



**Public Water Supply
Survival Guide
for the
Interim Enhanced
Surface Water Treatment Rule**

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An “Acronyms and Definitions” list is provided as an aid to using this guide.

Section 1 provides a summary of the Interim Enhanced Surface Water Treatment Rule and a timetable for compliance. Each requirement listed in the timetable is cross-referenced to the applicable state and federal rules, the applicable sections of this document, and the applicable references to EPA guidance manuals.

Section 2 describes the disinfection profiling requirements designed to make the water system operator aware of disinfection effectiveness on a weekly basis throughout the year, and describes monitoring *Giardia* inactivation periods which will serve as a benchmark when considering future changes in disinfection practices. This section provides procedures for avoiding disinfection profiling, developing a disinfection profile, and calculating a disinfection benchmark, as well as reporting and recordkeeping by the system.

Section 3 outlines the enhanced standards for conventional and direct filtration established under the Surface Water Treatment Rule, the turbidity monitoring applications for systems utilizing either individual or combined filters, and the applicable reporting and recordkeeping requirements for systems regarding effluent turbidity filter monitoring.

Section 4 explains KDHE’s policies and procedures that will be used in meeting the reporting and recordkeeping requirements, and special primacy requirements, which will be observed by KDHE in implementing the Interim Enhanced Surface Water Treatment Rule. This section discusses specifics such as sanitary surveys, the composite correction program, evaluation of alternative data for profiling purposes, determination of virus inactivation, changes in disinfection practices, and approvals of alternative technologies.

OVERVIEW

This guidance document is provided by the State of Kansas as a “quick reference guide” to assist Public Water Supply Systems in complying with the Interim Enhanced Surface Water Treatment Rule (IESWTR) requirements contained in the Kansas Primary Drinking Water Regulations. It presents a summary of the applicable regulatory requirements associated with the IESWTR promulgated by the Environmental Protection Agency (EPA) on December 16, 1998 which has been primarily adopted by the Kansas Department of Health and Environment (KDHE). This guidance provides a summary of the applicable requirements and the dates by which the requirements must be met. It is a basic “what and when” summary for all public water systems. While all systems should feel comfortable using this document as a complete and accurate summary of IESWTR requirements, the applicable full legal language is contained in the Kansas Administrative Regulations in conjunction with the Code of Federal Regulation which KDHE has adopted by reference.

This survival guide applies to:

Systems: CWSs, NTNCWSs, TNCWSs

Sources: Surface Water and Groundwater Under the Direct Influence of Surface Water

Persons Served: 10,000 or more

Treatment: All treatments

Specific questions regarding the information contained in this document, the Kansas Primary Drinking Water Regulations, or any other matters pertaining to drinking water and public water supply systems in Kansas should be directed to

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Additional information and e-mail addresses can be obtained by accessing KDHE’s web site at:

www.kdheks.gov

With the exception of the KDHE policies described in Section 4, reference is made to EPA guidance documents for specific details. Full citations to EPA manuals are given at the end of this “Survival Guide”, along with shortened names by which these publications are identified whenever they are cited in this document. KDHE staff, public water supply system officials, and other interested parties can refer to these documents when examining the specific details of the Interim Enhanced Surface Water Treatment Rule. A handy EPA Quick Reference Guide on the Interim Enhanced Surface Water Treatment Rule is also provided at the end of this survival guide.

ACRONYMS

ACC - Alternative Compliance Criteria

BAT - Best Available Technology

KDHE - Kansas Department of Health and Environment

CCP – Composite Correction Program

CFR - Code of Federal Regulations

CWS - Community Water System

D/DBP - Disinfectants and disinfection byproducts

D/DBPR - Disinfectants and Disinfection Byproducts Rule

DBPs - Disinfection Byproducts

DBPP - Disinfection Byproducts Precursor

DOC - Dissolved Organic Carbon

EPA - United States Environmental Protection Agency

GAC10 - Granular activated carbon adsorption with a 10 minute empty bed contact time

GWUDI - Ground Water Under the Direct Influence of Surface Water

HAA5 - Sum of five haloacetic acids (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid)

LT1ESWTR (LT1) – Long Term 1 Enhanced Surface Water Treatment Rule

MCL - Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal

MDBP – Microbial and Disinfection Byproduct

mg/L - Milligrams per liter

MRDL - Maximum Residual Disinfectant Level (as mg/L)

MRDLG - Maximum Residual Disinfectant Level Goal

NCWS - Non-Community Water System

NTNCWS - Non-Transient Non-Community Water System

PWS - Public Water System

SDWA - Safe Drinking Water Act

SOP - Standard Operating Procedure

SUVA - Specific Ultraviolet Absorbance

TNCWS - Transient Non-Community Water System

TOC - Total Organic Carbon

TTHMs - Total trihalomethanes (Sum of chloroform, bromoform, chlorodibromomethane, and bromodichloromethane)

DEFINITIONS

KDHE: The Kansas Department of Health and Environment is Kansas' primacy agency for the administration of the Safe Drinking Water Act. When the term "the State" is used in this survival guide, it refers to this agency.

EPA: The United States Environmental Protection Agency has federal oversight responsibility and authority regarding the administration and enforcement of the Safe Drinking Water Act. EPA prepares rules and technical / implementation guidance to implement the Safe Drinking Water Act through other agencies with primacy authority such as KDHE.

CCP: A Composite Correction Program is a structured approach to analyzing the performance of filtration and disinfection facilities. This activity is commonly carried out by a water system in cooperation with a third party consultant. The IESWTR requires water systems to undergo a CCP evaluation under specific circumstances, as described in Section 3 of this guidance. See Appendix A for a more detailed definition about CCPs and Sanitary Surveys.

GWUDI: Systems utilizing "groundwater under the direct influence of surface water" (as previously determined by KDHE) are required to treat water from these sources as specified under the Surface Water Treatment Rule.

IESWTR: The Interim Enhanced Surface Water Treatment Rule, promulgated by EPA on December 16, 1998, is a companion rule to the Stage 1 Disinfection and Disinfection Byproducts Rule and a precursor to the Long Term 1 Enhanced Surface Water Treatment Rule. The IESWTR established enhanced requirements for filtration of surface and GWUDI sources. These two rules have interrelated provisions; actions initiated under one rule have the potential to effect compliance under the companion rule.

M/DBP Rules: The term "M/DBP Rules" stands for "Microbial / Disinfection Byproduct Rules" and refers to the TCR, SWTR, IESWTR, LT1ESWTR, LT2ESWTR, Stage 1 DDBPR, Stage 2 DDBPR, FBRR, and GWR collectively.

Stage 1 DDBP Rule: The Stage 1 Disinfectants and Disinfection Byproducts Rule, promulgated by EPA on December 16, 1998, is a companion rule to the Interim Enhanced Surface Water Treatment Rule. The Stage 1 DDBP Rule established enhanced requirements on the monitoring and treatment of disinfectants and disinfection residuals in system distribution systems. These two rules have interrelated provisions; actions initiated under one rule have the potential to effect compliance under the companion rule.

SWTR: The Surface Water Treatment Rule, promulgated by EPA on June 29, 1989, was the precursor to enhanced requirements established under the Interim Enhanced Surface Water Treatment Rule and the Stage 1 Disinfectants and Disinfection Byproducts Rule. It established filtration and disinfection requirements that provide for continuous protection from pathological microbes potentially present in source waters.

TCR: The Total Coliform Rule, promulgated by EPA on June 29, 1989, was a precursor to enhanced requirements established under the Interim Enhanced Surface Water Treatment Rule and the Stage 1 Disinfectants and Disinfection Byproducts Rule. The TCR established health goals and legal limits for total coliform levels in drinking water (as indicator organisms), requires the conduct of routine sanitary surveys of systems, and specifies the type and frequency of testing which systems must perform.

1. Summary and Compliance Timetable

1. A. Water Systems Affected by this Rule

The Interim Enhanced Surface Water Treatment Rule (IESWTR) imposes more stringent treatment requirements on systems that use surface water or ground water under the direct influence of surface water and serve 10,000 or more persons. [The requirements are quite similar to those that were applied to smaller systems by the 2002 Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). This guidance follows the same format as KDHE's guidance for the LT1ESWTR.]

1. B. General Requirements

The Interim Enhanced Surface Water Treatment Rule contains the following major provisions:

1. The definition of ground water under the direct influence of surface water (GWUDI) is modified for systems serving 10,000 to include *Cryptosporidium*.
2. All systems affected by the rule are required to achieve 2-log removal of *Cryptosporidium*. This requirement is assumed to be met when the system maintains compliance with the turbidity standards established by the rule.
3. Turbidity standards for systems using slow sand or diatomaceous earth filtration remain the same as with the SWTR. KDHE must approve alternative filtration technologies and set turbidity performance requirements.
4. For conventional or direct filtration systems, combined effluent turbidity must be measured every four hours and reported in accordance with the Surface Water Treatment Rule. Turbidity must be less than .3 NTU in 95% of the measurements taken in a month and the turbidity level may not exceed 1 NTU.
5. Systems using conventional or direct filtration must conduct continuous turbidity monitoring (every fifteen minutes) for each individual filter and turbidimeters must be calibrated using procedures specified by the manufacturer.
6. If a system exceeds specified levels in individual filter turbidity, a series of follow-up actions are required.
7. Turbidity records must be maintained by the water system for at least three years. Combined effluent turbidity measurements are to be reported to the state within 10 days after the end of each month. An exception report for individual filter turbidity performance is required when certain levels are exceeded.
8. The public notification requirements for the IESWTR remain the same as the SWTR.

9. Systems must determine the annual average concentration of total trihalomethanes (TTHMs) and a group of five haloacetic acids (HAA5s). If these levels are 0.064 mg/l or 0.048 mg/l respectively, the system must profile its inactivation of *Giardia lamblia* over a twelve-month period. If a system decides to make a significant change in its disinfection practices, it must calculate a benchmark from its disinfection profile and receive KDHE approval prior to making the change.
10. For systems which use surface water or groundwater under the direct influence of surface water, KDHE is required to conduct sanitary surveys once every three years for community water systems, and once every five years for non-community systems. These surveys must consider eight separate elements.

1. C. Timetable for the IESWTR

Date	Rule Requirement	Reference
March 1999	TTHM and HAA5 monitoring must begin for systems that do not have ICR or occurrence data and wish to determine if they must develop a disinfection profile.	K.A.R. 28-15a-172 40 CFR 141.172 KDHE Survival Guide Section 2 EPA Profiling / Benchmarking Manual
December 31, 1999	TTHM and HAA5 data are due for those systems that collected data under the ICR to determine if they must develop a disinfection profile.	K.A.R. 28-15a-172 40 CFR 141.172 KDHE Survival Guide Section 2 EPA Profiling / Benchmarking Manual
March 31, 2000	Systems that began monitoring in March 1999 for TTHM and HAA5 to determine if they must develop a disinfection profile must submit this data to KDHE.	K.A.R. 28-15a-172 40 CFR 141.172 KDHE Survival Guide Section 2 EPA Profiling / Benchmarking Manual
April 1, 2000	Systems with an annual average TTHM of 0.064 mg/L or HAA5 of 0.048 mg/L must begin developing a disinfection profile.	K.A.R. 28-15a-172 40 CFR 141.172 KDHE Survival Guide Section 2 EPA Profiling / Benchmarking Manual
April 1, 2001	Disinfection profile to be completed.	K.A.R. 28-15a-172 40 CFR 141.172 KDHE Survival Guide Section 2 EPA Profiling / Benchmarking Manual
December 31, 2001	Systems that were required to develop a disinfection profile that wish to make a significant change to their disinfection practice after this date must first calculate a disinfection benchmark and consult with KDHE.	K.A.R. 28-15a-170 40 CFR 141.170(a) KDHE Survival Guide Section 2 EPA Profiling / Benchmarking Manual
December 2001	KDHE must begin first round of sanitary surveys for all surface water and GWUDI systems.	40 CFR 142.16 KDHE Survival Guide Section 2 EPA Sanitary Survey Guidance Manual
January 1, 2002	Systems must comply with reporting and recordkeeping requirements, including turbidity exceptions reporting. Systems must, <u>when appropriate</u> : *Produce filter profiles or identify obvious reasons for poor performance. *Report profile has been produced or identify obvious reason for poor performance. *Conduct filter self-assessments. *Have 3rd party CPEs performed.	K.A.R. 28-15a-175 40 CFR 141.175 KDHE Survival Guide Section 3 EPA Turbidity Guidance Manual

1. C. Timetable for the IESWTR (con't)

Date	Rule Requirement	Reference
January 1, 2002	Requirements of Subpart P (IESWTR) generally apply to surface water and GWUDI systems that serve at least 10,000 people (called Subpart H systems).	K.A.R. 28-15a-170 40 CFR 141.170(a)
December 2004	KDHE must have first round of sanitary surveys completed for Subpart H community water systems.	40 CFR 142.16
December 2006	State must have first round of sanitary surveys completed for Subpart H community water systems with "outstanding performance" and Subpart H non-community systems.	40 CFR 142.16

2. Disinfection Profiling and Benchmarking

2. A. Introduction

The Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DDBP Rule), which was promulgated at the same time as the IESWTR, places limits on the concentration of TTHMs and HAA5s in finished drinking water. Some water systems may find it necessary or desirable to change their disinfection practices in order to reduce concentrations of these compounds. The profiling and benchmarking requirements of the IESWTR are designed to determine if large surface water systems are at risk of exceeding the MCLs for disinfection byproducts, and if so, to require such systems to develop a profile of existing disinfection performance to be used as a reference when considering future changes in disinfection practices. Systems will not be allowed to reduce microbial protection below the benchmark level when enacting changes designed to comply with the Stage 1 DDBP Rule requirements.

2. B. Summary of Requirements

Profiling and benchmarking is a three-step process. A brief description is provided here.

Step 1 - determining if a system must develop a profile. Large systems that participated in monitoring required under the Information Collection Rule already had four consecutive quarters of TTHM and HAA5 data at the time the IESWTR was promulgated. Those systems which did not have this data were required to begin quarterly monitoring for these compounds in March 1999. If the annual average concentration of TTHMs is 0.064 mg/L or greater, or the annual average concentration of HAA5's is 0.048 mg/L or greater, the system must develop a disinfection profile.

Step 2 - developing the profile. Systems that determine they must profile based on the sampling described in Step 1 must monitor daily for a year to determine total logs of *Giardia lamblia* inactivation for each day of operation. This monitoring is to begin by April 1, 2000 (see table of IESWTR compliance dates). The profile must characterize inactivation throughout the treatment plant. Monitoring is to be done during peak hourly flow. Temperature is measured daily at each residual disinfectant sampling point. If the system uses chlorine, the pH value of

the disinfected water must be measured once a day at each disinfectant residual sampling point. Disinfectant contact time must be determined each day for each residual sampling point. The disinfectant residual concentration of water before or at the first customer and before each additional point of disinfection must be measured each day. Inactivation is then calculated by the Concentration x Time (CT) method used for the SWTR. Surface water systems are already familiar with this methodology. The disinfection profile must be maintained in a graphic or other acceptable format so that it can be reviewed by KDHE during a regularly scheduled sanitary survey.

Step 3 - calculating a disinfection benchmark and consulting with KDHE. If a water system decides in the future to make a significant change in its disinfection practices, it must calculate a benchmark and consult with KDHE. The system determines the average *Giardia lamblia* inactivation for each calendar month that data were profiled (one year minimum). This value is calculated by dividing the sum of daily log inactivation by the number of values calculated for that month. The disinfection benchmark is the lowest average monthly inactivation for systems with one year of data. The EPA Profiling and Benchmarking Manual provides additional detail and examples of calculations, including situations where multiple years of profiling data are available. When consulting with KDHE, the system must submit its benchmark information, describe proposed changes to disinfection practices, and provide an analysis of how the changes in disinfection practice will affect current levels of disinfection effectiveness.

2. C. Reporting and Recordkeeping by the Water System

The water system must report the results of TTHM and HAA5 monitoring to KDHE. Data collected under the Information Collection Rule is due by December 1999. Those systems that began monitoring in March 1999 must submit their data by March 2000. (See the timetable on page 5 of this survival guide).

If a system is required on the basis of this monitoring to prepare a disinfection profile, it must retain the profile and make it available for examination by KDHE during a regularly scheduled sanitary survey. The profile does not have to be submitted to KDHE; it is a reference tool that will be used by the system and KDHE in evaluating possible impacts of future changes in disinfection practices.

3. Turbidity Requirements

3. A. Combined Effluent Turbidity

The IESWTR tightens the turbidity performance standards of the Surface Water Treatment Rule. EPA's Turbidity Guidance Manual provides detailed information on these requirements. **It is assumed that the IESWTR requirement to remove 2 logs (99%) of Cryptosporidium is being achieved when these turbidity standards are met.** The following table compares turbidity performance standards under the two rules for systems using conventional or direct filtration. All of the large surface water systems in Kansas that are affected by the IESWTR use this treatment technology. For this reason, turbidity requirements for other treatment methods are not covered in this survival guide.

Combined Effluent Turbidity Performance Standards

Requirement	SWTR	IESWTR
Combined effluent turbidity measured every four hours must not exceed in 95% of monthly measurements...	.5 NTU	.3 NTU
Combined effluent turbidity must never exceed...	5 NTU	1 NTU

3. B. Individual Filter Turbidity Monitoring

The IESWTR requires systems using conventional or direct filtration to monitor individual filters continuously for turbidity of effluent water. Turbidity meters must be regularly calibrated in accordance with the equipment manufacturer’s instructions. Turbidity must be recorded every fifteen minutes during periods when the plant is producing water. If automatic turbidity monitoring equipment fails, the system must take grab samples every four hours until repairs are made. Grab sampling may not continue for more than five working days from the time of equipment breakdown. **The individual filter turbidity monitoring requirement is not considered part of the treatment technique requirements of this rule.** It is intended to provide a systematic method for monitoring individual filter performance. An escalating series of corrective responses are required when a filter is performing poorly (see below).

EPA’s Turbidity Guidance Manual provides a thorough technical background on the technology and methodology of turbidity measurement. It also includes discussion of the usefulness of turbidity measurements as an indicator of filtration efficiency. Water systems and drinking water staff should refer to this manual for details on monitoring requirements and for descriptions of the responses required when individual filter turbidity excursions occur.

There are four conditions which trigger follow-up action:

1. Individual filter turbidity is > 1.0 NTU in two consecutive measurements taken 15 minutes apart.

Action Required: The system must record the filter number, turbidity measurements, and dates. A filter profile must be produced within seven days if there is no obvious reason for the excess turbidity. The system must report to KDHE that a profile has been produced (or report the obvious reason for the excess turbidity) within 10 days after the end of each month the system delivers water to the public.

2. Individual filter turbidity is > 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of 4 hours of operation after the filter has been backwashed or otherwise taken off line.

Action Required: The system must record the filter number, turbidity measurements, and date(s). A filter profile must be produced within seven days if there is no obvious reason for the excess turbidity. The system must report to KDHE that a profile has been produced (or report the obvious reason for the excess turbidity) within 10 days after the end of each month that the system delivers water to the public.

3. Individual filter turbidity is >1.0 NTU in two consecutive measurements taken 15 minutes apart in each of three consecutive months.

Action Required: The system must record the filter number, turbidity measurements, and date(s). An assessment of the filter's performance must be conducted within 14 days, and a filter profile must be developed. The factors limiting filter performance must be identified and prioritized, and a filter assessment exceptions report must be prepared.

4. Turbidity is > 2.0 NTU in two consecutive measurements taken 15 minutes apart in two consecutive months.

Action Required: The system must record the filter number, turbidity measurements, and date(s). A comprehensive performance evaluation (CPE) must be arranged and conducted no more than thirty days after the excess turbidity was measured. The CPE must be completed and submitted to KDHE no more than 90 days after the excess turbidity was measured. .

3. C. Reporting and Recordkeeping

The system must report the results of combined effluent turbidity monitoring to KDHE within ten days of the end of each month that it serves water to the public, just as it currently does under the requirements of the SWTR. A form for reporting these results is included in Appendix C. Given the fact that large systems will almost certainly be recording turbidity continuously, use of this form is not mandatory. However, the data that would ordinarily be presented on the form must be reported in a format that allows the water system and KDHE to easily compare turbidity results with the limits specified in the rule.

Records of individual filter turbidity monitoring must be retained by the system for at least three years. The system must prepare an exception report and submit it to KDHE when individual filter turbidity exceeds certain levels as described in preceding section.

4. KDHE Recordkeeping / Special Primacy Requirements

4. A. Introduction

The IESWTR imposes certain requirements on KDHE as the primacy agency. KDHE must describe to EPA the approach it will take in making certain regulatory decisions in the implementation, administration, and enforcement of these requirements. For example, the IESWTR imposed a requirement that KDHE conduct a sanitary survey of all surface water systems at least once every three years for community systems and once every five years for non-community systems. Requirements concerning comprehensive performance evaluations of filtration systems that exceed turbidity standards are also outlined here, and a description of recordkeeping requirements is provided.

4. B. Sanitary Surveys

General: Federal regulations (40 CFR 142.16) require that KDHE conduct a sanitary survey of all community surface water and GWUDI systems every three years, and that non-

community systems must be surveyed every five years. See Appendix B of this survival guide for more specific information pertaining to sanitary surveys.

A sanitary survey is defined as consisting of eight elements:

1. Source
2. Treatment
3. Distribution system
4. Finished water storage
5. Pumps, pump facilities, and controls
6. Monitoring and reporting and data verification
7. System management and operation
8. Operator compliance with state requirements

(These eight elements are described in detail in EPA’s Sanitary Survey Manual.) If a water system has developed a disinfection profile, KDHE will examine the profile as part of the sanitary survey for that system. All eight elements of the survey must be examined during one on-site review of the water supply system.

System response required: KDHE requires that a water system respond in writing within 45 days of receiving a sanitary survey report describing how and on what schedule the system will respond to significant deficiencies noted in the report (K.A.R. 28-15-18(i). Operation and maintenance requirements.) Significant deficiencies are defined by KDHE as “any defect in a public water supply system’s design, operation, maintenance, or administration, as well as any failure or malfunction of any system component that causes, or has the potential to cause, an unacceptable risk to health or that could affect the reliable delivery of safe drinking water” (K.A.R. 28-15a-2(a)(4)(H). Definitions).

Significant deficiencies must be corrected: K.S.A. 65-171r (regarding public water supply systems and prohibited acts) and K.S.A. 65-171(s) (regarding public water supply systems and violation of standards, penalties, procedures, hearings, and judicial review) establishes that a failure by the system to correct deficiencies that are under the control of the public water system will constitute a violation of the Kansas Administrative Regulations. As such, administrative penalties and other remedies may be imposed by the state if the system does not comply with these requirements. It is KDHE’s responsibility to track and follow up on efforts by the system to meet the schedule for correcting deficiencies.

Discussion of significant deficiencies: EPA’s Sanitary Survey Manual (pages 4-7) describes some common deficiencies that may be significant for any given water system. These deficiencies and others from additional sources are compiled in Appendix B. This reference list may be helpful to an inspector when weighing the importance of a particular deficiency, but it is not intended to be prescriptive in nature. Questions that might be asked when deciding whether or not a deficiency is significant are:

- * **Does the deficiency cause the potential for contaminants to be introduced to the drinking water?**
- * **If left uncorrected, will the deficiency cause the potential for the introduction of contaminants at some point in the future?**
- * **Does the deficiency affect treatment in an unacceptable manner?**
- * **Does the deficiency pose risks to the safety of the public or operators?**

It is understood that a specific deficiency may be more serious for one water system than it is for another, given the complexity of the system, differences in treatment methods and control systems, and other site-specific factors. Professional judgment by the person conducting the sanitary survey will prevail in such matters. KDHE's evaluation and determination of significant deficiencies will necessarily err on the side of caution with respect to public health and safety.

[Outstanding performance: The IESWTR allows a state primacy agency to reduce the frequency of sanitary surveys for community water systems from once every three years to once every five years if the water system has demonstrated "outstanding performance." Although KDHE does not initially intend to adopt a reduced schedule of sanitary surveys under this "outstanding performance" criteria, KDHE has requested the opportunity to negotiate an "outstanding performance" criteria at a later date if it is determined to be desirable in the future.]

4. C. Composite Correction Program

General: KDHE may require a system using surface water or GWUDI to arrange for a Composite Correction Program (CCP) to be performed for the purpose of finding and correcting deficiencies in water treatment or distribution. K.S.A. 65-171r (regarding public water supply systems and prohibited acts) and K.S.A. 65-171(s) (regarding public water supply systems and violation of standards, penalties, procedures, hearings, and judicial review) establishes that a failure to implement performance improvement factors identified in the course of the CCP is a violation of Kansas Administrative Regulations. As such, administrative penalties and other remedies may be imposed by the state if the system does not comply with these requirements. It is KDHE's responsibility to track and follow up on efforts by the system to meet the factors identified in the Composite Correction Program..

EPA Guidance: The EPA's CCP Manual describes the process to be followed in carrying out a CCP evaluation.

Service Providers: A water system required to conduct a CCP evaluation may obtain assistance from various service providers. These may consist of engineering firms or other qualified water industry professionals.

CCP Findings: A copy of the CCP findings report must be provided to KDHE for use in tracking system progress in implementing performance improvement opportunities identified during the CCP evaluation.

4. D. Calculation of Virus Inactivation for Systems using Chloramines or Ozone

KDHE will use the following approach in determining virus inactivation for systems using these disinfectants:

Chloramines: Systems that use chlorine prior to adding ammonia may apply Table E-13 of EPA's SWTR Guidance Manual. Systems that add ammonia first, or add the two chemicals concurrently, may use the protocol in Appendix G of the SWTR Guidance Manual. In the unlikely event that a system wishes to suggest an alternative means for determining virus inactivation, the system must provide a scientifically defensible rationale for the proposed method.

Ozone: Systems utilizing ozone may apply Table E-11 of the SWTR Guidance Manual to determine virus inactivation. As above, an alternative method may be proposed and defended by the water system.

4. E. Consultation between KDHE and Public Water Supply Systems Planning to Modify Their Disinfection Practices

General: If a water system is required to develop a disinfection profile and the system subsequently decides to change its disinfection practices, it must first consult with KDHE, pursuant to K.S.A. 65-163 (regarding public water supply systems and water treatment residues, regulation, permits, and investigations) and K.A.R. 28-15a-542 (regarding consultation regarding significant change to disinfection practice for Subpart H systems serving fewer than 10,000 people.) The purpose of this requirement is to encourage the system and KDHE to work together to ensure that all potential water quality trade-offs are addressed and that any changes in disinfection practice do not result in a decrease in microbial protection. Changes subject to this requirement include:

- * **Changing the point of disinfection application**
- * **Changing the disinfectant**
- * **Changing the disinfection process**
- * **All other changes considered significant by the state, such as changes in pH, pre-treatment strategies, source water, contact basin dynamics, etc.)**

Because the above list is not all-inclusive, any system that is required to develop a disinfection profile and subsequently decides to make a change in its disinfection practices must notify KDHE so that the agency can determine whether or not the proposed change is significant and will require consultation between the system and KDHE.

Consultation: KDHE and the water system will weigh the following factors in their consultation:

- * **Why the system is proposing a change in disinfection practice;**
- * **Evaluation of positive and negative impacts of the change;**
- * **Calculation of an alternative benchmark; and**
- * **Examination of all known alternatives to the proposed change.**

The goal of this consultation will be to ensure that any changes made by the system will represent the best available balance between microbial protection and disinfection byproduct formation potential. In determining whether or not the proposed change in disinfection practices will be approved, KDHE will consider criteria such as a) the microbial quality of the raw water; b) the effectiveness of watershed protection efforts; and c) the efficacy of the treatment process in removing microbiological contaminants.

4. F. Approval of Alternative Filtration Technologies

KDHE will approve the use of an alternative filtration technology after a comprehensive review of data gathered during a pilot study. Turbidity performance requirements will be maintained at 0.3 NTU unless sufficient data from a pilot study shows that a treatment system consistently achieves 99.9 percent removal and/or inactivation of *Giardia Lamblia* cysts, 99.99

percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts at a level above 0.3 NTU. If a system has removal data from a study acceptable to KDHE as performed under the ETV or NSF standard test procedures, it may be considered for approval without additional pathogen removal studies. An approval granted for the use of alternative technologies and establishing turbidity performance standards will be put into writing by KDHE.

4. G. Recordkeeping by KDHE

KDHE will maintain the following records with respect to the IESWTR, as required by 40 CFR 142.14:

1. Records of turbidity measurements submitted by the water system must be kept in the system file for a minimum of one year. This information must be set forth in a form that makes possible a comparison with the turbidity limits specified in the SWTR and IESWTR. KDHE will use an existing form that was developed for the SWTR, as modified to reflect the tighter standards established by the IESWTR. An example of this form is included as Appendix C of this guidance. Because of the trend toward automatic logging of turbidity data, especially among larger systems, use of alternative formats is acceptable as long as equivalent information is provided, and as long as it is possible to compare the turbidity readings to the limits established in the SWTR and IESWTR.

2. Records of disinfectant residual measurements and other parameters necessary to document disinfection effectiveness must be kept in the system file for a minimum of one year.

3. The following record types must be kept in the system file on a permanent basis:

- a. Any case-by-case, system-specific regulatory decisions made by KDHE.
- b. Records of consultations between a system and KDHE regarding changes in disinfection practices, including the status of the consultation.
- c. Records of decisions that systems using alternative filtration technologies can consistently achieve a 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts. The decision must include the state-determined turbidity standards for the system. A copy of this decision must be provided to the water system.
- d. Records of systems that are required to perform filter self-assessments, and a CCP or CPE evaluation (see Section 3 of this survival guide).

4. I. Annual Report on Sanitary Surveys

KDHE is required to prepare an annual report which lists all Subpart H water systems that have had a sanitary survey during the previous year and an evaluation of KDHE's program for conducting sanitary surveys of public water systems as required by 40 CFR 142.16(b)(3). This report will be made available for examination by the public and will be submitted to EPA.

APPENDIX A

Composite Correction Program and Sanitary Surveys

Definitions

Composite Correction Program: The Composite Correction Program (CCP) is a systematic approach to identifying opportunities for improving the performance of water treatment and implementing changes that will capitalize on these opportunities. The CCP consists of two (2) elements:

a. Comprehensive Performance Evaluation: The Comprehensive Performance Evaluation (CPE) is a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation, and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. The CPE must consist of at least the following components: a) assessment of plant performance; b) evaluation of major unit processes; c) identification and prioritization of performance limiting factors; d) assessment of the applicability of comprehensive technical assistance; and e) preparation of a CPE report.

b. Comprehensive Technical Assistance: Comprehensive Technical Assistance (CTA) is the implementation phase that is carried out if the CPE results indicate improved performance potential. During the CTA phase, the system must identify and systematically address plant-specific factors. The CTA consists of a) follow-up to the CPE results; b) implementation of process control priority setting techniques; and c) maintaining long term involvement to systematically train staff and administrators.

Sanitary Survey: A Sanitary Survey is an onsite review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water. The sanitary survey will include, but is not limited to, the following elements:

- a. Source
- b. Treatment
- c. Distribution system
- d. Finished water storage
- e. Pumps, pump facilities, and controls
- f. Monitoring and reporting and data verification
- g. System management and operation
- h. Operator compliance with state requirements.

Significant Deficiency. A Significant Deficiency is any defect in a system's design, operation, maintenance, or administration, as well as any failure or malfunction of any system component which KDHE determines to cause, or have potential to cause, an unacceptable risk to health or that could affect the reliable delivery of safe drinking water.

Requirements

Sanitary Surveys

KDHE shall conduct a sanitary survey of all public water systems which use surface water or ground water under the direct influence of surface water.

Frequency: A sanitary survey shall be conducted for non-community water supply systems every five (5) years. For community water systems, a sanitary survey shall be conducted every three (3) years.

Report: A report describing the results of the sanitary survey will be provided to the water system.

Response Required: A water system must respond in writing not later than forty-five (45) days after receipt of the sanitary survey report describing how and on what schedule the system will address significant deficiencies identified in the survey.

Violation: Failure to address significant deficiencies identified in a sanitary survey that is within the control of the public water system and its governing body shall constitute a violation of Kansas Administration Regulations.

Composite Correction Program:

KDHE may require a public water system to conduct a Composite Correction Program for the purpose of identifying and correcting deficiencies in water treatment and distribution. Failure to implement the performance improvement factors identified through the CCP constitutes a violation of Kansas Administrative Regulations.

Appendix B

Significant Deficiencies in a Sanitary Survey

List of Potentially Significant Deficiencies That May Be Noted during a Sanitary Survey

The following deficiencies have the potential to meet KDHE's definition of a significant deficiency. This list is not intended to be prescriptive. The inspector in the field will have the final word on whether or not a particular deficiency is significant. However, each of these deficiencies has the potential to be significant and referring to this list may assist the inspector in making this decision.

Source:

- * Location of intake near pollution source
- * Well construction inadequate or in deteriorated condition
- * Spring collection facilities inadequate or in deteriorated condition

Treatment:

- * The hatch to a pressure filter has not been opened on a yearly basis to clean the media and to check for media loss and the condition of the underdrain system
- * Filter does not have adequate depth of media (e.g. less than 24 inches)
- * No standard operating procedure for taking a filter out of service for backwashing, for performing the backwash, or returning the filter to service
- * No process control plan for coagulant addition
- * Inadequate application of treatment chemicals
- * Chemical feed rates not adjusted for varying raw water quality conditions or changes in plant flow rate
- * Inadequate disinfection CT
- * Unsafe chemical storage

Distribution System:

- * TCR sampling plan not representative of the distribution system
- * Negative pressures at any time
- * System not flushed periodically
- * No disinfectant residual, or HPC levels greater than 500/ml, repeatedly, at same sites
- * Inadequate monitoring of disinfectant residual, when required
- * Inadequate cross-connection controls, either at the treatment facility or in the distribution system (or failure to have a cross-connection control program)
- * Unacceptable system leakage which could result in entrance of contaminants
- * System plans unavailable or outdated
- * Valve locations unknown
- * Valves not exercised regularly or known to be inoperable

Finished Water Storage:

- * Inadequate internal cleaning and maintenance of storage tank
- * Improper venting of tank
- * Lack of proper screening of overflow pipe and drain
- * Inadequate roofing (e.g. holes in the storage tank, improper hatch construction)

Pumps, Pump Facilities and Controls:

- * Ponding of water in pump housing
- * Inadequate pump capacity
- * Lack of redundant mechanical components
- * Electrical hazards

Monitoring/Reporting/Data Verification:

- * Failure to properly monitor water quality
- * Failure of system operator to address customer complaints regarding water quality or quantity
- * TCR sampling plan not available or not being followed
- * Chronic TCR coliform detections with inadequate remediation

Water System Management/Operation:

- * Lack of properly trained or licensed staff as required by the state
- * Lack of emergency response plan
- * Failure to meet water supply demands or interruptions to service (inadequate pump capacity, unreliable water source, lack of auxiliary power)
- * Inadequate follow-up to deficiencies not in previous sanitary surveys
- * Spare parts inventory inadequate
- * Lack of accessible contact list w/phone numbers for emergency repairs or troubleshooting
- * Evidence of poor or infrequent communication between operator and system managers

Operator Compliance with State Requirements:

- * Operator does not have the correct level of certification as required by regulation

Appendix C

Sample Turbidity Monitoring Form with Instructions

INSTRUCTIONS FOR "TURBIDITY, DISINFECTION AND CT" FORM

1. In the Heading Area of the form, enter: ¹⁾ the **Name** of the system, ²⁾ **Address**, ³⁾ **City**, ⁴⁾ public water supply **ID Number** and ⁵⁾ the **Month** and **Year**. The report is to be **Signed** and **Dated** by the person in responsible charge of the plant. **Return** the completed form no later than the **10th Day** following the end of the month.
2. In Column A, enter the daily minimum distribution system ¹⁾**Disinfectant Residual**. Also note whether the residual is ²⁾ *free chlorine (F)* or *combined chlorine (C)*, and specify ³⁾**Number of Residual Readings** that were taken that day.
3. In Column B, enter ¹⁾**Lowest Concentration** of disinfectant residual leaving the facility at any time during the 24 hour day. Indicate whether the residual is ²⁾ *Free Chlorine (F)* or *Combined Chlorine (C)*, and specify ³⁾ **Number of Residual Readings** that were taken that day.
4. In Column C, enter the **Highest Combined Filter Effluent (CFE) Turbidity Measurement** recorded during the 24-hour day. If this reading exceeds 5.0 NTU, notify KDHE within 24 hours or by the end of the next business day.
5. In Column D, enter the **Number of CFE Turbidity Measurements** taken during the 24-hour day. The regulations require that measurements be taken at least every 4 hours of plant operation unless the population served is less than 500 persons, then daily sampling is allowed.
6. In Column E, enter the number of turbidity readings which **Exceed 0.3 NTU (0.5 for systems < 10,000 until January 14, 2005)** during the 24-hour day.
7. In Column F, calculate the plant **CT Ratio** for the indicated 24-hour day by dividing the CT result by the CT required (CT₉₉) to get CT available. Total the CT available for the treatment segments to get the plant CT available (**CT Ratio**) value for the day. For help with this calculation, call the Public Water Supply Section at (785) 296-5516.
8. At the bottom of page 2, below Column D and Column E, **Add the Numbers** and enter the totals in their boxes.
9. In the Percent of NTU...in Compliance box, calculate the **Percentage of CFE Turbidity Readings** which are less than or equal 0.3 NTU (0.5 for systems < 10,000 until January 14, 2005) for the month. This is the total of Column D, minus total of Column E, result divided by total of Column D.
10. Use Comment lines or far right Column for: ¹⁾ date of **Sanitary Survey**, ²⁾date **State** was **Contacted**, or ³⁾dates, time and duration of any **Treatment Technique Failures or Violations**.
 Check any dates on which bacteriological compliance samples were collected. **Systems ≥ 10,000 are required to report continuous monitoring of individual filters beginning January 1, 2002. Systems <10,000 are required to report continuous monitoring of individual filters beginning January 14, 2005. Even when there are no problems, the monthly message must clearly state "Individual filters are continuously monitored for turbidity and results are recorded every 15 minutes as required".**

MONTHLY TURBIDITY - DISINFECTION - CT

SUMMARY REPORT FOR THE MONTH & YEAR OF: _____

PWS NAME/FACILITY: _____

ACCOUNT/PWS ID No.: _____

ADDRESS: _____

CITY & ZIP CODE: _____

MAIL TO:

KDHE - Bureau of Water
Public Water Supply Section
1000 SW Jackson St.; Suite 420
Topeka, KS 66612-1367

DATE	(A) Minimum Residual in Distribution System			(B) Minimum Residual Leaving the Plant			(C) Maximum Combined Filter Effluent (CFE) Turbidity Reading For Each Day	(D) Total Number of CFE Turbidity Readings Taken Each Day	(E) Number of CFE Turbidity Readings Greater than 0.3 NTU	(F) Disinfectant Contact Time Ratio	Bacteriological Samples Collected
	Minimum Daily Residual	Disinfectant Type (Combined or Free)	# of Residual Readings Taken	Minimum Daily Residual	Disinfectant Type (Combined or Free)	# of Residual Readings Taken					<input checked="" type="checkbox"/>
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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29											
30											
31											

TOTAL NUMBER OF READINGS:

Percent (%) of NTU Readings Which are in Compliance:

COMMENTS: _____

Please check box if the Individual Filter Effluent (IFE) was monitored and recorded every 15 minutes as required.

Please check box if any IFE exceeded 1.0 NTU in two consecutive readings taken 15 minutes apart. (attach required data with this report)

Prepared By: _____

Date Form Completed: _____

Signature on this form certifies all information above is accurate and complete to the best of the signer's knowledge.



A number of national guidance products and other informational materials have been developed by EPA to assist the state and regulated water systems in complying with this rule and other related rules. Printed copies of informational materials may be requested from the Safe Drinking Water Hotline at 1-800-426-4791. Many documents may be viewed and downloaded from the following EPA Internet addresses:

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

<http://www.epa.gov/safewater/mdbp/implement.html>

<http://www.epa.gov/safewater/mdbp/ieswtr.html>

Other national guidance products are available for this rule. The best place to access these documents as they become available is on the Internet at the web addresses provided above. Listed below are existing publications that are of general use to surface water systems.

Guidance Manual for Conducting Sanitary Surveys of Public Water Systems; Surface Water and Ground Water Under the Direct Influence (GWUDI) of Surface Water, EPA 815-R-99-016, April 1999. [a.k.a. "Sanitary Survey Guidance Manual"]

Guidance Manual for Compliance with the Interim Enhanced Surface Water Treatment Rule: Turbidity Provisions, EPA 815-R-99-010, April 1999. [a.k.a. "Turbidity Guidance Manual"]

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

Optimizing Water Treatment Plant Performance Using the Composite Correction Program, EPA 625/6-91/027 Revised August 1998. [a.k.a. "CCP Manual"]

Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources, US EPA, 1991. [a.k.a. "SWTR Guidance Manual"]

Implementation Guidance Manual for the Interim Enhanced Surface Water Treatment Rule, EPA 816-R-01-011, June 2001. [a.k.a. "IESWTR Implementation Manual"]

The following EPA Quick Reference Guide on the Interim Enhanced Surface Water Treatment Rule is provided as a handy reference as a supplement to this survival guide.



Interim Enhanced Surface Water Treatment Rule: A Quick Reference Guide



Overview of the Rule

Title	Interim Enhanced Surface Water Treatment Rule (IESWTR) 63 FR 69478 - 69521, December 16, 1998, Vol. 63, No. 241 Revisions to the Interim Enhanced Surface Water Treatment Rule (IESWTR), the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR), and Revisions to State Primacy Requirements to Implement the Safe Drinking Water Act (SDWA) Amendments 66 FR 3770, January 16, 2001, Vol 66, No. 29
Purpose	Improve public health control of microbial contaminants, particularly <i>Cryptosporidium</i> . Prevent significant increases in microbial risk that might otherwise occur when systems implement the Stage 1 Disinfectants and Disinfection Byproducts Rule.
General Description	Builds upon treatment technique approach and requirements of the 1989 Surface Water Treatment Rule. Relies on existing technologies currently in use at water treatment plants.
Utilities Covered	Sanitary survey requirements apply to all public water systems using surface water or ground water under the direct influence of surface water, regardless of size. All remaining requirements apply to public water systems that use surface water or ground water under the direct influence of surface water and serve 10,000 or more people.

Major Provisions

Regulated Contaminants

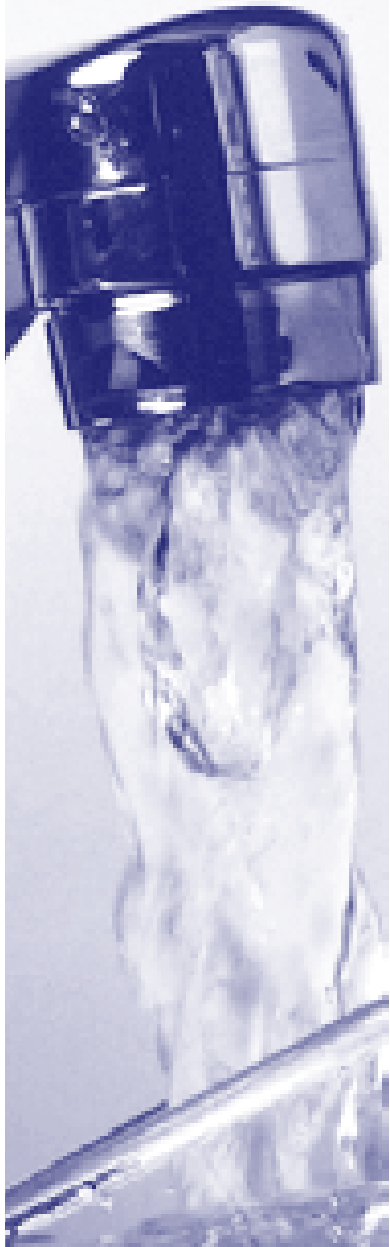
<i>Cryptosporidium</i>	<ul style="list-style-type: none"> ▶ Maximum contaminant level goal (MCLG) of zero. ▶ 99 percent (2-log) physical removal for systems that filter. ▶ Include in watershed control program for unfiltered systems.
Turbidity Performance Standards	<p>Conventional and direct filtration combined filter effluent:</p> <ul style="list-style-type: none"> ▶ ≤ 0.3 nephelometric turbidity units (NTU) in at least 95 percent of measurements taken each month. ▶ Maximum level of 1 NTU.

Turbidity Monitoring Requirements (Conventional and Direct Filtration)

Combined Filter Effluent	▶ Performed every 4 hours to ensure compliance with turbidity performance standards.
Individual Filter Effluent	▶ Performed continuously (every 15 minutes) to assist treatment plant operators in understanding and assessing filter performance.

Additional Requirements

<ul style="list-style-type: none"> ▶ Disinfection profiling and benchmarking. ▶ Construction of new uncovered finished water storage facilities prohibited. ▶ Sanitary surveys, conducted by the state, for all surface water and ground water under the direct influence of surface water systems regardless of size (every 3 years for community water systems and every 5 years for noncommunity water systems). 	
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Profiling and Benchmarking

Public water systems must evaluate impacts on microbial risk before changing disinfection practices to ensure adequate protection is maintained. The three major steps are:

- ▶ Determine if a public water system needs to profile based on TTHM and HAA5 levels (applicability monitoring)
- ▶ Develop a disinfection profile that reflects daily *Giardia lamblia* inactivation for at least a year (systems using ozone or chloramines must also calculate inactivation of viruses)
- ▶ Calculate a disinfection benchmark (lowest monthly inactivation) based on the profile and consult with the state prior to making a significant change to disinfection practices

Critical Deadlines and Requirements

For Drinking Water Systems

February 16, 1999	Construction of uncovered finished water reservoirs is prohibited.
March 1999	Public water systems lacking ICR or other occurrence data begin 4 quarters of applicability monitoring for TTHM and HAA5 to determine if disinfection profiling is necessary.
April 16, 1999	Systems that have 4 consecutive quarters of HAA5 occurrence data that meet the TTHM monitoring requirements must submit data to the state to determine if disinfection profiling is necessary.
December 31, 1999	Public water systems with ICR data must submit it to states to determine if disinfection profiling is necessary.
April 1, 2000	Public water systems must begin developing a disinfection profile if their annual average (based on 4 quarters of data) for TTHM is greater than or equal to 0.064 mg/L or HAA5 is greater than or equal to 0.048 mg/L.
March 31, 2001	Disinfection profile must be complete.
January 1, 2002	Surface water systems or ground water under the direct influence of surface water systems serving 10,000 or more people must comply with all IESWTR provisions (e.g., turbidity standards, individual filter monitoring).

For States

December 16, 2000	States submit IESWTR primacy revision applications to EPA (triggers interim primacy).
January 2002	States begin first round of sanitary surveys.
December 16, 2002	Primacy extension deadline - all states with an extension must submit primacy revision applications to EPA.
December 2004	States must complete first round of sanitary surveys for community water systems.
December 2006	States must complete first round of sanitary surveys for noncommunity water systems.

For additional information on the IESWTR

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.

Additional material is available at www.epa.gov/safewater/mdbp/implement.html.

Public Health Benefits

Implementation of the IESWTR will result in . . .	<ul style="list-style-type: none"> ▶ Increased protection against gastrointestinal illnesses from <i>Cryptosporidium</i> and other pathogens through improvements in filtration. ▶ Reduced likelihood of endemic illness from <i>Cryptosporidium</i> by 110,000 to 463,000 cases annually. ▶ Reduced likelihood of outbreaks of cryptosporidiosis.
Estimated impacts of the IESWTR include . . .	<ul style="list-style-type: none"> ▶ National total annualized cost: \$307 million ▶ 92 percent of households will incur an increase of less than \$1 per month. ▶ Less than 1 percent of households will incur an increase of more than \$5 per month (about \$8 per month).