organism or potentially interfering materials were not found in the sterility check)	
4	Media sterility check	The media sterility check was acceptable (target organism or potentially interfering materials were not found in the sterility check)	
5	Positive/negative controls	The positive/negative controls were acceptable	
6	Media storage specifications	The media storage specifications were not exceeded	
Membrane Filtration QC Specifications			
7	Incubation time and temperature	The following incubation time and temperature requirements were not exceeded: mEndo NA-MUG 24±2 hours at 35°C±0.5°C- 4 hours at 35°C±0.5°C LES-Endo NA-MUG 24±2 hours at 35°C±0.5°C- 4 hours at 35°C±0.5°C mFC NA-MUG 24±2 hours at 44.5°C±0.2°C- 4 hours at 35°C±0.5°C mTEC 2 hours at 35°C±0.5°C -22-24 hours at 44.5°C±0.2°C Modified mTEC 2 hours at 35°C±0.5°C -22-24 hours at 44.5°C±0.2°C MI Medium 24 hours at 35°C±0.5°C m-ColiBlue24 24 hours at 35°C±0.5°C	
8	Filtration unit sterility check	The Filtration unit sterility check was acceptable (target organism or potentially interfering materials were not found in the sterility check)	
9	Preparation blank	The preparation blank was not contaminated with the target organism	
10	Colony verification	The verifications, performed in accordance with method-specific requirements, were acceptable	

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Appendix G

Submission Review Checklists

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Intent to Provide Full Treatment - Background Information for Reviewers

The following information will assist reviewers conducting *Intent to Provide Full Treatment* reviews. It is not intended to be an extensive explanation of the LT2ESWTR requirements. For more information on LT2ESWTR requirements, please refer to the EPA website (www.epa.gov/safewater/disinfection/lt2) and review the following documents:

- Source Water Monitoring Guidance Manual
- Factsheets:
  - LT2ESWTR Source Water Monitoring for System Serving Less than 10,000 People
  - LT2ESWTR Source Water Monitoring for Systems Serving at Least 10,000 People
- LT2ESWTR Quick Reference Guide (Schedules 1, 2, 3, & 4)

I. Intent to Provide Full Treatment Requirements

For Filtered Systems:

Filtered systems are not required to conduct source water monitoring under the LT2ESWTR if the system currently provides or will establish treatment that will provide a total of at least 5.5-log of treatment for Cryptosporidium, equivalent to meeting the treatment requirements of Bin 4 in the LT2ESWTR.

For Unfiltered Systems:

Unfiltered systems are not required to conduct source water monitoring under the LT2ESWTR if the system will provide a total of at least 3-log Cryptosporidium inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean Cryptosporidium concentration of greater than 0.01 oocysts/L.

II. Before Submitting an Intent to Provide Full Treatment

Systems that are considering this option to avoid monitoring, or that currently provide treatment equivalent to meeting the treatment requirements of Bin 4 (filtered systems: 5.5-log of treatment for *Cryptosporidium* & unfiltered systems: 3-log *Cryptosporidium* inactivation), should consult with the state or EPA before submitting their intent to provide full treatment. The reviewer should confirm that the system has discussed with either EPA or the state the microbial toolbox credits provided in the LT2ESWTR, the systems' existing treatment capabilities, any credits already determined by the state and understands the treatment capabilities needed to fulfill the LT2 Rule requirements. The reviewer should also ensure that the system is aware of the dates by which all equipment must be installed and in operation to provide the required level of treatment by the applicable compliance date.

III. Submitting an Intent to Provide Full Treatment

The system must submit the intent to provide full treatment in written form no later than the date the system is required to submit a sampling schedule for monitoring. A template is provided in the Source Water Monitoring Guidance Manual (Appendix A). The system does not have to use this template, however the reviewer can use the template to make sure all the necessary information has been provided. Alternatively, a system may choose to stop at any point after it has initiated monitoring if it provides written notification to the EPA or state that it will provide the required level of treatment.

IV. Approving an Intent to Provide Full Treatment

The reviewer should feel confident that the system will be capable of providing the required level of treatment before approving the intent to provide full treatment. This may require additional discussion between the reviewer and the system. If the submission is not approved, the reviewer should provide the system with further guidance regarding options to comply with the initial source water monitoring requirements.

Intent to Provide Full Treatment – Checklist Instructions

The set of instructions will assist reviewers using the *Intent to Provide Full Treatment* Checklist.

Part 1: PWS Information

1.A – PWS Name – Enter complete PWS name.

1.B – PWSID – Enter the complete 9-character Federal PWSID number.

1.C – Address – Enter mailing address for PWS.

1.D – Schedule – Enter Schedule information as provided by the System. Reviewer should refer to the Data Collection and Tracking System (DCTS) to ensure the schedule indicated by the system matches the information found in the inventory. The reviewer should indicate if the schedules do not match.

1.E – Water Treatment Plant Name – Enter the full water treatment plant name as stated in the submission.

1.F – Date Received – Enter date when submission was received.

1.G – Water System Facility ID – Enter the Water System Facility ID if applicable.

1.H – Date Assigned – Enter date when submission was assigned to the Reviewer.

Part 2: Submission Approval

2.A – Indicate if the system submitted its *Intent to Provide Full Treatment* no later than the date identified below for its Schedule:

- Schedule 1 – by July 1, 2006
- Schedule 2 – by January 1, 2007
- Schedule 3 – by January 1, 2008
- Schedule 4 – filtered PWS monitoring for E.Coli - by July 1, 2008
- Schedule 4 – PWS monitoring for Cryptosporidium – by July 1, 2010

NOTE: The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For more information on sampling schedules, consult Section 1 of the LT2 Source Water Monitoring Guidance Manual.

2.B – If applicable, indicate if the filtered system stated it will provide at least 5.5 log of treatment for Cryptosporidium by the compliance date.

2.C – If applicable, indicate if the unfiltered system stated it will provide at least 3 log of treatment for Cryptosporidium by the compliance date.

2.D – Indicate if the system has provided enough information about how it plans to provide the adequate level of treatment. Systems are encouraged to discuss the requirements of the rule with the state or U.S. EPA to ensure the system understands what it means to provide full treatment under the rule and for the state or U.S. EPA to get a better sense if the system will be able to provide the required level of treatment.

2.E – Indicate if the Intent to Provide Full Treatment has been approved. The reviewer should only approve the intent to provide full treatment if the system has demonstrated a complete understanding of the intent and is capable of providing the adequate level of treatment. It is recommended that the reviewer indicate the conditions of the approval or reasons why the submission has not been approved in the comments section found at the end of the checklist. If the submission is disapproved, the reviewer should inform the system of the status of its submission and provide information regarding what the next steps are for the system in a timely manner.

2.F – After completing the checklist, the reviewer must input the information into the DCTS. The reviewer should record the date of when the data was entered into the DCTS.

Intent to Provide Full Treatment - Checklist	
Part 1. PWS Information	
1.A PWS Name:	1.B PWS ID:
1.C PWS Address:	1.D Schedule:
1.E Water Treatment Plant Name:	1.F Date Received:
1.G Water System Facility ID:	1.H Date Assigned:
Part 2: Submission Approval	
2.A ☐ YES ☐ NO	Notice of Intent was submitted by the date listed below (at least three months prior to the date when the PWS monitoring period begins) -Schedule 1* – by July 1, 2006 -Schedule 2* – by January 1, 2007 -Schedule 3* – by January 1, 2008 -Schedule 4* – filtered PWS monitoring for *E. coli* – by July 1, 2008 -Schedule 4* – PWS monitoring for *Cryptosporidium* – by July 1, 2010
2.B ☐ YES ☐ NO ☐ N/A	Filtered PWS indicates it is providing or will provide a total of at least 5.5-log of treatment for *Cryptosporidium* by the applicable compliance date
2.C ☐ YES ☐ NO ☐ N/A	Unfiltered PWS indicates it is providing or will provide a total of at least 3-log *Cryptosporidium* inactivation by the applicable compliance date
2.D ☐ YES ☐ NO	PWS indicates the treatment it intends to use AND that it has discussed the requirements with the state or U.S. EPA
2.E ☐ YES ☐ NO	Intent to Provide Full Treatment has been approved. (If no is checked, provide explanation in comments field)
2.F ☐ YES ☐ NO	Intent to Provide Full Treatment has been entered into the DCTS (If it has not, please enter it and then check yes here)
Comments: (Include notes from any discussions with the PWS. Use additional sheets if necessary)	
Initial Reviewer:	Date:
Final Reviewer:	Date:

*The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS).

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Intent to Grandfather - *Background Information for Reviewers*

The following information will assist reviewers conducting *Intent to Grandfather* reviews. It is not intended to be an extensive explanation of the LT2ESWTR requirements. For more information on LT2ESWTR requirements, please refer to the EPA website (www.epa.gov/safewater/disinfection/lt2) and review the following documents:

- Source Water Monitoring Guidance Manual
- Factsheets:
  - LT2ESWTR Source Water Monitoring for System Serving Less than 10,000 People
  - LT2ESWTR Source Water Monitoring for Systems Serving at Least 10,000 People
- LT2ESWTR Quick Reference Guide (Schedules 1, 2, 3, & 4)

I. What constitute Grandfather data

Grandfather data are results generated before monitoring begins as required under the LT2ESWTR that will be used by a system to determine the bin classification or mean *Cryptosporidium* level. Systems may grandfather all the required samples for initial source water monitoring as long as the samples are taken according to the specifications outlined in the rule. The system is also able to grandfather a portion of the required monitoring and conduct additional monitoring to complete the required number of samples. Grandfather data should only be approved if the data submitted is equivalent to the data collected during the initial source water monitoring and therefore eligible for determining bin classification or establishing Cryptosporidium level. The option of grandfather data is only available for the initial source water monitoring round. Systems will not be able to grandfather data for the second round of source water monitoring.

II. Submitting an intent to grandfather

Systems planning to submit grandfather data must first submit intent to grandfather by the date specified in the rule for their schedule, which is no later than the date to submit their source water monitoring plan. A template is found in the Source Water Monitoring Guidance Manual (Appendix K). If the system opts not to use the template, the following information must be included in the submission:

- Number of previously collected results that will be submitted for grandfathering
- Dates of the first and last sample
- Whether the system will collect additional source water monitoring samples to meet the requirements.

If the system will not be able to grandfather all the required number of samples, additional monitoring must be conducted to meet the initial source water monitoring requirements of the system. The reviewer should review both the intent to grandfather and the source water monitoring sample schedule and location submissions to ensure that both the grandfather data and the additional monitoring will satisfy the rule requirements.

III. Upon Approval of the intent to grandfather

The system will be required to submit the data within two months after the initial source water monitoring is scheduled to begin. The reviewer should take a close look at the data to ensure that all the data submitted meets the LT2 initial source water monitoring requirements. If the reviewer realizes that some of the data does not meet the requirements, the reviewer shall inform the system immediately so that the system may modify the monitoring schedule accordingly. A review checklist for Grandfather Data has been attached to this document. Please refer to it when conducting Grandfather Data review.

Intent to Grandfather – Checklist Instructions

The set of instructions below will assist reviewers using the *Intent to Grandfather* Checklist.

Part 1: PWS Information

1.A – PWS Name – Enter complete PWS name.

1.B – PWSID – Enter the complete 9-character Federal PWSID number.

1.C – Address – Enter mailing address for PWS.

1.D – Schedule – Enter Schedule information as provided by the System. Reviewer should refer to the Data Collection and Tracking System (DCTS) to ensure the schedule indicated by the system matches the information found in the inventory. The reviewer should indicate if the schedules do not match.

1.E – Water Treatment Plant Name – Enter the full water treatment plant name as stated in the submission.

1.F – Date Received – Enter date when submission was received.

1.G – Water System Facility ID – Enter the Water System Facility ID if applicable.

1.H – Date Assigned – Enter date when submission was assigned to the Reviewer.

Part 2: Submission Approval

2.A – Indicate if the system submitted its *Intent to Grandfather* no later than the date identified below for its Schedule:

- Schedule 1 – by July 1, 2006
- Schedule 2 – by January 1, 2007
- Schedule 3 – by January 1, 2008
- Schedule 4 – filtered PWS monitoring for E.Coli - by July 1, 2008
- Schedule 4 – PWS monitoring for Cryptosporidium – by July 1, 2010

NOTE: The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For more information on sampling schedules, consult Section 1 of the LT2 Source Water Monitoring Guidance Manual.

2.B – Indicate if the system has included the number of samples that will be submitted for grandfathering. This will help the reviewer determine if the system will need to conduct additional source water monitoring to meet the LT2ESWTR requirements.

2.C – Indicate if the system provided the dates of the first and last sample that will be submitted.

2.D – Indicate if the system stated if it would need to conduct additional source water monitoring. The reviewer should verify how many samples are required of the system to comply with the LT2ESWTR. If the system plans to do a combination of grandfathering and source water monitoring to satisfy LT2ESWTR requirements, the reviewer should also review the source water monitoring submission to ensure that the additional samples are taken at the correct locations and frequency needed to compliment the grandfathered data.

2.E – Indicate if the Intent to Grandfather has been approved. It is recommended that the reviewer indicate the conditions of the approval or reason(s) why the submission has not been approved in the comments section found at the end of the checklist. If the submission is disapproved, the reviewer should inform the system of the status of its submission and provide information regarding the next steps for the system in a timely manner.

2.F – After completing the checklist, the reviewer must input the information into the DCTS. The reviewer should record the date of when the data was entered into the DCTS.

Intent to Grandfather - Checklist

Part 1. PWS Information

1.A PWS Name:	1. B PWS ID:
1.C PWS Address:	1.D Schedule:
1.E Water Treatment Plant Name:	1.F Date Received:
1.G Water System Facility ID:	1.H Date Assigned:

Part 2. Submission Approval

2.A ☐ YES ☐ NO	Notice of Intent was submitted by the date listed below (at least three months prior to the date when the PWS monitoring period begins) -Schedule 1* – by July 1, 2006 -Schedule 2* – by January 1, 2007 -Schedule 3* – by January 1, 2008 -Schedule 4* – filtered PWS monitoring for *E. coli* – by July 1, 2008 -Schedule 4* – PWS monitoring for *Cryptosporidium* – by July 1, 2010
2.B ☐ YES ☐ NO	PWS indicates the number of previously collected sample results that will be submitted
2.C ☐ YES ☐ NO	PWS indicates the dates of the first and last samples to be submitted
2.D ☐ YES ☐ NO	PWS indicates whether they will be collecting additional source water monitoring samples to meet the requirements for this plant
2.E ☐ YES ☐ NO	Intent to Grandfather is complete and acceptable - If submission is not approved, the reviewer should list the reason why in the comments box below.
2.F ☐YES ☐ NO	Intent to Grandfather has been entered into the DCTS (If it has not, please enter it and then check yes here)

Comments: (Include notes from any discussions with the PWS. Use additional sheets if necessary)

Initial Reviewer:	Date:
Final Reviewer:	Date:

*The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For information on sampling schedules, consult the LT2 Source Water Monitoring Guidance Manual.

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Grandfather Data Package - *Background Information for Reviewers*

The following information will assist reviewers conducting *Intent to Grandfather Data Package* reviews. It is not intended to be an extensive explanation of the LT2ESWTR requirements. For more information on LT2ESWTR requirements, please refer to the EPA website (www.epa.gov/safewater/disinfection/lt2) and review the following documents:

- Source Water Monitoring Guidance Manual
- Factsheets:
  - LT2ESWTR Source Water Monitoring for System Serving Less than 10,000 people
  - LT2ESWTR Source Water Monitoring for Systems Serving at Least 10,000 people
- LT2ESWTR Quick Reference Guide (Schedules 1, 2, 3, & 4)

I. Requirements of Grandfather Data

Systems may comply with the initial source water monitoring requirement of the LT2 rule by grandfathering samples collected before the systems is required to begin monitoring or using a combination of grandfathering data and initial source water monitoring data. All systems that submit Grandfather Data must submit the intent to grandfather by the required date (see *Intent to Grandfather – Background Information for Reviewers* for more information). Depending on the type of system and the corresponding LT2 initial source water monitoring requirements, systems may grandfather samples collected for *Cryptosporidium*. Only samples taken after January 1999 may be approved as grandfather data. The rule has specific requirements that must be met by each sample and these will be discussed below. Two checklists have been developed to help systems planning to submit grandfather data. These are found in the Source Water Monitoring Guidance Manual. The *"Grandfathered Cryptosporidium Data Submittal Report"* (Appendix M) is designed to be used by systems to check their data package when submitting grandfathered monitoring data for review. The "*Checklist for Beginning Grandfathered Cryptosporidium Monitoring*" (Appendix L) is designed to be used by systems to check their intended monitoring approach before proceeding with monitoring.

II. Requirements to Grandfather *Cryptosporidium*

The initial source water monitoring requirements depend on the size and type of system. Filtered systems serving at least 10,000 people will need to monitor for Cryptosporidium, E.Coli and turbidity, while unfiltered systems serving at least 10,000 will only need to monitor for Cryptosporidium. Filtered system serving less than 10,000 will need to monitor for Cryptosporidium with an option to first monitor for E.Coli (please view Source Water Monitoring: Sample Schedule and Location Background Information for Reviewers for more information). Unfiltered systems serving less than 10,000 will need to monitor for *Cryptosporidium*. Filtered systems may still grandfather any Cryptosporidium samples to meet the initial source water monitoring when the system does not have corresponding *E.Coli* or turbidity samples. However the system may not grandfather *E.Coli* or turbidity samples if it does not have corresponding *Cryptosporidium*.

Cryptosporidium Analysis: The LT2 rule specifies methods 1622 or 1623 for the analysis of grandfathered Cryptosporidium monitoring. EPA established the Laboratory Quality Assurance Evaluation Program (Lab QA Program) under LT2. Samples collected must meet the same volume analysis requirements as for the source water monitoring. For each Cryptosporidium sample the laboratory must analyze at least 10L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods.

Cryptosporidium Sampling Location: The sampling locations must be located prior to any chemical treatment and representative of the source water. For more information regarding Sampling locations please refer to the *Source Water Monitoring: Sample Schedule and Location Background Information for Reviewers* found in this document.

Cryptosporidium Sampling Frequency: The samples must have been collected no less frequently than each calendar month on a regular schedule no earlier than January 1999. If time gaps exist in the sampling frequency the data can only be grandfathered if EPA or the state approves the data and an additional monitoring schedule to substitute for the time gaps. If approved, the system must follow a specified averaging procedure found in the rule if applicable.

III. REQUIREMENTS TO GRANDFATHER *E.COLI* & TURBIDITY

Systems may not grandfather *E.Coli* or turbidity samples if there are no corresponding *Cryptosporidium* samples.

E.Coli & Turbidity Analysis: Systems must use approved EPA methods for enumeration of E.Coli in source water. Systems must maintain samples between 0 – 10 degrees Celsius during storage and transit to the laboratory. For a list of approved methods, please go to Chapter 7 of the Source Water Monitoring Guidance Manual above. Measurements for turbidity must be made by a party approved by the state.

E.Coli & Turbidity Sample Location and Frequency: *E.Coli* and turbidity samples must be taken at the same time and location as the *Cryptosporidium* samples are collected.

IV. USING GRANDFATHER DATA & CONDUCTING SOURCE WATER MONITORING TO MEET LT2 REQUIREMENTS

A system may choose to submit grandfather data and conduct source water monitoring to meet the initial source water monitoring requirements. Reviewers should look at both submissions to ensure that the system meets all the requirements for initial source water monitoring. For more information on conducting source water monitoring, please refer to the *Source Water Monitoring: Sample Schedule and Location Background Information for Reviewers* found in this document.

Grandfather Data Package – Checklist Instructions

The set of instructions below will assist reviewers using the *Grandfather Data Package* Checklist. Please note that this checklist includes two additional sections: *Grandfather Data Quality Control Checklist* and the *Review of Bench Sheet & Sample Examination Report Forms Checklist.* These checklists will help the reviewer determine the adequacy of the samples submitted.

Part 1: PWS Information

1.A – PWS Name – Enter complete PWS name.

1.B – PWSID – Enter the complete 9-character Federal PWSID number.

1.C – Address – Enter mailing address for PWS.

1.D – Schedule – Enter Schedule information as provided by the System. Reviewer should refer to the Data Collection and Tracking System (DCTS) to ensure the schedule indicated by the system matches the information found in the inventory. The reviewer should indicate if the schedules do not match.

1.E – Water Treatment Plant Name – Enter the full water treatment plant name as stated in the submission.

1.F – Date Received – Enter date when submission was received.

1.G – Water System Facility ID – Enter the Water System Facility ID if applicable.

1.H – Date Assigned – Enter date when submission was assigned to the Reviewer.

Part 2: Submission Approval

2.A – Indicate if the system submitted its *Grandfather Data* on time:

- Schedule 1 – by December 1, 2006
- Schedule 2 – by June 1, 2007
- Schedule 3 – by June 1, 2008
- Schedule 4 – by December 1, 2008
- Schedule 4 – PWS monitoring for Cryptosporidium – by July 1, 2010

NOTE: The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For more information on sampling schedules, consult Section 1 of the LT2 Source Water Monitoring Guidance Manual.

2.B – Indicate if the data package includes a list of the field and matrix spike samples identified by sample ID and collection date.

2.C – Indicate if the system submitted an Intent to Grandfather. The rule requires that the system submit an intent to grandfather by the specified due date. The Intent to Grandfather will indicate if the system has enough data to grandfather or if it will need to use a combination of grandfather data and source water monitoring.

2.D – Indicate if the system submitted a source water monitoring plan. If the system plans to use a combination of grandfather data and source water monitoring to comply with LT2 requirements, the system must submit its sampling schedule and location description at the same time as the Intent to Grandfather. The reviewer should review both the grandfather data and the proposed source water monitoring locations and schedule to ensure the system is meeting the intent of the rule.

2.E – Indicate if the system includes a description of the sampling location. The system must collect the samples before any chemical addition occurs or the source water is mixed with filter backwash. The system must clearly identify the sampling locations in relation to its water source and treatment processes.

2.F – Indicate if the system collected the proposed grandfather data each calendar month at a regular schedule. The rule requires that systems collect samples no less frequently than each calendar month on a regular schedule beginning no later than January 1999. If there are gaps in time, the system may collect additional samples to comply with the rule as approved by the EPA or the state.

2.G – Indicate if the system included a letter certifying that all quality control criteria were met or provided the bench sheets and sample examination report forms. The *Grandfather Data Quality Control Checklist* found below has been developed to help the reviewer determine if each of the individual samples meets the LT2 requirements.

2.H – Indicate if the system included at least one matrix spike (MS) sample for every 20 field samples.

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Grandfather Data Submission - Checklist	
Part 1. PWS Information	
1.A. PWS Name:	1.B PWS ID:
1.C PWS Address:	1.D Schedule:
1.E Water Treatment Plant Name:	1.F Data Received:
1.G Water System Facility ID:	1.H Data Assigned:
Part 2. Submission Approval	
2.A ☐ YES ☐ NO	Grandfathered data package was submitted no later than two months after the date when the system's monitoring period begins - Schedule 1* – by December 1, 2006 - Schedule 2* – by June 1, 2007 - Schedule 3* – by June 1, 2008 - Schedule 4* – by December 1, 2008 - Schedule 4* – PWS monitoring for *Cryptosporidium*** – by June 1, 2010
2.B ☐ YES ☐ NO	Data package includes a list of the field and matrix spike (MS) samples identified by sample ID and collection date.
2.C ☐ YES ☐ NO	Intent to grandfather was submitted, entered in the Data Collection and Tracking System, and indicates how many samples will be submitted for grandfathering and how many additional samples will be collected to complete the data set. (Indicate any deficiencies in the comments section)
2.D ☐ YES ☐ NO	If the PWS will collect additional samples, a sampling schedule and sample location description has been submitted no later than three months prior to the date when the system's monitoring period begins -Schedule 1* – by July 1, 2006 -Schedule 2* – by January 1, 2007 -Schedule 3* – by January 1, 2008 -Schedule 4* – filtered PWS monitoring for *E. coli* – by July 1, 2008 -Schedule 4* – PWS monitoring for *Cryptosporidium*** – by July 1, 2010
2.E ☐ YES ☐ NO	Grandfathered data package includes a description of the sampling location in relation to its water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.
2.F ☐ YES ☐ NO	Grandfathered data samples have been collected each calendar month on a regular schedule or documentation has been provided for any cases when this requirement has not been met.
2.G ☐ YES ☐ NO	The laboratory analyzing the samples provide a letter certifying that all quality control criteria have been met as listed below or the laboratory provides bench sheets and sample examination report forms. • Ongoing precision and recovery • Method blank • Positive and negative staining controls • Matrix spike

	• Sample receipt temperature • Holding time *Refer to Grandfather Data Quality Control Checklist* or the *Bench Sheet & Sample Examination Report Forms Review Checklist found below. If the answer is "No" to any of the boxes, provide further explanation in the Comments section found below.*
2.H ☐ YES ☐ NO	There is at least one matrix spike (MS) sample for every 20 field samples
Comments: (Include notes from any discussions with the PWS. Use additional sheets if necessary)	
Initial Reviewer:	Date:
☐ YES ☐ NO	Grandfather data is complete and acceptable
Final Reviewer:	Date:

*The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For information on sampling schedules, consult the LT2 Source Water Monitoring Guidance Manual.

** Required for all unfiltered systems and those filtered systems that bypass *E. coli* monitoring or exceed *E. coli* trigger levels

Complete for each sample submitted. List unacceptable samples and provide an explanation in the comments section found in the *Grandfather Data Submission Checklist*.

Grandfather Data Quality Control Checklist						
Required Elements	**Sample ID:**					
	Collection Date:					
Facility ID	Name or number					
Sample Type	Field or matrix spike					
Sample volume filtered (L)	Liters					
Was 100% of filtered volume examined? *	Yes or No					
Number of oocysts counted	Number					
If less than 100% examined						
- Volume of resuspended concentrate	Liters					
- Volume of resuspended concentrate processed via IMS	Liters					
If less than 10L filtered or less than 100% examined						
- Number of filters used *	Number					
- Packed pellet volume *	mL					
For matrix spike samples						
- Sample volume spiked	Liters					
- Estimated number of oocysts spiked	Number					
Sample meets all requirements	Yes or No					

*Volume analyzed for all field samples must be at least 10 L, 2 mL of packed pellet, or as much volume as could be filtered by 2 filters

Complete for each sample submitted & provide comments if necessary.

Review of Bench Sheet & Sample Examination Report Forms Checklist						
Required Elements	**Sample ID:**					
PWS ID (name or #) Facility ID (name or #)	**Collection Date:**					
Sample Type	field or matrix spike					
Sample temperature upon receipt at the laboratory ≤20°C (but not frozen)	Yes or No					
Acceptable ongoing precision and recovery sample are associated with each field sample • Reagent water sample spiked with ~100 to 500 oocysts • Processed within one week of associated field sample • Recovery between 11% and 100%	Yes or No					
An acceptable method blank is associated with the field sample • Reagent water sample free from oocysts and potentially interfering organisms or materials	Yes or No					
Positive and negative staining controls acceptable	Yes or No					
All holding times were met 1999 version of Method 1622/1623 • Time from initiation of sample collection to completion of concentration 72 hours or less • Concentrate is held no longer than 24 hours between IMS and staining • Stained slides read and confirmed within 72 hours of staining 2001,2003, 2005 versions of Method 1622/1623 • Sample elution initiated within 96 hours of sample collection or field filtration • Sample elution, concentration, and purification steps completed in one work day • Slides stained within 72 hours of application of the purified sample to the slide • Stained slides read and confirmed within 7 days of staining	Yes or No					

Source Water Monitoring: Sample Schedule & Location - *Background Information for Reviewers*

The following information is to assist reviewers conducting *Intent to Grandfather Data Package* reviews. It is not intended to be an extensive explanation of the LT2ESWTR requirements. For more information on LT2ESWTR requirements, please refer to the EPA website (www.epa.gov/safewater/disinfection/lt2) and review the following documents:

- Source Water Monitoring Guidance Manual
- Factsheets:
  - LT2ESWTR Source Water Monitoring for System Serving Less than 10,000 People
  - LT2ESWTR Source Water Monitoring for Systems Serving at Least 10,000 People
- LT2ESWTR Quick Reference Guide (Schedules 1, 2, 3, & 4)

I. Requirements of Initial Source Water Monitoring

For filtered systems serving at least 10,000 that use surface water or GWUDI:

- Required to conduct initial source water monitoring that includes sampling for *Cryptosporidium, E.Coli* and turbidity at least once per month for two years.

For unfiltered systems serving at least 10,000 that use surface water or GWUDI:

- Required to conduct initial source water monitoring that includes sampling for only Cryptosporidium at least once per month for two years.

For filtered systems serving fewer than 10,000 that use surface water or GWUDI:

- Required to conduct initial source water monitoring for *E.Coli* or Cryptosporidium. These systems have the option of conducting biweekly *E.Coli* samples for a year. If at the end of the *E.Coli* monitoring year the system has exceeded the *E.Coli* trigger levels (for lake/reservoir sources annual mean greater than 10 E.Coli/100mL, for flowing stream source annual mean greater than 50 E.Coli/100mL), the system will need to conduct Cryptosporidium monitoring. If the system does not exceed the trigger levels, the system will fall in the Bin 1 classification and will have satisfied initial source water monitoring requirements. The system can opt not to monitor for *E.Coli* and go straight into monitoring for *Cryptosporidium*. The system has the choice of conducting one *Cryptosporidium* sample per month for 24 months or 2 *Cryptosporidium* samples per month for 12 months.

For unfiltered systems serving fewer than 10,000 that use surface water or GWUDI:

- Required to conduct initial source water monitoring that includes Cryptosporidium sampling only. These systems may not conduct *E.Coli* indicator monitoring.

A system may choose to conduct monitoring for all the required number of samples or to grandfather a portion of the data and conduct monitoring for the rest. For more information on grandfathering requirements, please refer to the *Intent to Grandfather & Grandfather Data Package – Background Information for Reviewers* found in this document.

The rule has specific requirements that must be met by each sample taken for initial source water monitoring purposes such as: Sample Collection Location & Volume, Sample Collection Frequency & Schedule, and Analytical Methods & Laboratories. This information is discussed below.

II. SAMPLE COLLECTION LOCATION & VOLUME

The intent of the rule is to assess the mean Cryptosporidium level in the source of the drinking water treatment plants. For this reason, the rule requires that samples be collected prior to chemical treatment, unless approved otherwise by EPA or the state. Systems must submit a description of the sampling location(s) along with the sampling schedule. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash water recycle. The Source Water Monitoring Guidance Manual contains two templates available to systems to submit this information (Appendix E: LT2 Sample Collection Schematics & Appendix D: LT2ESWTR Sampling Location Worksheet.) The following provides guidance for different scenarios systems might face:

- Plants That Do Not Have Sampling Tap located Prior to Any Treatment: The system may manually collect as close to the intake, install a sampling tab prior to treatment, or collect samples after chemical disinfection if the EPA or state determines that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

- Plants that Use Different Water Sources at the Same Time: The system may collect the samples after the sources are combined but prior to treatment or collect the samples at each source near the intake on the same day and analyze the sample by either compositing or weighted average.

-Plants that Use Presedimentation: The system may collect samples prior to the presedimentation basin or after presedimentation if no chemical treatment is used. If chemical pretreatment is used, the system will need to get approval from the EPA or state.

- Plants that Use Raw Water Off-Stream Storage: The system may collect the sample after the off-stream storage reservoir.

- Plants that Use Bank Filtration: Systems that receive credit for Bank Filtration under IESWTR or LT1 must collect the samples prior to bank filtration. Systems that use bank filtration as pretreatment must collect the samples from the well.

Samples collected must meet the same volume analysis requirements as for the initial source water monitoring. For each Cryptosporidium sample the laboratory must analyze at least 10L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods.

III. SAMPLE COLLECTION & FREQUENCY

Systems must develop a schedule listing the calendar dates on which the samples will be collected. Systems serving over 10,000 will need to upload this information directly to the DCTS unless EPA or the state approves an alternative method. This means that the reviewers will need to go into the DCTS system to review the Sample Location and Schedule. Systems serving less than 10,000, may submit the information to the DCTS, IPMC or the state. Data must not have been collected prior to January 1999. Samples must have been collected no less frequently than each calendar month on a regular schedule. The reviewer may approve grandfather data even if there are time gaps between samples if the system conducts additional monitoring that complies with the intent of the initial source water monitoring.

IV. ANALYTICAL METHODS FOR GRANDFATHER DATA

The LT2 rule requires methods 1622 or 1623 for analysis of grandfather Cryptosporidium monitoring. EPA has established the Laboratory Quality Assurance Evaluation Program for the Analysis of Cryptosporidium in Water (Lab QA Program) to approve laboratories to perform these analyses under LT2. For *E.Coli*, the systems must use the approved methods for enumeration of *E.Coli* in the source water. For a list of these methods, please go to Chapter 7 of the Source Water Monitoring Guidance Manual mentioned above.

Source Water Monitoring: Sample Schedule & Location – Checklist Instructions

The set of instructions below will assist reviewers using the *Source Water Monitoring: Sample Schedule & Location* Checklist.

Part 1: PWS Information

1.A – PWS Name – Enter complete PWS name.

1.B – PWSID – Enter the complete 9-character Federal PWSID number.

1.C – Address – Enter mailing address for PWS.

1.D – Schedule – Enter Schedule information as provided by the System. Reviewer should refer to the Data Collection and Tracking System (DCTS) to ensure the schedule indicated by the system matches the information found in the inventory. The reviewer should indicate if the schedules do not match.

1.E – Water Treatment Plant Name – Enter the full water treatment plant name as stated in the submission.

1.F – Date Received – Enter date when submission was received.

1.G – Water System Facility ID – Enter the Water System Facility ID if applicable.

1.H – Date Assigned – Enter date when submission was assigned to the Reviewer.

Part 2: Sampling Schedule Approval

2.A – Indicate if the system submitted its *Source Water Monitoring Sampling Schedule* on time:

- Schedule 1 – by December 1, 2006
- Schedule 2 – by June 1, 2007
- Schedule 3 – by June 1, 2008
- Schedule 4 – by December 1, 2008
- Schedule 4 – PWS monitoring for Cryptosporidium – by July 1, 2010

NOTE: The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For more information on sampling schedules, consult Section 1 of the LT2 Source Water Monitoring Guidance Manual.

2.B – Indicate if the system provided a specific sampling schedule for the source water monitoring. The rule requires that the system collect at a frequency of at least of one sample per month at a regular frequency. The intent of the rule is that the system collects samples that represent the entire period of monitoring.

2.C – Indicate if the system submitted its sampling schedule for the initial round of source water monitoring electronically to the DCTS. Systems in Schedule 1 are allowed to submit hardcopy to the IPMC if approved by EPA or the state. The IPMC would be responsible for uploading the information and making it available via the DCTS.

2.D – Indicate if the system is collecting a minimum of one sample per month. This is applicable to systems in Schedules 1, 2 and 3 for 24 months collecting Cryptosporidium samples.

2.E – Indicate if the system is collecting at the appropriate frequency for E.Coli sampling. Filtered systems on Schedule 4 have the option of monitoring for E.Coli. The system must collect one sample every two weeks for a year. At the end of the year, the system will calculate the mean of the samples. For systems using a flowing stream source, if the annual mean E.Coli concentration is greater than 50 E.coli/100mL the system would have to monitor for Cryptosporidium. For systems using lake/reservoir sources, if the annual mean concentration is greater than 10 E.Coli/100mL, then the system will need to monitor for Cryptosporidium. If the system's mean is not greater than the trigger levels mentioned above, then the system will fall under the Bin 1 classification.

2.F – For systems on Schedule 4, indicate if they are monitoring at the appropriate frequency for Cryptosporidium. Schedule 4 systems are allowed to take Cryptosporidium samples either at a frequency of 2 samples per month for 12 months or one Cryptosporidium sample per month for 24 months.

2.G – If the system operates only part of the year, the reviewer should make sure that the months of operation are included in the proposed monitoring schedule. If the system monitors less than six months a year, please refer to 2.H below.

2.H – If the system operates less than six months a year, the reviewer should verify that a minimum of six evenly spaced samples are scheduled to be taken during the year, including the months of operation.

2.I – Indicate if the sampling schedule submitted is complete and has been approved. If the answer is no to any of the previous questions in the checklist, the schedule might be unacceptable. The reviewer is encouraged to discuss any suggested changes with the system to ensure the intent of the rule is met.

Part 3: Sample Location Approval

3.A – Indicate if the system submitted its *Source Water Monitoring Location Description* on time:

- Schedule 1 – by December 1, 2006
- Schedule 2 – by June 1, 2007
- Schedule 3 – by June 1, 2008
- Schedule 4 – by December 1, 2008
- Schedule 4 – PWS monitoring for Cryptosporidium – by July 1, 2010

NOTE: The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS). For more information on sampling schedules, consult Section 1 of the LT2 Source Water Monitoring Guidance Manual.

3.B – Indicate if the system submitted a sample location schematic. A template for this submission may be found in the Source Water Monitoring Guidance Manual, Appendix E. The samples should be representative of the source water. Samples should be taken prior to any chemical addition unless approved by the state or EPA.

3.C – Indicate if the submitted sample location schematic clearly shows the position of the source, chemical addition, backwash entry and the proposed sampling location. The sampling location needs to be collected prior to any chemical treatment or backwash unless approved by the EPA or the state. Collecting the source water sample after filter backwash would not be representative of the source which is the intent of the rule.

3.D – Indicate if the system provided information regarding its chemical treatment if the system is planning to collect samples after chemical treatment. If this is the case, the reviewer should state this in the comment section of the checklist and further discuss with EPA and state staff to determine final approval/disapproval. This situation in particular may be approved if the chemical used will not interfere with the analysis of the sample and the final result. EPA and the state should discuss this matter before approving or disapproving a submission.

3.E – If the system uses bank filtration, indicate if the system picked an adequate sampling location. Systems that received credit for bank filtration under IESWTR or LT1, must take the initial source water sample before the bank filtration occurs. If the system does not receive credit for bank filtration, the initial source water sample can be taken after the bank filtration occurs.

3.F – Indicate if the system intends to use one set of source water monitoring samples to satisfy LT2 requirements for multiple treatment plants. For multiple treatment plants using the same intake, the rule allows for them to use one data set of source water monitoring to satisfy LT2 requirements with EPA or state approval.

3.G – Indicate if the system is planning to take combined or separate samples to represent multiple sources. Systems that have multiple water sources can either take the sample from a tap where the sources combine prior to treatment or can manually take a sample from each source the same day. If the system plans to take individual samples, they can either analyze the sample by compositing or weighted average. For more information regarding compositing and weighted average refer to the Source Water Monitoring Guidance Manual.

3.H – Indicate if the submission is complete and approved.

Source Water Monitoring: Sampling Schedule & Location Checklist	
Part 1. PWS Information	
1.A PWS Name:	1.B PWS ID:
1.C PWS Address:	1.D Schedule:
1.E Water Treatment Plant Name:	1.F Data Received:
1.G Water System Facility ID:	1.H Date Assigned:

Part 2. Sample Schedule Approval	
2.A ☐ YES ☐ NO	Sampling schedule was submitted by the date listed below (at least three months prior to the date when the PWS monitoring period begins) -Schedule 1* – by July 1, 2006 -Schedule 2* – by January 1, 2007 -Schedule 3* – by January 1, 2008 -Schedule 4* – filtered PWS monitoring for *E. coli* – by July 1, 2008 -Schedule 4* – PWS monitoring for *Cryptosporidium*** – by July 1, 2010
2.B ☐ YES ☐ NO	Sampling schedule specifies the calendar dates when the PWS will collect each required sample
2.C ☐ YES ☐ NO ☐ N/A	PWS on Schedule 1, 2 or 3 submitted the sampling schedule for the initial round of source water monitoring to EPA electronically via the LT2/Stage 2 Data Collection and Tracking System at *www.epa.gov/safewater/disinfection/tools*
2.D ☐ YES ☐ NO ☐ N/A	For PWSs on Schedules 1, 2 and 3, the sampling schedule includes a minimum of one sample per month for 24 months (including grandfathered data.)
2.E ☐ YES ☐ NO ☐ N/A	For filtered PWSs on Schedule 4, the sampling schedule for *E. coli* monitoring includes at least one sample every two weeks for 12 months (including grandfathered data.)
2.F ☐ YES ☐ NO ☐ N/A	For unfiltered PWSs on Schedule 4, and for filtered PWSs on Schedule 4 that must monitor for *Cryptosporidium*, the sampling schedule for *Cryptosporidium* monitoring includes at least 2 samples per month for 12 months or one sample per month for 24 months.
2.G ☐ YES ☐ NO ☐ N/A	If the plant only operates part of the year, the schedule only includes the months the plant is in operation.
2.H ☐ YES ☐ NO ☐ N/A	If the plant operates for less than six months per year, the schedule includes six evenly-spaced *Cryptosporidium* samples per year.
2.I ☐ YES ☐ NO	Sampling schedule is complete and acceptable (the sampling schedule may be unacceptable if any of the above checklist items are marked as "No", describe any issues in the comments section)

Part 3. Sample Location Approval	
3.A ☐ YES ☐ NO	Sample Location Description was submitted by the date below (three months prior to the date when the system's monitoring period begins) -Schedule 1* – by July 1, 2006 -Schedule 2* – by January 1, 2007 -Schedule 3* – by January 1, 2008 -Schedule 4* – filtered PWS monitoring for *E. coli* – by July 1, 2008 -Schedule 4* – PWS monitoring for *Cryptosporidium*** – by July 1, 2010
3.B ☐ YES ☐ NO	Sample location schematic was provided.
3.C ☐ YES ☐ NO	Sample location schematic shows position of the sampling location in relation to the system's water source(s) and treatment processes. The sample location is prior to chemical treatment and filter backwash.
3.D ☐ YES ☐ NO ☐ N/A	The system intends to collect sample after chemical treatment and information on that chemical treatment has been provided.
3.E ☐ YES ☐ NO ☐ N/A	The system uses bank filtration as pretreatment and therefore the samples will be collected after bank filtration. The system receives *Cryptosporidium* treatment credit for bank filtration and therefore the samples will be collected from the surface water prior to bank filtration.
3.F ☐ YES ☐ NO ☐ N/A	The system has multiple plants that use the same set of monitoring results and do they all draw from the same intake.
3.G ☐ YES ☐ NO ☐ N/A	If the system has multiple water sources, samples will be collected: ☐ From a sampling tap where the sources are combined, prior to treatment ☐ Manually at each source near the intake on the same day
Comments: (Include notes from any discussions with the PWS. Use additional sheets if necessary)	
Initial Reviewer:	Date:
3.H ☐ YES ☐ NO	Sample schedule and location description is complete and acceptable • Sample schedule and location description may be unacceptable if any of the checklist items above are marked as "No" • If the system wishes to collect samples after chemical treatment then additional evaluation and approval by the state is necessary
Final Reviewer:	Date:

*The PWS monitoring schedule is indicated in the LT2/Stage 2 Data Collection and Tracking System (DCTS).
** Required for all systems that bypass *E. coli* monitoring or exceed *E. coli* trigger levels.

Appendix H

Guidance for Reviewing Extension Requests under 1412(b)(10) of the SDWA

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FINAL
Guidance For Reviewing Extension Requests Under 1412(b)(10) Of The Safe Drinking Water Act

PURPOSE

This document provides guidance concerning how EPA interprets the authorities and limitations of Section 1412(b)(10) of the Safe Drinking Water Act (SDWA). For the purpose of this document State refers to EPA Regions and States exercising primary enforcement responsibility under the SDWA. Under certain conditions, this provision allows States to provide up to a two year extension of the date by which public water systems must comply with a new or revised National Primary Drinking Water Regulation. It also provides recommendations to State Directors on the procedures they may want to follow in using this authority.

The SDWA provisions and EPA regulations described in this document contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA and State decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. Any decisions regarding a particular facility will be made based on the applicable statutes and regulations. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation, and EPA will consider whether or not the recommendations or interpretations in the guidance are appropriate in that situation. EPA may change this guidance in the future.

BACKGROUND

The SDWA, as amended in 1996, generally requires compliance with national primary drinking water regulations 3 years after promulgation. The Amendments also allow compliance deadlines to be extended for up to an additional 2 years if it is determined that additional time is needed for capital improvement projects to comply with a maximum contaminant level (MCL) or treatment technique (TT). This is specified in Section 1412 (b)(10) of the SDWA:

> *"A national primary drinking water regulation promulgated under this section (and any amendment thereto) shall take effect on the date that is 3 years after the date on which the regulation is promulgated unless the Administrator determines that an earlier date is practicable, except that the Administrator, or a State (in the case of an individual system), may allow up to 2 additional years to comply with a maximum contaminant level or treatment technique if the Administrator or State (in the case of an individual system)determines that additional time is necessary for capital improvements."*

Furthermore, the responsibilities of the States have been further explained in the legislative history[1] for this provision:

- "The Administrator may establish an earlier date for compliance as part of the regulation, if an extended period is not necessary for design and construction. The **Administrator** is also authorized to extend the compliance period for an additional 2 years (up to a total of 5 years) in the promulgated regulation where the additional period is necessary for construction activities that may be necessary to comply."[bold added]

- "In addition to the Administrator's authority to extend the period beyond the 3 years by rule, a **State** may extend the compliance period for particular public water systems in that State that need up to an additional 2 years for the design and construction of treatment facilities or alternative water supplies to comply." [bold added]

- "The **Administrator** is authorized to provide case-by-case extensions for particular systems in States that do not have primary enforcement responsibility under section 1413."[bold added]

A State may grant extensions to an MCL or TT under 1412(b)(10) on a case-by-case basis only when additional time has not been incorporated into the rule. Under the authority of this provision, compliance with a regulation may not be extended to beyond five years after the rule publication. In other words, a system's application for an extension would only apply to those rules with a compliance deadline of less that 5 years from promulgation (e.g., Interim Enhanced Surface Water Treatment Rule). Additional extensions may be granted through the exemption provision of Section 1416. States are granted authority to issue extensions by the federal law and do not need a parallel State statute or regulation.

EPA Regions will provide case-by-case extensions for individual systems in States that do not have primacy or interim primacy (a state has interim primacy if they have submitted a complete primacy application package). The extension only applies to a time frame for compliance with an MCL or TT. A system is still obligated to comply with all other provisions of the regulation such as monitoring and reporting.

As new regulations are promulgated, systems will begin to evaluate the adequacy of their treatment processes to determine if they will satisfy compliance requirements for these rules. During the evaluation process some systems will conclude that, despite best efforts to do so, they will not be able to satisfy compliance requirements (i.e., meet an MCL or TT) and submit applications to their State for extensions under 1412(b)(10).

[1] Report of the Committee on the Environment and Public Works United States Senate on S. 1316, 104th Congress - 1st Session, pg. 49

HYPOTHETICAL EXAMPLE - ABC SYSTEM

ABC System is seeking an extension to comply with the new HAA5 MCL set by the Stage 1 Disinfectant/Disinfection Byproducts Rule (Stage 1 DBPR).

ABC System uses surface water as a source and serves 10,000 or more people. Note: For the Stage 1 DBPR, only Subpart H systems (systems using surface water or ground water under the direct influence of surface water) that serve 10,000 or more people may apply for an extension, since all other affected systems have up to five years to comply.

GUIDANCE

Three general areas the State should consider when reviewing requests for extensions are:

- qualification criteria,
- conditions of the extension, and
- interim treatment measures

Before a system may be granted an extension it should satisfy the qualification criteria and agree to the conditions and measures deemed necessary by the State.

QUALIFICATION CRITERIA

To qualify for an extension, a water system should meet the following criteria:

- **Demonstrate a need for an extension.**
  - The system should show that without an extension they would not be able to meet a new MCL or TT specified in the regulation.
  - The proposed capital improvement should facilitate compliance.
  - An additional aspect is to allow systems to be progressive (e.g., forethought to design with future rules in mind).

ABC System performed a study over an 18-month period and found while operating under optimum conditions they could not meet the new standards (0.060 mg/L) for the group of five haloacetic acids (HAA5), on a consistent basis.

The system should document their "Good Faith" efforts to meet the original compliance date of the regulation.

- A system should demonstrate that they initiated steps towards compliance in a reasonable period of time after the promulgation date of the rule. A reasonable period can include time for a system to discuss their options with the State prior to initiating any activities. Additionally, when evaluating a system's "Good Faith" effort toward compliance, the State may wish to consider other factors such as compliance history.
- A system which did not take steps towards compliance, or has only started to do so in the months immediately preceding the compliance date has not demonstrated a "good faith" effort.

In February 1999, shortly after rule publication, ABC System evaluated their plant and determined it would not satisfy new regulations. ABC based the determination on monitoring done after optimization of current processes. Therefore, in January 2000, in good faith ABC initiated renovation and upgrade activities on an expedited time line.

Demonstrate that the scope and/or complexity of the capital improvements warrant the length of the extension.

- Extensions should be granted for only the period necessary to complete the required capital improvements. While 1412(b)(10) allows for extensions of up to two years, extensions for the full time should only be granted where the scope of the proposed improvements justifies the length of the time requested.

ABC System initiated construction activities to upgrade their plant to incorporate granular activated carbon (GAC) treatment to reduce HAA5 levels. Although ABC System began construction in January 2000 (two full years prior to the initial compliance deadline for Stage 1 DBPR), construction would not be completed until April 2003. Thus, ABC System requested an extension for compliance with the HAA5 MCL. Through the negotiation process with the State, ABC Systems received a 1.5 year extension.

EXTENSION CONDITIONS

Systems will likely propose a plan that includes critical milestones and a time-line with a final compliance date. Often these conditions will be refined through negotiations with the State. The State may wish to consider documenting the conditions of the extension through a memorandum of understanding signed by both parties or by signing-off on the system's plan once negotiations are completed. The conditions of an extension should, at a minimum, contain:

Compliance schedules with critical milestones.

- A system should present a realistic construction schedule to complete their capital improvement efforts. Schedules should be based upon the scope/complexity of the capital improvement. Critical milestones are those which would indicate that significant progress towards construction goals are being realized.
- While developing the compliance schedule, the State and system should discuss and document the implications of missed milestones (e.g. violation of National Primary Drinking Water Regulation) and remedies for the delay.

Progress reports corresponding to critical milestones.

- The State should request progress reports as frequently as is necessary to perform oversight of the system. We do not intend to create any undue reporting burden by requesting information that is not critical to determining the system's compliance with the negotiated compliance schedule.

The ABC System proposed the following critical milestone to discuss in their progress reports during the extension period:

- Groundbreaking for the GAC system
- 50% building completion
- GAC installed - to include results of pilot test run
- Building construction complete, and
- Plant operating with GAC system fully operational

Compliance with interim measures for public health protection as determined by the State.

- During the extension period the system should make reasonable efforts to meet the intent of the provisions established in the rule. Measures that can be taken within the scope of the system's current operation should be established and complied with to provide a level of public health protection while capital improvements are on ongoing. Interim measures are discussed further in the following section.

Provide an opportunity for a system's customers to respond/comment to a notice of an extension.

- It is important that the public which is served by the system is informed of the purpose of the extension and has an opportunity to provide input to the system and the State.
- The system should consider publishing a "Notice of Availability" of a public hearing as an opportunity to explain and receive feedback on the extension.

Notice of the extension in the annual Consumer Confidence Report (CCR) [note: applies only to community water systems (CWSs)].

- A CWS should explain to their customers the reason they pursued an extension.
- The notice should explain the issues surrounding the extension and the interim measures the system will take to ensure that the quality of service will not be compromised.

ABC System agreed to notify their customers of the **extension** to the HAA5 compliance date in their annual CCR. Note: The system would not be in violation of the MCL/TT or be required to report under the Public Notification Rule, but they are required to report any compliance monitoring results in the CCR (if they are a CWS).

- The CWS is required to publish their compliance monitoring results in the CCR.

The State may wish to have a system issue a Public Notice, or a statement in the CCR if the MCL or TT for which the extension was granted is exceeded.

- A system is not required to issue a public notice during the extension period for an exceedence of an MCL or TT. The State may wish to encourage the system to notify their customers of any exeedences as part of the system's responsibility to keep the public informed of any issues related to public health and the water supply.

For ABC System, conditions of an extension include submitting quarterly sample data and notifying the public if the annual average for HAA5 exceeds 0.060 mg/L.

INTERIM MEASURES

EPA believes that it is important to consider each system's potential for achieving meaningful overall risk reduction through reasonable interim treatment requirements. Some possibilities the States may wish to consider include the following:

Change the treatment process, type of treatment, or point of treatment.

ABC System will optimize treatment in their plant to improve precursor removal and minimize the formation of disinfection byproducts.

Implement a main flushing program in areas with high detention times and/or biofilm problems.

Minimize the use of certain sources.

Provide alternate solutions for sensitive populations (e.g., bottled water, point-of-use, or point-of-entry devices).

In all cases, EPA believes that it is essential to evaluate all potential interim treatment requirements in terms of their impact on disinfection byproduct formation, microbial protection, corrosion control, and other public health issues. States should consider the net gain in public health protection when establishing interim treatment requirements.mike.price@crowncork.com

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that has been manufactured with Wind Power