Federal Register

Tuesday
May 14, 1996

Part II

Environmental Protection Agency

40 CFR Part 141

National Primary Drinking Water Regulations: Monitoring Requirements for Public Drinking Water Supplies; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 141

[WH–FRL–5501–1]

RIN 2040–AC24

National Primary Drinking Water Regulations: Monitoring Requirements for Public Drinking Water Supplies: Cryptosporidium, Giardia, Viruses, Disinfection Byproducts, Water Treatment Plant Data and Other Information Requirements

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: Today, EPA is promulgating an information collection rule (ICR) which establishes monitoring and data reporting requirements for large public water systems (PWSs). This rule is intended to provide EPA with information on the occurrence in drinking water of (1) chemical byproducts that form when disinfectants used for microbial control react with chemicals already present in source water (disinfection byproducts (DBPs)) and (2) disease-causing microorganisms (pathogens), including Cryptosporidium. Also, EPA will collect engineering data on how PWSs currently control such contaminants. All data collected pursuant to this rule will be available to the public via the Internet.

This information is being collected because a Regulatory Negotiation on disinfectants and DBPs concluded that additional information is needed to assess the potential health problem created by the presence of DBPs and pathogens in drinking water and to assess the extent and severity of risk in order to make sound regulatory and public health decisions. These contaminants may have adverse human health effects, including cancer, liver and kidney damage, and may cause microbial disease such as cryptosporidiosis and hepatitis.

EPA will use information generated by this rule, along with concurrent research, to determine whether revisions need to be made to EPA's current drinking water filtration and disinfection rule and to determine the need for new regulations for disinfectants and DBPs.

EPA has determined that the rule's objectives can be satisfied, and sufficient information collected, by requiring only large PWSs to collect the data. Surface water systems serving at least 100,000 people and ground water systems serving at least 50,000 must monitor. EPA will supplement this information with EPA-funded surveys that target smaller PWSs. The specific information required is based on the number of people served, the source of water (i.e., surface water or ground water), and the type(s) of treatment used.

Although *Cryptosporidium* is an important drinking water pathogen, it poses difficult measurement challenges. To ensure quality of data, EPA has and will continue to take extraordinary steps. The first is to continue an extensive method analysis and possible improvements. The second is to establish stringent laboratory approval criteria to increase *Cryptosporidium* data quality for developing a national occurrence data base and conducting a national cost assessment of possible future rules. Finally, EPA will supplement the collection of *Cryptosporidium* data in this rule with a separate, EPA-funded survey. EPA believes this combination of data collection activities will produce the best data possible.

DATES: The effective date for this final rule is June 18, 1996. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of June 18, 1996. This rule shall remain effective until December 31, 2000.

The information collection requirements contained in subpart M of part 141 have not been approved by the Office of Management and Budget (OMB) and are not effective until OMB has approved them. EPA will publish a final rule announcing the effective date when OMB approves the information collection requirements.

ADDRESSES: Copies of the public comments received, EPA responses, and all other supporting documents (including references included in this notice) are available for review at the U.S. Environmental Protection Agency (EPA) Drinking Water Docket (MC–4101), 401 M Street SW, Washington, DC 20460. For access to Docket materials, call (202) 260–3027 between 9 am and 3:30 pm (Eastern) for an appointment. Copies of major supporting documents cited in the reference section of this notice are available for inspection at EPA's regional offices, listed below. Copies of ''ICR Sampling Manual'', ''DBP/ICR Analytical Methods Manual'', ''ICR Manual for Bench- and Pilot-scale Studies'', ''ICR Microbial Laboratory Manual'', ''Reprints of EPA Methods for Chemical Analyses under the Information Collection Rule'', and ''ICR Water Utility Database System Users' Guide'' are available for a fee from the National Technical Information Service (NTIS), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. The toll-free number is 800–336–4700, local 703–487–4650. Copies of ''Standard Methods for the Examination of Water and Wastewater'', 19th Ed., 1995, are available from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. Copies of ''Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources'', Appendices C and O, 1991, are available from American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235.

FOR FURTHER INFORMATION CONTACT: The Safe Drinking Water Hotline, Telephone (800) 426–4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding Federal holidays, from 9:00 am to 5:30 pm Eastern Time. Since this rule will be directly implemented by EPA rather than States, EPA recommends that inquiries be directed to EPA. For technical inquiries, contact Tom Grubbs or Paul S. Berger, Ph.D., Office of Ground Water and Drinking Water (4603), U.S. Environmental Protection Agency, 401 M Street SW, Washington, DC 20460, telephone (202) 260–7270 (Grubbs) or (202) 260–3039 (Berger). For implementation inquiries, contact Barbara Wysock, Technical Support Division, U.S. Environmental Protection Agency, 26 West Martin Luther King Drive, Cincinnati, OH 45268, telephone (513) 569–7906, or your EPA regional office.

SUPPLEMENTARY INFORMATION:

EPA Regional Office Points of Contact for the Information Collection Rule

I. Kevin Reilly, Water Supply Section, JFK Federal Bldg., Room 203, Boston, MA 02203, (617) 565–3619

II. Michael Lowy, Water Supply Section, 290 Broadway, 24th Floor, New York, NY 10007–1866, (212) 637–3830

III. Ghassan Khaled, Drinking Water Section (3WM41), 841 Chestnut Building ,Philadelphia, PA 19107, (215) 597–8992

IV. David Parker, Water Supply Section, 345 Courtland Street, Atlanta, GA 30365, (404) 347–2913 ext. 6493

V. Kimberly Harris, Water Supply Section, 77 W. Jackson Blvd., Chicago, IL 60604, (312) 353–2650

VI. Blake L. Atkins, Team Leader, Water Supply Section, 1445 Ross Avenue, Dallas, TX 75202, (214) 665–2297

VII. Stan Calow, State Programs Section, 726 Minnesota Ave., Kansas City, KS 66101, (913) 551–7410

VIII. Bob Benson or Bob Clement, Public Water Supply Section (8WM–DW), 999 18th Street, Suite 500, Denver, CO 80202–2466, (303) 312–6243 (Benson), (303) 312–6079 (Clement)
IX. Barry Pollock, Water Supply Section, 75 Hawthorne Street, San Francisco, CA 94105, (415) 744–1913
X. Wendy Marshall, Drinking Water Unit, 1200 Sixth Avenue (OW–136), Seattle, WA 98101, (206) 553–1890

Regulated Entities

Entities potentially regulated by this action are public water systems that treat surface water and serve at least 100,000 people and public water systems that treat ground water and serve at least 50,000 people. Regulated categories and entities include:

Category	Example of regulated entities
Public water systems	Public water systems that treat surface water and serve at least 100,000 people. Public water systems that treat ground water and serve at least 50,000 people.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in this table could also be regulated. To determine whether your public water system is regulated by this action, you should carefully examine the applicability criteria in § 141.141 of the rule. If you have questions regarding the applicability of this action to a particular entity, contact the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Table of Contents

Abbreviations Used in This Notice

°C—degrees Celsius
CFR—Code of Federal Regulations
CT—product of disinfectant residual concentration (C (mg/l)) and contact time (T (minutes))
DBP—disinfection byproduct
D/DBPR—Disinfectants/Disinfection Byproducts Rule
DSE—distribution system equivalent
EPA—Environmental Protection Agency
ESWTR—Enhanced Surface Water Treatment Rule
equ—equivalents
ft—foot or feet
ft^2—square feet
ft^3—cubic feet
FR—Federal Register
GAC—granular activated carbon
gpd—gallons per day
GWUDI—ground water under the direct influence of surface water
HAA5—haloacetic acids (five)
HAA6—haloacetic acids (six)
HAN—haloacetonitriles
HK—haloketones
ICR—Information Collection Rule
MGD—million gallons per day
mg/l—milligrams per liter
nm—nanometers
OMB—Office of Management and Budget
PE—performance evaluation
psi—pounds per square inch
PWS—public water system
PWSID—public water system identification
RSSCT—rapid small-scale column test
SCFM—standard cubic feet per minute
SDS—simulated distribution system
THM4—trihalomethanes (four)
TOC—total organic carbon
TOX—total organic halides
TTHM—total trihalomethanes
µm—micrometers
UFCTOX—Uniform formation conditions for total organic halides
U.S.C.—United States Code
WIDB—Water Industry Data Base

I. Summary of Regulation

Acting under the requirement of the Safe Drinking Water Act to regulate additional contaminants that may cause adverse health effects, EPA convened a regulatory negotiation in 1992 due to concerns over the health effects of chemical byproducts (known as disinfection byproducts (DBPs)). DBPs form in drinking water when disinfectants used for microbial control react with organic and inorganic chemicals already present in source water. The regulatory negotiation was convened to determine how the risk-risk issue of controlling the level of DBPs in drinking water on the one hand while controlling exposure to disease-causing microbes (pathogens) on the other hand is best addressed.

The Negotiating Committee, consisting of representatives of State and local regulatory and public health agencies, local elected officials, consumer groups, public water systems (PWSs), environmental groups, and EPA, met for more than six months to develop a plan to concurrently control DBPs and microorganisms. The Committee determined that an important component of their plan would be to develop additional information to better define the problem and better identify possible solutions. To develop this information, the Committee agreed that PWSs should be required to collect occurrence and treatment data to characterize disinfectants, DBPs, and microorganisms in drinking water. The Committee also decided that some PWSs should conduct treatment studies to evaluate the use of granular activated carbon or membranes to remove DBP precursors. The information collected, in addition to concurrently conducted health effects and technology research, will be used to evaluate the need for possible changes to the current Surface Water Treatment Rule (SWTR) and to evaluate the need for future regulations for disinfectants and DBPs. All data collected pursuant to this rule will be available to the public via the Internet. (See Section III below and the preamble to the proposed Information Collection Rule (ICR) [59 FR 6332, February 10, 1994] for a more detailed discussion of the regulatory negotiation process).

Today, EPA is promulgating an information collection rule (ICR) which requires large PWSs to generate and provide the Agency with specific monitoring data and other information characterizing their water systems. There are three classes of PWSs affected, each somewhat differently, by this rule. The three general classes are: (1) PWSs that serve at least 100,000 people and use surface water; (2) PWSs that serve at least 100,000 people, and use only ground water as the source; and (3) PWSs that serve at least 50,000, but less than 100,000, people and use ground water as the source. Throughout this rule and preamble, requirements for

PWSs or treatment plants that use ground water under the direct influence of surface water as a source are the same as those for surface water.

Table I–1 contains a summary of today's rule, which will appear in subpart M to 40 CFR Part 141.

TABLE I–1.—GENERAL SUBPART M REQUIREMENTS [1]

Type of PWS [2]	DBP and related monitoring [3]	Microbial Monitoring [4]	Treatment Studies [5]
PWS using surface water [6] serving ≥100,000	Yes—monthly for 18 months	Yes—monthly for 18 months	Yes.
PWS using ground water serving ≥100,000	Yes—monthly for 18 months	NA	Yes.
PWS using ground water serving 50,000 to <100,000	NA	NA	Yes.

[1] These are general requirements and do not include regulatory allowances for reduced monitoring and other specific provisions provided in the rule.
[2] Population served will include both retail and wholesale populations. Specific instructions for calculating population served are included in the rule.
[3] DBP and related monitoring includes monitoring for DBPs and other parameters at specified locations throughout the treatment plant. Also, PWSs will be required to characterize treatment processes in the treatment plant. Monitoring includes disinfectant residuals, trihalomethanes, haloacetic acids, haloacetonitriles, haloketones, chloral hydrate, chlorite, chlorate, bromide, bromate, total organic halides (TOX), total organic carbon (TOC), and general water quality parameters.
[4] Microbiological monitoring includes monitoring for specific pathogens and microbial indicators: total culturable viruses, total coliforms, fecal coliforms or E. coli, Giardia, and Cryptosporidium.
[5] PWSs must conduct treatment study applicability monitoring and, unless avoidance criteria are met, bench- or pilot-scale treatment studies to determine the effectiveness of granular activated carbon (GAC) or membranes in reducing the levels of precursors to the formation of disinfection byproducts.
[6] Includes PWSs using ground water under the direct influence of surface water.

A major issue with this rule is the adequacy of the protozoa analytical method to generate meaningful occurrence information for *Cryptosporidium*. The analytical method is relatively new and difficult to conduct. Even experienced laboratories have had widely varying results. EPA has worked over the last couple of years to improve the method and evaluate its performance under field conditions. The most recent round of testing showed laboratories recovering between 5% and 21% of the *Cryptosporidium* known to be present. However, despite its generally acknowledged limitations, this method is the best method either currently available or anticipated to be available in the near future and EPA is confident that data produced by approved laboratories will enable the Agency to develop a reliable national occurrence data base and national cost impact estimates for various scenarios of regulations.

In making its determination whether the protozoa analytical method is adequate to yield meaningful results, EPA focussed on how the data were to be used. Specifically, the data generated under this rule will be used to develop a national occurrence data base and national cost impact estimates for various scenarios of regulations which could be promulgated to reduce microbiological risk. Also, these data may be used in conjunction with results of dose-response health effects research to develop benefit estimates for regulatory options. ICR data would not be used, except at the option of the PWS, to make compliance determinations with future rules. At the national level, EPA will aggregate data from PWS samples analyzed at different laboratories so that the range of relative error is much smaller, nationally, than it would be for a single PWS. EPA developed statistically based data quality objectives which indicated that, even if *Cryptosporidium* recovery averaged only 8%, the range of uncertainty in cost estimates would be no greater than with previously issued drinking water rules. The reason the recovery rate can be this low is because of the large number of PWSs (over 300) which would be generating data. With a much smaller sample size, a higher range of recovery would be needed. With such a large data base, EPA's independently evaluated statistical analysis shows that an 8% recovery rate can provide a reliable adjustment factor from which to estimate national occurrence. EPA believes that, with the stringent laboratory approval requirements contained in this rule, recovery rates will meet this minimum requirement. As added insurance that the data will be useful, EPA intends to conduct a companion survey of 50 PWSs where the data are analyzed by a single laboratory meeting even more stringent requirements than those imposed in this rule. The results from this survey will augment the ICR-generated data and improve their statistical reliability.

II. Statutory Authority

The Safe Drinking Water Act (SDWA, or the Act), as amended in 1986, requires EPA to publish maximum contaminant level goals (MCLGs) for contaminants which may have an adverse effect on human health and are known or anticipated to occur in PWSs. For such contaminants, EPA must also promulgate national primary drinking water regulations (NPDWRs) which specify either maximum contaminant levels (MCLs) or treatment techniques (42 U.S.C. 300g–1). An MCL must be set as close to the MCLG as feasible.

Under the Act, PWSs can be required to ''establish and maintain such records, make such reports, conduct such monitoring, and provide such information as the Administrator may reasonably require by regulation to assist him in establishing regulations, [or] * * * in evaluating the health risks of unregulated contaminants''. 40 U.S.C. 300j–4. This provision authorizes EPA to require systems to monitor and provide the Agency with these data as well as other data characterizing the systems, including source and treated water quality.

In addition, the Act defines NPDWRs to include ''criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; including quality control and testing procedures * * *''. 40 U.S.C. 300f(1)(D). This provision authorizes EPA to require systems and laboratories to use Agency-approved methods and quality assurance criteria for collecting and analyzing water samples. EPA is using these information collection authorities as the basis for promulgating the ICR.

III. Regulatory Background

EPA has issued two regulations intended to control pathogens in public water supplies—the Total Coliform Rule (54 FR 27544, June 29, 1989) and the Surface Water Treatment Requirements (SWTR) (54 FR 27486, June 29, 1989). A

third regulation, the Groundwater Disinfection Rule, is currently under development and will add further protection for systems using ground water.

In addition to these regulations, EPA concluded that it was necessary to address disinfectants and chemical byproducts that form when disinfectants used for microbial control in drinking water react with various organic and inorganic chemicals in the source water. Chronic exposure to various DBPs may cause cancer, liver and kidney damage, heart and neurological effects, and effects to unborn children. In 1992, EPA instituted a formal regulatory negotiation (reg-neg) process to develop the Disinfectants/Disinfection Byproducts Rule (D/DBPR) (57 FR 53866, November 13, 1992). This negotiation was discussed in the proposed rule.

In the course of the discussions, the Negotiating Committee determined that insufficient data were available on DBPs to make appropriate regulatory decisions. The Committee was concerned about the risk from DBPs, on one hand, and microbial risk on the other. As disinfectant use is decreased to decrease the formation of DBPs, the risk of microbial illness increases. Microbes cause many diseases, including giardiasis, cryptosporidiosis, dysentery, and hepatitis. For individuals with weakened immune systems, these diseases can be fatal.

The Committee recommended that additional data be developed on health effects, occurrence of and exposure to these contaminants, and on the capabilities of treatment technologies to reduce levels of these contaminants. Committee members were also concerned about limited data available on microbial contaminants in water. (See preamble of proposed ICR for a more detailed discussion of the need for additional data and rationale for the proposed monitoring and reporting requirements. 59 FR 6332 (February 10, 1994).) The Committee agreed to proceed with the proposal of regulatory actions but at the same time to initiate a process for developing additional data for future regulatory decisions. Accordingly, the Committee developed three proposed rules: (a) the Information Collection Rule (ICR) (59 FR 6332, February 10, 1994), (b) the ''interim'' Enhanced Surface Water Treatment Rule (ESWTR) (59 FR 38832, July 29, 1994), and (c) the D/DBPR (59 FR 38668, July 29, 1994). It is the ICR that is the subject of this final rulemaking.

The Negotiating Committee's development of the three proposed rules was based on: (1) the need to take prudent immediate steps by proposing a Stage 1 D/DBP rule and an interim ESWTR and (2) the need to develop additional data through monitoring and research for future regulatory decisions that would support refinements to the proposed interim ESWTR, and development of the long-term ESWTR and Stage 2 D/DBP rule.

The information collected under this rule will be used to determine the most effective regulatory option(s) to reduce exposure to pathogens, disinfectants, and DBPs. All can have adverse effects on human health. Over 200 million people will benefit from these rules once they are fully effective. Preliminary estimates of the annual benefits of the rules could be the avoidance of many cases of disease, including as many as several thousand cancer cases and 500,000 cases of giardiasis, and control of the parasite *Cryptosporidium*. Accordingly, today's final rule, which requires this additional information, meets the direction and objectives of the Negotiating Committee.

The ICR is designed to obtain both microbial and DBP occurrence, exposure, and treatment data for input into the ESWTR and Stage 2 D/DBP rule, as outlined below, and is expected to require the expenditure of an estimated $130 million over three years by a segment of PWSs. The commitment by the public water supply community to support this collection of additional data is linked to EPA's commitment to provide (1) adequate quality control procedures for collecting and managing the information obtained under the ICR and (2) additional funding, especially on health effects research, for properly interpreting ICR data.

The Negotiating Committee also agreed that more data, especially monitoring data, should be collected under the ICR to assess possible shortcomings of the SWTR and to develop appropriate remedies, if needed, to prevent increased risk from microbial disease as systems begin complying with the Stage 1 D/DBP Rule. It was also agreed that EPA would propose an interim ESWTR for systems serving at least 10,000 people that included a wide range of regulatory alternatives. Data gathered under the ICR will form the basis for developing the most appropriate criteria among the options presented in the proposed interim ESWTR. Eventually a long-term ESWTR would include possible refinements to the interim ESWTR and be applicable to all system sizes. The interim and long-term ESWTR rules would become effective concurrently with the requirements of the Stage 1 D/DBP rule for the respective different system sizes.

The Negotiating Committee also agreed that additional data on the occurrence of disinfectants, DBPs, and potential surrogates for DBPs; source water and within-treatment plant conditions affecting the formation of DBPs; and bench- and pilot-scale information on the removal of DBP precursors would be useful for developing Stage 2 D/DBP regulatory criteria beyond those currently being considered for proposal in Stage 1. Additional data will be developed on potential consumer exposures, acute short-term health effects, and chronic health effects through a concurrent EPA-sponsored research program. These data will support important decisionmaking that will be required when promulgating the Stage 2 D/DBPR.

IV. Description of Today's Action

This preamble briefly summarizes the background of the ICR, the major elements of the regulations, and the major changes from the proposal. The proposed ICR (59 FR 6332, February 10, 1994) includes a detailed discussion of the lengthy regulatory negotiation process that led to the development of the ICR and is an essential part of the record for the decisions made in this final action. While the discussions from the proposed ICR are not generally repeated here, this preamble occasionally cites the proposed rule where such references are useful.

The purpose of the ICR is to establish specific data collection requirements for PWSs and to identify the exact manner in which the data are to be collected and transmitted to the Agency. Most of the requirements are presented in the rule in tabular format, because of the diverse characteristics of the PWSs subject to the ICR. EPA also concluded that technical manuals would be the most efficient way of communicating the detailed requirements of the ICR to those who are actually responsible for implementing the regulations. These technical manuals are incorporated by reference into the ICR. These manuals will be sent by EPA to those PWSs subject to the requirements of the rule. These technical manuals can also be obtained through the National Technical Information Service.

A. New Terms (§ 141.140)

EPA has developed new definitions to address specific issues raised by the ICR and to respond to commenters' questions concerning applicability and monitoring requirements. The definitions in § 141.140 apply only to

the regulatory requirements of this rule (i.e., 40 CFR Part 141, subpart M).

B. General Applicability

1. Notice of Applicability (§§ 141.142(c)(2)(i) and 141.143(c)(3)(i))

In Appendix B of the proposed ICR, EPA included lists of PWSs that it expected would have to comply with at least some of the proposed ICR requirements, based on the Agency's own data system, on the Water Industry Data Base (WIDB), or both. EPA requested comment on the accuracy of these lists. Based on public comments and input from EPA regions and States, the Agency developed an updated list of PWSs that are expected to comply with subpart M requirements. Each of these PWSs will receive a Notice of Applicability. Upon receiving a Notice of Applicability, a PWS must reply within 35 days, specifically identifying the subpart M requirements that apply to each treatment plant operated by the PWS. A PWS that believes that it does not meet applicability criteria must so indicate in its response to EPA's Notice of Applicability.

Although EPA has expended considerable effort to identify all of the PWSs subject to subpart M, it is possible that an affected PWS may not have been identified. Failure to receive a Notice of Applicability does not relieve a PWS of its responsibility for compliance. A PWS that meets the applicability requirements, but does not receive an EPA Notice of Applicability, must contact the ICR Utilities Coordinator, TSD, USEPA, 26 West Martin Luther King Drive, Cincinnati, OH 45268, so the Agency can send the necessary materials.

2. Applicability Determinations

In order to account for both retail and wholesale populations served by treated water produced by a PWS, and to determine specific monitoring requirements for each treatment plant operated by the PWS, each PWS subject to this regulation must calculate the population served by its entire system and by each of its plants. To make these calculations, the PWS must complete Appendix A to § 141.141(a). A PWS that serves no retail population is required to use an EPA-developed equation to calculate the wholesale population that it serves and determine applicability (Cummins, 1987). This equation, included in Appendix A, was developed from hundreds of data points showing the relationship between flow and population served.

For the ICR, a treatment plant includes any site where a disinfectant or oxidant is added to the water prior to the water entering the distribution system (e.g., a chlorinator at a well). A PWS that uses multiple wells drawing from the same aquifer and has no central treatment plant is considered to have one treatment plant for those wells and must monitor accordingly.

C. Applicability of ICR Requirements to Specific Classes of PWSs

The following discussion identifies the ICR requirements that are applicable to each class of PWSs covered by this final rule. Sections D–G explain each of these requirements in greater detail.

1. PWSs Serving at Least 100,000 People and Using Surface Water, or Ground Water Under the Direct Influence of Surface Water, as a Source

a. Monitoring for DBPs and Related Parameters

All PWSs in this class must monitor for DBPs, DBP precursors, and other chemical parameters at specific locations throughout each treatment plant operated by the PWS on a monthly basis for a period of 18 months. Such PWSs also must characterize treatment processes (e.g., filtration or sedimentation) monthly for the 18 month period. The only exception to this requirement is that PWSs receiving all of their water from a supplier and not further disinfecting that water at the entrance to their distribution system are not required to conduct such monitoring.

In addition, for each treatment plant that uses chloramines, hypochlorite solution, ozone, or chlorine dioxide for treatment or disinfection residual maintenance, a PWS must conduct an analysis of parameters related to those disinfectants, such as cyanogen chloride for PWSs that use chloramines. This additional monitoring must also be conducted by PWSs that disinfect finished water at the entrance to their distribution system and receive that water from a PWS that treated the water with chloramines, hypochlorite solution, ozone, or chlorine dioxide.

b. Monitoring for Disease-causing Microorganisms and Microbial Indicators

Unless a PWS meets the requirements for reduced monitoring (as described in section E), all PWSs in this class must: (1) monitor their source water at the intake of each treatment plant that treats surface water for *Cryptosporidium, Giardia,* total culturable viruses, total coliforms, and fecal coliforms or *Escherichia coli* (*E. coli*); and (2) monitor their finished water for these microorganisms when *Cryptosporidium* and *Giardia* exceed 10 per liter in the source water, or when total culturable virus levels exceed one per liter in the source water.

c. Treatment Studies

i. Treatment Study Applicability (Total Organic Carbon (TOC)) Monitoring

All PWSs must monitor for TOC to determine at which treatment plants they must conduct treatment studies. PWSs must conduct TOC monitoring at the following locations:

—At the influent of each treatment plant that treats surface water and serves a population of 100,000 people or more.
—On finished water at each treatment plant serving a population of 100,000 people or more and using ground water as the source.
—For PWSs that serve at least 100,000 people but have no individual treatment plant serving 100,000 or more, PWSs must conduct TOC monitoring at the treatment plant serving the largest population. PWSs must monitor for TOC at the influent of the treatment plant if it treats surface water and must monitor finished water if it treats ground water.

ii. Bench- and Pilot-scale Treatment Studies

Unless a PWS qualifies for one of the exceptions discussed in section F of this preamble, PWSs in this class must conduct bench- and/or pilot-scale treatment studies to determine the effectiveness of granular activated carbon (GAC) or membranes in reducing the levels of DBP precursors.

2. PWSs Serving at Least 100,000 People, Using Only Ground Water as a Source

a. Monitoring for DBPs and Related Parameters

All PWSs in this class must monitor for DBPs, DBP precursors, and other chemical parameters at specific locations throughout each treatment plant operated by the PWS on a monthly basis for a period of 18 months. Such PWSs also must characterize treatment processes (e.g., aeration or ion exchange) monthly for the 18 month period. The only exception to this requirement is that PWSs receiving all of their water from a supplier and not further disinfecting that water at the entrance to their distribution system are not required to conduct such monitoring.

In addition, for each treatment plant that uses chloramines, hypochlorite solution, ozone, or chlorine dioxide for treatment or disinfection residual

maintenance, a PWS must conduct an analysis of parameters related to those disinfectants. This additional monitoring must also be conducted by PWSs that disinfect finished water at the entrance to their distribution system and receive that water from a PWS that treated the water with chloramines, hypochlorite solution, ozone, or chlorine dioxide.

b. Treatment Studies

i. Treatment Study Applicability (TOC) Monitoring

All PWSs must monitor for TOC to determine at which treatment plants they must conduct treatment studies. PWSs must conduct TOC monitoring at the following locations:

—On finished water at each treatment plant serving a population of 100,000 people or more and using ground water as the only source.
—For PWSs that serve at least 100,000 people but have no individual treatment plant serving 100,000 or more, PWSs must conduct TOC monitoring on finished water at the treatment plant serving the largest population.

ii. Bench- and Pilot-scale Treatment Studies

Unless a PWS qualifies for one of the exceptions provided in section F of this preamble, PWSs in this class must conduct bench- and/or pilot-scale treatment studies to determine the effectiveness of granular activated carbon (GAC) or membranes in reducing the levels of DBP precursors.

3. PWSs Serving at Least 50,000 People, But Less Than 100,000, and Using Ground Water as a Source

PWSs serving at least 50,000, but less than 100,000, (with at least 50,000 served by ground water) are required to monitor for TOC in the finished water at the treatment plant serving the largest population. Subsequently, unless a PWS qualifies for one of the exceptions provided in section F, PWSs in this class must conduct bench- and/or pilot-scale treatment studies to determine the effectiveness of granular activated carbon (GAC) or membranes in reducing the levels of DBP precursors.

D. Disinfection Byproducts (DBPs) and Related Monitoring Requirements

1. General Monitoring (§§ 141.141(c) and 141.142(a))

PWSs affected by this requirement must conduct monthly monitoring for DBPs, DBP precursors, and other chemical parameters at each treatment plant and in the distribution system. These PWSs will also be required to characterize treatment processes (e.g., filtration and sedimentation) in the treatment plant on a monthly basis for 18 months. PWSs receiving all of their water from a supplier and not further disinfecting that water at the entrance to the distribution system are not required to conduct any monitoring under this rule.

2. Additional Monitoring Requirements for PWSs Using Chloramines, Hypochlorite Solution, Ozone, or Chlorine Dioxide (§§ 141.142(a) (2)–(5))

For each treatment plant that uses chloramines, hypochlorite solution, ozone, or chlorine dioxide for treatment or disinfection residual maintenance, a PWS must also conduct an analysis of such parameters as cyanogen chloride, chlorate, pH, temperature, free residual chlorine, bromide, bromate, ammonia, and aldehydes. For consecutive systems (i.e., PWSs receiving finished water from another PWS), the receiving PWS must consult with the provider to ensure that all such additional analyses are completed. For example, the rule requires a PWS covered by the ICR that receives finished water that has been treated with chlorine dioxide to conduct additional monitoring of parameters such as chlorite, chlorate, chlorine dioxide residual, and aldehydes. A PWS receiving finished water has the obligation to determine whether the water it receives has been treated with chloramines, chlorine dioxide, ozone, or hypochlorite solution and what additional monitoring, if any, is required, and to conduct the necessary monitoring.

3. Analytical Methods (§ 141.142(b))

For conducting the required analyses, PWSs are required to use the methods specifically approved for subpart M. With the exception of optional analyses for assimilable organic carbon (AOC) and biodegradable organic carbon (BDOC), only results from laboratories that have been approved by EPA to perform sample analyses for DBPs will be acceptable. Laboratories may apply for approval under the provisions of § 141.142(b)(2).

E. Microbiological Monitoring Requirements

1. Monitoring (§§ 141.141(d) and 141.143(a))

a. Source Water Monitoring

Microbiological monitoring requirements include monitoring for disease-causing microorganisms, such as *Cryptosporidium* and *Giardia*, total culturable viruses, and indicator organisms. To be eligible for reduced monitoring, a PWS must notify EPA in its response to the EPA Notice of Applicability of its plans to reduce monitoring, which is available under the following provisions:

—A PWS may avoid the requirement to conduct finished water monitoring of *Cryptosporidium* and *Giardia* (§ 141.143(a)(2)(iii)) by complying instead with alternative monitoring requirements, including particle counting at several locations within the treatment plant.
—A PWS may avoid virus monitoring (§ 141.143(a)(2)(iv)), if the PWS has monitored for total coliforms, fecal coliforms, or *E. coli* in the treatment plant influent for at least five days/week for any consecutive six month period beginning January 1, 1994, and 90 percent of all samples taken in that six-month period contain no greater than 100 total coliforms/100 milliliters (ml), or 20 fecal coliforms/100 ml, or 20 *E. coli*/100 ml. For purposes of making this determination, PWSs may use source water coliform data collected under the SWTR. EPA and the Negotiating Committee agreed that raw waters that contained densities of total coliforms, fecal coliforms, or E. coli lower than the specified density value were unlikely to contain measurable levels of viruses.

b. Finished Water Monitoring

PWSs must conduct finished water monitoring at any treatment plant at which it detects, during the first 12 months of monitoring, 10 or more *Giardia* cysts, or 10 or more *Cryptosporidium* oocysts, or one or more total culturable viruses, per liter of water. The PWS must analyze finished water samples for the same organisms analyzed for in source water until 18 months of source water microbial monitoring are completed.

c. Archiving

If either *i* or *ii* below occurs, PWSs must arrange to submit samples of treatment plant influent and finished water to EPA for virus archiving each month until the 18 months of microbial monitoring are complete.

i. After the PWS learns that viruses were detected in any previous sample of finished water.

ii. After the PWS learns that a density of at least 10 viruses per liter was detected in any previous treatment plant influent sample.

2. Analytical Methods (§ 141.143(b))

PWSs are required to use the analytical methods approved for subpart

M for pathogens and indicator organisms. In addition, systems are required to use EPA-approved laboratories for analysis of *Giardia, Cryptosporidium,* and total culturable viruses. As proposed, a PWS must use laboratories certified for microbiology analyses under the EPA or State drinking water program for the analysis of total coliforms, fecal coliforms, and *E. coli.* Laboratory approval criteria for *Giardia, Cryptosporidium,* and total culturable viruses are found in the ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178, April 1996. Periodically, the Agency will update the list of EPA-approved laboratories under this rule.

F. Disinfection Byproduct Precursor Removal Studies: Bench- and Pilot-Scale Treatment Studies and Treatment Study Applicability Monitoring

1. Determination of Treatment Study Requirements: Treatment Study Applicability (TOC) Monitoring (§ 141.141(e) (2)–(3)

To determine which treatment plants will be required to conduct bench- and/or pilot-scale testing, PWSs are required to conduct treatment study applicability monitoring. Treatment study applicability monitoring requires monitoring for TOC for 12 consecutive months. PWSs must monitor for TOC in the influent of each treatment plant that treats surface water and serves a population of 100,000 people or more. For treatment plants serving a population of 100,000 people or more and using ground water as the source, TOC monitoring must be conducted on finished water. For PWSs that serve at least 100,000 people but have no individual treatment plant serving 100,000 or more, TOC monitoring must be conducted at the treatment plant serving the largest population. PWSs serving at least 50,000, but fewer than 100,000 (with at least 50,000 served by ground water), are required to monitor finished water TOC at the treatment plant serving the largest population. A PWS operating multiple treatment plants using the same source is only required to conduct one treatment study for those treatment plants.

2. Treatment Study Requirements (§ 141.144(b))

Treatment studies will consist of bench- and/or pilot-scale testing systems for at least one of the two appropriate candidate technologies (granular activated carbon (GAC) or membrane processes) for the reduction of organic DBP precursors. The treatment studies must be designed to yield representative performance data and to allow the development of treatment cost estimates for different levels of organic DBP control. To simulate the most likely treatment scenario, treatment studies will need to be conducted with the effluent from the treatment processes that are already in place to remove DBP precursors and TOC. PWSs are required to conduct pilot-scale studies at treatment plants serving 500,000 people or more and may conduct either bench- or pilot-scale studies at those serving fewer than 500,000.

a. Bench-scale Testing (§ 141.144(b)(1))

Bench-scale tests are continuous flow tests using the rapid small scale column test (RSSCT) for GAC and either flat sheet or single-element bench test apparatus for membranes. Water to be used in bench-scale tests must be representative of water which would be applied to the advanced treatment full-scale technology. The testing will include the information specified in this rule and in the ''Manual for Bench- and Pilot-scale Treatment Studies'', EPA 814–B–96–003, April 1996. EPA has provided utilities flexibility to select a bench-scale protocol appropriate for its circumstances.

b. Pilot-scale Testing (§ 141.144(b)(2))

PWSs must conduct pilot-scale tests as continuous flow tests. For GAC, the PWS must use GAC of a particle size representative of that used in full-scale practice, a pilot GAC column with a minimum inner diameter of 2.0 inches, and hydraulic loading rate (volumetric flow rate/column cross-sectional area) representative of that used in full-scale practice. For membranes, the PWS must use a staged array to achieve a recovery of at least 75%. Pilot-scale testing must include the information specified in this rule and in the ''Manual for Bench- and Pilot-scale Treatment Studies'', EPA 814–B–96–003, April 1996.

3. Treatment Study Exceptions (§§ 141.141(e)(3) and 141.141(e)(7)(i))

PWSs that would otherwise be required to conduct a bench- and/or pilot-scale treatment study are exempt from treatment study requirements if they operate treatment plants that:

—Use chlorine as both the primary and residual disinfectant and have, as an annual average, levels less than 40 micrograms per liter (μg/l) for THM4 and less than 30 μg/l for HAA5. The quarterly average is calculated by averaging results from all individual distribution system samples taken during the quarter. The annual average is calculated by averaging the four quarterly averages.

—Use surface water that does not exceed a TOC level of 4.0 milligrams per liter (mg/l) in the treatment plant influent, when calculated by averaging the 12 monthly TOC samples.

—Use ground water not under the direct influence of surface water that does not exceed a TOC level of 2.0 mg/l in the finished water, when calculated by averaging the 12 monthly TOC samples.

—Already use full-scale GAC or membrane technology. These PWSs must submit full-scale plant data and data that show that the technology effectively removes DBP precursors and must monitor the full-scale process to comply with DBP and related monitoring requirements.

4. Joint Studies (§§ 141.141(e)(4) and 141.141(e)(7)(ii))

PWSs that use common water resources and similar treatment trains (e.g., conventional filtration treatment or softening) may conduct joint treatment studies with other PWSs. A PWS operating more than one treatment plant using similar treatment trains on the same source is not required to conduct multiple studies. PWSs wishing to conduct joint studies must submit a letter of intent to EPA signed by all PWSs planning to participate in the study, as well as the additional information specified in § 141.141(e)(7)(ii) of the rule. Once all applicability monitoring is complete, each PWS must formally apply for EPA approval of a joint study. The minimum number and type of treatment studies to be conducted in a joint study are specified in § 141.141(e)(4) of the rule.

5. Alternatives to Treatment Studies (§§ 141.141(e)(5) and 141.141(e)(7)(iii))

In lieu of conducting a treatment study, a PWS may apply to EPA to contribute funds to a cooperative research effort. The PWS must show in its application to EPA that the treatment plant for which the waiver of the treatment study is sought uses a common water resource which is being studied by another PWS or a cooperative of PWSs. If EPA approves the application, the PWS shall contribute funds for use in a dedicated cooperative research program related to disinfectants, DBPs, and enhanced surface water treatment. The mandatory contributions that must be made under this option are as follows: $300,000 for a treatment plant serving a population of 500,000 or more, and $100,000 for a treatment plant serving a population of fewer than 500,000.

6. Grandfathered Studies (§§ 141.141(e)(6) and 141.141(e)(7)(iv))

PWSs that have conducted studies of precursor removal using GAC or membrane technology and which meet specified criteria may use the results of those studies, if approved by EPA, in lieu of conducting another treatment study. PWSs using grandfathered studies must submit appropriate information on the earlier studies, such as data, study description, equipment used, protocol, analytical methods, and information to develop a full-scale cost estimate, and obtain EPA approval.

G. Dates, Schedules and Reporting Requirements

EPA intends to notify PWSs that they are subject to this rule. PWSs receiving a Notice of Applicability from EPA must respond within 35 days of receipt.

1. Sampling Plans (§ 141.141(f))

PWSs required to comply with subpart M requirements must submit sampling plans to EPA for review and approval no later than eight weeks after receiving sampling software and requirements from EPA. Once EPA notifies the PWS that the plan has been approved, the PWS must begin monitoring the following month.

2. Monitoring

PWSs must begin treatment study applicability monitoring (i.e., TOC monitoring) no later than three months from the date the rule is published in the Federal Register, regardless of whether the sampling plan has been approved. For other applicable monitoring requirements, a PWS must begin monitoring the month after receiving notice that the PWS's sampling plan has been approved by EPA. If the PWS must conduct both DBP and microbiological monitoring, the PWS must begin monitoring for both in the same month.

3. Data Reporting (§§ 141.142(c) and 141.143(c))

PWSs must submit monthly monitoring reports electronically on diskettes in the format that EPA has prescribed and will be providing to affected PWSs. This electronic reporting is necessary because of the need for EPA to evaluate and manipulate the data.

4. Treatment Studies (§ 141.141(f)(4))

A PWS must begin treatment studies not later than 23 months from the date that the ICR is published in the Federal Register. PWSs must submit a report of each completed treatment study not later than 38 months after the final rule appears in the Federal Register.

H. Summary

Table IV–1 below provides a listing of the requirements contained in today's rule cross-referenced to the section of the rule where each requirement appears.

TABLE IV–1.—SUMMARY OF SUBPART M REGULATORY REFERENCES

Subject	DBP and related monitoring	Microbiological monitoring	Treatment studies
Definitions	§ 141.140	§ 141.140	§ 141.140
PWS applicability	§ 141.141(b)	§ 141.141(b)	§ 141.141(b)
Treatment plant applicability	§ 141.141 (b), (c)	§ 141.141 (b), (d)	§ 141.141 (b), (e)
Schedule	§ 141.141(f)(2)	§ 141.141(f)(3)	§ 141.141(f)(4)
Monitoring requirements	§ 141.142(a)	§ 141.143(a)	§ 141.144 (a), (b)
Analytical methods	§ 141.142(b)	§ 141.143(b)	§ 141.144(c)
Reporting requirements	§ 141.142(c)	§ 141.143(c)	§ 141.144(d)

V. Significant Changes to the Proposed Rule

In response to comments received during the public comment period, EPA made many changes to the rule. All comments were evaluated, and EPA has prepared a comment-response document that contains EPA's responses to those public comments. That document, along with other documents that support the rule, is available in the Drinking Water Docket. The following sections provide a discussion of the most significant comments considered.

A. Rule Applicability

The most far-reaching change in rule applicability was removing PWSs serving 10,000 to 99,999 that use surface water from any ICR requirements. EPA decided to take this action because the analytical method for protozoan measurement had proven to be very complex and difficult, and EPA was concerned about whether an adequate number of laboratories would be able to meet the approval criteria, which include passing a performance evaluation sample.

Many commenters noted that the DBP and related monitoring and reporting required in the proposed rule were not applicable to their PWS. These commenters believed that many of the proposed requirements would not make sense based on the configuration or operational practices of their PWS. During development of the ICR data system, EPA held a number of public meetings with representatives of PWSs and others to evaluate the applicability of the proposed requirements for the universe of treatment plants. These meetings helped EPA to: (1) Clarify the categories of PWSs that would appropriately be required to meet the different requirements of the ICR and (2) clarify treatment plant monitoring and data collection requirements. For example, the Agency modified proposed rule language to include PWSs that sell or buy large amounts of water in the appropriate applicability category. Also, EPA has reorganized the rule to make it easier to find applicability and monitoring requirements.

EPA has coordinated with the American Water Works Association (AWWA) to form a group of technical experts that will be available to PWSs to answer questions about this rule concerning applicability, sampling plans, and monitoring. PWSs may contact these experts at 800–200–0984 or on the Internet at 103327.2057@compuserve.com.

B. Data Quality Objectives

Several commenters noted that EPA did not clearly identify data quality objectives for the large amount of data to be generated by this rule. In response, EPA participated in several public workshops that addressed this issue. During the workshops, statisticians, data managers, scientists, and engineers reviewed the proposed requirements to ensure that the data reporting is necessary and adequate to achieve the goals of the rule. Also, EPA has developed a quality control program to ensure that data used in modeling are appropriate for regulatory development.

C. Data System

Commenters noted that EPA's data system for PWSs at the time of proposal,

the Federal Reporting Data System (FRDS), was inadequate to handle and manipulate the large amount of data that will be reported under this rule. Commenters stated that the Agency needed to develop a new data system that is able to receive, store, retrieve, manipulate, and analyze data submitted by PWSs. Additionally, commenters noted that once such a data system became available, EPA would have to test the data system to ensure its smooth operation.

EPA used a contractor as the primary data systems developer for this project. The contractor worked closely with EPA personnel and a broad array of technical experts from drinking water suppliers and other interested parties to understand the regulatory requirements, develop data manipulation procedures and report capability, produce adequate user instructions, and ensure the data system could perform necessary data handling and manipulation.

The utility data system has undergone alpha, beta, and gamma testing and revision and has been found to meet EPA's needs. Other data systems, for laboratory quality assurance data and mainframe data storage and manipulation, are undergoing similar testing and revision. Testing and revision will be completed before data entry begins under the rule.

D. Data Base Development

Many commenters stated that EPA, not PWSs, should fund the development of a data base adequate to meet the objectives of the ICR (i.e., determine what regulatory requirements are necessary for the control of disinfectants, DBPs, and pathogens). Under section 1445(a)(1) of the Act, however, EPA is authorized to require PWSs to conduct monitoring and provide information necessary to establish drinking water regulations, including evaluating the health risks of unregulated contaminants.

The information collected under this rule will enable EPA to determine current occurrence levels and patterns for unregulated contaminants. Because the ICR will provide EPA with detailed information on what treatment PWSs already have in place and how well such treatment processes work, the rule will also allow the Agency to develop predictive models to evaluate the effect that various changes in treatment will cause. Participants in the regulatory negotiation process understood the importance of the data collection effort as it relates to the objectives of the SDWA and agreed, as part of the negotiation, to participate in the effort.

E. Protozoan Analytical Method

Many commenters expressed concern that EPA lacks an analytical method to provide adequate quality data for *Cryptosporidium*. Also, some commenters believed that the method that the Agency proposed was too complex and difficult for reliable use by most laboratories. EPA has taken several steps to address these concerns. The first was to establish stringent laboratory approval criteria to assure adequate quality analyses and ensure that data quality objectives are met. EPA developed data quality objectives after consultation with outside parties, including statisticians and microbiologists, to determine minimum percentage recoveries and precision to meet data analytical objectives (i.e., to characterize national occurrence of *Cryptosporidium* for the purpose of conducting a regulatory impact analysis). Based on performance evaluation testing of microbiological laboratories, EPA believes that only laboratories that maintain high standards will be able to comply with the EPA criteria.

In the ICR proposal, any PWS that treated surface water and served a population of at least 10,000 would have been required to sample at each treatment plant, with more sampling required for PWSs serving at least 100,000. However, because only a small number of laboratories would be available to analyze samples, EPA reduced the universe of PWSs that must collect and analyze *Cryptosporidium* samples. In the final rule, only PWSs that treat surface water and serve a population of at least 100,000 are required to sample for *Cryptosporidium*. A PWS serving fewer than 100,000 is not required to take any microbiological samples. By reducing both the number of PWSs that are required to sample and the number of samples that some of the remaining PWSs are required to take, EPA expects that the number of laboratories who will qualify to conduct testing will be able to handle the workload.

Since PWSs serving fewer than 100,000 people are no longer required to conduct microbiological monitoring, EPA intends to conduct two sample surveys to collect microbiological occurrence data at smaller PWSs to determine the correlation with the data collected at PWSs serving at least 100,000 people. These sample surveys will be conducted at PWSs using surface water serving (1) 10,000 to 100,000 people and (2) fewer than 10,000 people. A secondary purpose of these sample surveys will be to collect occurrence data for areas where no PWSs will be collecting microbiological occurrence data because there are no PWSs serving at least 100,000 people that use surface water (e.g., the upper Great Plains and Rocky Mountain area).

EPA has determined that the purposes of the ICR will not be adversely affected by reducing the number of PWSs required to provide data. In conjunction with requiring fewer samples, EPA has continued to refine the analytical method and validate its accuracy and precision in non-EPA laboratories. Results of field testing that used various source waters in multiple laboratories indicate that a well-operated laboratory will be able to exceed EPA's minimum recoveries. The field testing results also indicate that well-operated laboratories will be able to provide adequate data for deriving national occurrence data that will be used in national cost estimates for evaluating different ESWTR regulatory options. Depending on the criteria developed for the interim ESWTR, data collected under the ICR may also be useful for implementing the interim ESWTR. EPA further believes that analysis of these data may aid in the identification of target indicators that smaller PWSs using surface water can utilize for determining the level of treatment needed for compliance with the ESWTR.

EPA believes that meaningful national occurrence data and regulatory impact analyses for different ESWTR regulatory options can be derived from ICR data if laboratories achieve, on average, greater than an 8% recovery for protozoan cysts. EPA simulation studies indicated that if this laboratory performance is achieved, PWSs should be able to detect and enumerate protozoa at least twice (among 18 monthly ICR raw water samples) at most sites where protozoa are actually present. This level of occurrence, with use of a statistically-derived adjustment factor for estimating true protozoan concentrations from measured values, would enable EPA to estimate the number of systems, nationally, that require different levels of treatment to achieve a desired finished water concentration, as might be prescribed under the ESWTR. Such an analysis, together with treatment cost and performance information for various technologies, would allow EPA to estimate national costs for different ESWTR regulatory options. Also, samples in which *Cryptosporidium* are not detected will help EPA evaluate the extent to which analyzable sample volume and percent recovery affect the ability to quantify source water protozoan concentrations. Such information will help EPA evaluate the

extent to which the protozoan method may need to be improved, or special monitoring provisions adopted, to enable appropriate treatment requirements to be prescribed for all systems under the ESWTR. For example, depending upon the extent which better methods can be developed for implementation of the ESWTR, utilities may be able to increase the number of raw water samples collected (beyond the minimum that may be required) to enable more sensitive quantification of source water concentrations, and more accurate level of treatment requirement estimates.

To provide for higher quality data to estimate national occurrence and conduct a national regulatory impact analysis, EPA is prescribing stringent laboratory approval criteria specific to the ICR. For a laboratory to qualify for conducting protozoan analysis, it must (a) conduct a comprehensive inventory to ensure the extensive equipment and personnel requirements are met, (b) employ at least one principal analyst (with previous experience of having analyzed at least 100 samples using the IFA procedure) to verify all microscopic counts, (c) pass an on-site inspection that includes observation of the analysis being performed by the laboratory, and (d) achieve sufficient recovery and precision on PE samples provided by EPA. EPA does not normally undertake the actions noted in (a) through (c) as part of laboratory approval and will require more frequent PE samples (in d)) than usual. EPA intends to provide technical assistance to laboratories during the laboratory approval process to enhance laboratory performance.

While performance by ICR approved laboratories should be adequate for conducting national regulatory impact analysis, EPA believes that better method performance, and knowledge of how that performance varies for specific water qualities, will be needed for individual PWSs to comply with future rules. To address this issue, EPA is conducting research to improve method performance. In the short term, EPA is evaluating the extent to which the IFA method can be improved, focusing mainly on the effects of different filters and smaller raw water sample volumes. In the long term, as part of its five year research plan, EPA is attempting to develop new methods that can achieve better recovery and precision, and distinguish whether the oocysts that are detected are alive or infectious to humans. Many researchers outside of EPA are also involved with these efforts.

One shortcoming of PE samples is that they do not reproduce the full range of sampling or water quality conditions of ICR monitoring. To augment the ICR, EPA will conduct a sample survey of 50 PWSs serving 100,000 to measure *Cryptosporidium* under tightly controlled laboratory conditions. Only those *Cryptosporidium* data from the ICR which meet data quality objectives will be used, with EPA survey data, in a cost analysis. EPA believes it appropriate to require *Cryptosporidium* data under the ICR because: (1) the incremental cost of its inclusion is low (since the same method and sample is used for *Giardia*), (2) a sufficient number of laboratories are expected to meet the data quality objectives, (3) the more experience laboratories have with the method, the better their performance should be, and (4) through subsequent testing, an adjustment factor can be generated to improve the utility of ICR-generated protozoan data.

F. Other Changes

Other changes to the rule include requiring all systems taking samples for microorganisms to also collect a full 18 months of virus samples (with no provisions for reduced monitoring), unless a system meets certain source water quality criteria. EPA is concerned about the possibly significant variability in the virus density over time. Therefore, the final rule eliminates the provision that allowed a PWS to avoid further virus sampling if no viruses were found during the first 12 months of sampling.

EPA decided not to include *Clostridium perfringens* and coliphage in the list of microbial parameters to evaluate their potential use as indicators. EPA was not confident that a valid laboratory approval and performance evaluation process could be implemented and believes that evaluation of indicators could be better accomplished under a separate research project. EPA will allow particle counting in lieu of finished water *Cryptosporidium* and *Giardia* monitoring, in order to develop data to evaluate the usefulness of particle counting as a surrogate for *Cryptosporidium* and *Giardia* removal.

The ICR also will require PWSs to submit treatment plant influent and finished water samples for virus archiving under certain conditions. EPA will use these samples to conduct research on occurrence and treatment for specific viruses.

EPA has also added an additional analytical method (Standard Method 4500–Cl B) for determining free chlorine concentration in hypochlorite stock solutions. A commenter pointed out that this method is able to determine concentrations at much higher levels than the proposed methods, reducing the need for large dilutions and their associated potential for error. Because this method is not sensitive at concentrations typically found in drinking water, its use is restricted to analyses of hypochlorite solutions. Other approved analytical methods may be used for any required free chlorine analyses, including hypochlorite solutions.

G. Other Changes Considered

EPA also received comments on several other requirements that, after evaluation, were not changed in the final ICR. One such comment addressed the provision in the proposed rule to limit analyses of cyanogen chloride and aldehyde to the EPA laboratory. Some commenters disagreed with EPA's decision to limit cyanogen chloride and aldehyde analyses to the EPA laboratory. Since EPA did not believe that it could have developed performance evaluation samples and implemented a laboratory approval program in the period of time that the Agency believed it had available between proposal and promulgation, EPA's laboratory will continue to be the only laboratory to analyze these samples under the final rule. EPA believed that the following issues could not be resolved in time: (1) the standard for cyanogen chloride may not be stable for more than a few weeks and (2) the methods are not simple (both require highly skilled analysts and must be analyzed within 48 hours; aldehyde analysis is subject to contamination). The EPA laboratory will provide sample containers and will not charge PWSs for these analyses.

VI. State Implementation

The February 10, 1994, notice proposed that EPA, rather than States, administer this rule. Many commenters believed that States should be involved in the ICR and should be given primary enforcement responsibility (primacy). Among their reasons were: States have more experience with local conditions; administration of drinking water rules by more than one party will cause confusion and contradictions and would be cumbersome; it sends a message that the public water system supervision program is not fully delegated; it would increase noncompliance; it would not allow systems to use State waivers; State administration would allow for local support and training and facilitate corrective action; and EPA is not authorized to confer partial primacy under the SDWA.

The rationale for proposing that EPA administer the ICR was that this rule,

unlike other drinking water rules, is an information-gathering effort of a limited duration, and the time constraints for implementing this rule would strain State resources. The Negotiating Committee, including the member representing State drinking water agencies, concurred on this point during the regulatory negotiation. Some commenters agreed, indicating that States should not administer the program. At least one commenter remarked that States do not have the time or resources to meet the ambitious ICR schedule.

EPA continues to believe that the short times involved with this rule make it imperative that the Agency administer the rule. While some States might be able to put all necessary mechanisms for rule implementation (including regulatory authority and laboratory approval) into place in the short-term (three months after promulgation), most would not. EPA also believes that data such as these, which are to be used for regulatory development (rather than for compliance) needs national standardization to maximize the data's usefulness. To ensure coordination with other implementation activities, EPA will be sharing data with the States and will inform the States about any enforcement actions the Agency intends to take to implement this rule.

VII. Cost of Rule

The ICR is estimated to result in national costs of $129 million, with a range of $117 to $148 million, to be expended over a three year period. Since this cost does not exceed $100 million per year, it does not qualify as a ''major rule'' for purposes of Executive Order 12866, or for the purposes of the Unfunded Mandate Reform Act of 1995. EPA has prepared an economic impact analysis which establishes that this action would not be a major rule within the meaning of the Executive Order. A copy of this analysis is available in the docket. This analysis has been submitted to the Office of Management and Budget for review. The following is a summary of the cost estimates for implementation of this rule.

A. Cost Estimates for Final ICR as Compared to the Proposed ICR

The range of the final total ICR cost estimates are exactly the same as the range of cost estimates in the proposed rule. Comparisons between the costs of the proposed rule and the costs of the final rule are not straightforward, however, due to a number of factors. Some of these factors resulted in higher cost estimates for some components of the final rule, while other factors resulted in lower cost estimates for various components of the final rule. The major factors which resulted in changes to the final cost analysis include the following items.

1. Decreases in the Final ICR Cost Estimates

The original cost estimates for DBP monitoring were found to have been over-estimated in the proposed ICR due to a flawed assumption regarding the number of treatment sites that systems using ground water would be required to monitor. The proposed rule assumed that DBP monitoring would be conducted at every treatment site within a ground water system. The cost estimate in the final rule, however, more realistically assumes that ground water systems will be required to conduct DBP sampling at two treatment sites representing different aquifers. This revised assumption reduced costs by $30 million. The cost estimate for the final ICR also reflects the elimination of microbial monitoring requirements for PWSs that serve fewer than 100,000 people.

2. Increases in the Final ICR Cost Estimates

The final rule cost estimates for DBP monitoring for surface water systems show an increase of $11 million. This increase reflects a number of revised assumptions including: changes regarding the number of samples actually required by the monitoring requirements; a deeper appreciation of the complexity of some treatment trains (an issue which was brought to light during the development of the ICR data management system); and the inclusion of some purchased water systems that re-disinfect.

In addition, numerous unit cost assumptions within the analysis were revised upwards to reflect public comments. Most notably, the startup costs, microbial monitoring costs, and data reporting costs were increased, taking into account information received from commenters on the analysis accompanying the proposed rule.

3. Uncertainty

These national cost estimates have an inescapable range of uncertainty associated with them. A sensitivity analysis performed in response to public comments as part of the revised economic impact analysis indicates that the greatest source of uncertainty is the cost of the pilot- and bench-scale treatment studies. These studies were estimated to cost $57 million in the proposed rule, with high and low bounds of $76 and $45 million. In the final rule, EPA has retained the original cost estimates and accompanying ranges for the cost of bench- and pilot-scale treatment studies. EPA has also finalized an option for utilities to contribute to a research fund in lieu of conducting pilot- and bench-scale testing to reduce any possible duplication of effort and possibly reduce costs to the PWS. The net effect of this option on total costs is unpredictable. It is clear, however, that the pilot- and bench-scale testing will remain the largest and most uncertain element of the total cost.

B. Total Cost and Burden Estimates for the Final ICR

The total estimated cost of $129 million for the final ICR is indicated in the third column of Table VII–1. The following five elements contribute to the total cost:

BILLING CODE 6560–50–P

BILLING CODE 6560-50-C

Table VII - 1: Total Cost and Burden Estimates for the Information Collection Rule[1]

	Respondents Affected	Costs (K$)		Burden (hr.)		Responses	
		All Respondents	Per Respondent	All Respondents	Per Respondent	All Respondents	Per Respondent
Compliance Activities							
141.141 - Start-Up Activities							
233 Non-purchased Surface Water Systems>100K	440 plants	5,280	12	132,000	300	1,320	3
165 Non-purchased Ground Water Systems>50K	165 systems	1,980	12	49,500	300	495	3
22 Purchased Surface Water Systems>100K	22 systems	264	12	6,600	300	66	3
2 Purchased Ground Water Systems>100K	2 systems	24	12	600	300	6	3
Subtotal:		*7,548*		*188,700*		*1,887*	
141.143 - Microbiological Monitoring							
233 Non-purchased Surface Water Systems>100K	440 plants	*17,196*	*39*	*175,923*	*400*	*55,440*	*126*
141.142 - DBP and Related Monitoring							
233 Non-purchased Surface Water Systems>100K	440 plants	30,489	69	239,172	544	720,258	1,637
59 Non-purchased Ground Water Systems>100K	118 treat.sites	5,857	50	43,409	368	114,144	967
22 Purchased Surface Water Systems>100K	22 treat.sites	1,090	50	7,919	360	18,396	836
2 Purchased Ground Water Systems>100K	2 treat.sites	99	49	709	354	1,656	828
Subtotal:		*37,535*		*291,209*		*854,454*	
Data Reporting (141.142 - 143)							
233 Non-purchased Surface Water Systems>100K	440 plants	8,103	18	268,693	611	8,213	19
165 Non-purchased Ground Water Systems>50K	224 treat.sites	1,142	5	36,528	163	3,396	15
22 Purchased Surface Water Systems>100K	22 treat.sites	99	5	3,168	144	396	18
2 Purchased Ground Water Systems>100K	2 treat.sites	9	5	288	144	36	18
Subtotal:		*9,353*		*308,677*		*12,041*	
141.144 - TOC Monitoring and Treatment Studies							
TOC Studies							
106 Ground Water Systems 50-100K	106 treat.sites	70	0.66	636	6	1,272	12
Bench and Pilot Studies							
233 Surface Water Systems>100K	178 plants[2]	48,300	271	322,000	1,809	178	1
165 Ground Water Systems>50K	33 plants[2]	8,550	259	57,000	1,727	33	1
Subtotal:		*56,920*		*379,636*		*1,483*	
Total:		***128,552***		***1,344,146***		***925,305***	

[1]Total costs and burden over 18 months, except for pilot studies which extend over two and one-half years.

[2]Surface water treatment plants with influent TOC > 4 mg/l; ground water treatment plants with effluent TOC > 2 mg/l.

1. Start-up Activities (§ 141.141)

Start-up activities are estimated to cost a total of $7.6 million. This estimate has been revised upward from the original cost estimate of $515,000 in the proposed ICR to reflect public comments. Start-up activities consist of reading and understanding the requirements of the rule, determining applicability and evaluating treatment plants to determine specific sampling requirements for each treatment plant, preparing sampling plans, and installing and learning to operate computer software to report monitoring results. Start-up costs will be spread across an estimated 422 community water systems, resulting in an average cost of $18,000 per system.

2. Microbiological Monitoring (§ 141.143)

Microbial monitoring, which is estimated to apply to 440 plants in 233 community surface water systems serving at least 100,000 people, is estimated to cost $17.2 million. The average cost per plant is estimated to be $39,000.

3. DBP and Related Monitoring (§ 141.142)

DBP monitoring is estimated to apply to 292 surface and ground water community water systems that purchase none, or only a portion, of their water and serve at least 100,000 people. DBP monitoring is also estimated to apply to an additional 24 community water systems that purchase all their finished water and disinfect that water prior to distribution, and serve at least 100,000 people. DBP monitoring is estimated to cost $37.5 million nationally, resulting in average costs of $50,000 per treatment site for ground water systems and $69,000 per treatment site for surface water systems.

This estimate is approximately $20 million less than the estimate presented in the preamble to the proposed rule due to a flawed assumption (discussed above) regarding the number of treatment sites that PWSs using ground water would be required to monitor. The analysis accompanying the proposed rule assumed that DBP monitoring would be conducted at every treatment site within a ground water system (a total of 1,295 sites in 59 ground water systems). The present analysis, however, more realistically assumes DBP sampling at two treatment sites per system (a total of 118).

4. Electronic Data Reporting (§§ 141.143 and 141.142)

The ICR requires monthly electronic reporting of microbial monitoring results and DBP monitoring results along with various process parameters of water treatment processes related to microbial treatment and DBP formation. The total cost is estimated to be $9.4 million nationally, with an average cost of $14,000 per treatment plant. This estimate compares to $3.9 million estimated in the proposed rule.

5. TOC Monitoring and Bench- and Pilot-Scale Treatment Studies (§ 141.144)

Required TOC monitoring and bench- and pilot-scale treatment studies are estimated to have a total national cost of $57 million, with a range of $45 million to $75 million. For each treatment study, costs are estimated to range from $150,000 to $750,000. This requirement applies, with some exceptions, to all surface water treatment plants serving at least 100,000 persons (or the largest treatment plant in the PWS if no single treatment plant serves at least 100,000) that have an influent TOC concentration greater than 4 mg/l. It also applies to all ground water treatment plants serving at least 100,000 persons (or the largest treatment plant in the PWS if no single treatment plant serves at least 100,000) that have a finished water TOC concentration greater than 2 mg/l, or to the largest ground water treatment plant in PWSs serving 50,000 to 99,999 (with at least 50,000 served by ground water), if that treatment plant has a finished water TOC concentration greater than 2 mg/l.

VIII. Other Statutory Requirements

A. Executive order 12866

Under Executive Order 12866, (58 FR 51735, October 4, 1993) the Agency must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact or entitlements, grants, user fees, or loan programs or the rights and obligations of the recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action'' within the meaning of the Executive Order. As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations are documented in the public record.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act requires EPA to explicitly consider the effect of proposed regulations on small entities. The Act requires EPA to consider regulatory alternatives if a rule has a significant economic impact on a substantial number of small entities. The Small Business Administration defines a small water utility as one which serves fewer than 3,300 people.

This Final Rule is consistent with the objectives of the Regulatory Flexibility Act because it will not have any economic impact on any small entities. The rule only applies to PWSs serving more than 50,000 people; thus, PWSs serving fewer than 50,000 people would not be affected. Therefore, pursuant to section 605(b) of the Regulatory Flexibility Act, 5 U.S.C. 605(b), the Administrator certifies that this rule will not have a significant economic impact on a substantial number of small entities.

C. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the Office of Management and Budget (OMB) under the *Paperwork Reduction Act,* 44 U.S.C. 3501 et seq. An Information Collection Request document has been prepared by EPA (ICR No. 270.35) and a copy may be obtained from Sandy Farmer, OPPE Regulatory Information Division, U.S. Environmental Protection Agency (2136), 401 M Street SW., Washington, DC 20460 or by calling (202) 260–2740. The information requirements are not effective until OMB approves them.

Public burden for this collection of information is estimated to total 1,344,146 hours, about 200,794 more than estimated in the proposed rule, reflecting public comments on the previous analysis. There are five elements contributing to the total burden estimate, as detailed in Table VII–1. The total burden associated with start-up activities is estimated to be 188,700 hours. The total burden associated with microbial monitoring is estimated to be 175,923 hours (§ 141.143). Total burden for DBP monitoring is estimated to be 291,209

hours (§ 141.142). Total burden for the process data reporting requirement is estimated to be 308,677 hours (§§ 141.142 and 141.143). Total burden associated with the bench- and pilot-scale treatment study requirement is estimated to be 379,636 hours (§ 141.144).

The annual public reporting and recordkeeping burden for this collection of information is estimated to average 1.42 hours per response and 1,062 hours per respondent. This estimate includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to respond to a collection of information; search existing data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

No person is required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are displayed in 40 CFR Part 9.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Director, OPPE Regulatory Information Division, U.S. Environmental Protection Agency (2136), 401 M Street SW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street NW., Washington, DC 20503, marked ''Attention: Desk Officer for EPA.'' Include the ICR number in any correspondence.

D. Enhancing the Intergovernmental Partnership

As described in greater detail in the preamble to the proposed ICR, EPA used a negotiated rulemaking process to develop the regulatory approach to the problems associated with disinfection. The Negotiating Committee included representatives of:

—Local public health, drinking water supply, and elected officials; and
—State public health, regulated utilities commissioners, and drinking water program officials.

Committee members were supported by other program and financial officials and Washington-based association directors (e.g., Association of State Drinking Water Administrators, National League of Cities) both during meetings and between meetings of the Committee. Also, EPA made documents publicly available and associations distributed them to interested members.

During evaluation of public comments and development of the final requirements, EPA held several public meetings to discuss monitoring requirements, the data management system, applicability, and data quality objectives.

E. Unfunded Mandates Reform Act

Section 201 of the Unfunded Mandates Reform Act of 1995 (''Unfunded Mandates Act''), signed into law on March 22, 1995, requires each agency, unless prohibited by law, to assess the effects of federal regulations on State, local, and tribal governments and the private sector. Under Section 202 of the Unfunded Mandates Act, EPA must prepare an unfunded mandate statement to accompany any proposed rule where the estimated costs to State, local, or tribal governments, or to the private sector, will be $100 million or more in any one year. Under Section 205, EPA must select the most cost-effective or least burdensome alternative that achieves the requirements for actions covered by Section 202, or explain why this was not possible. Section 203 requires EPA to establish a plan for informing and advising any small governments that may be significantly affected by the rule.

The unfunded mandate statement under Section 202 must include: (1) A citation of the statutory authority under which the rule is proposed, (2) an assessment of the costs and benefits of the rule and the federal resources available to defray the costs, (3) where feasible, estimates of future compliance costs and disproportionate impacts upon particular geographic or social segments of the nation or industry, (4) where relevant, an estimate of the effect on the national economy, and (5) a description of EPA's prior consultation with State, local, and tribal officials.

Since this rule is not estimated to impose annual costs of $100 million or more on either State, local, or tribal governments, or on the private sector, EPA is not required to prepare an unfunded mandate statement. Because the rule only applies to PWSs serving at least 50,000 persons, no small governments are affected.

F. Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA)

For the purposes of Congressional review, OMB has determined that this rule is not major under SBREFA. Therefore, this rule is effective 35 days after publication.

IX. References

APHA. 1995. American Public Health Association. ''Standard methods for the examination of water and wastewater'' (19th ed.). Washington, DC.

AWWA. 1991. ''Guidance manual for compliance with the filtration and disinfection requirements for public water systems using surface water sources.'' American Water Works Association, Denver, CO.

Cummins, Michael D. Memorandum to Stephen Clark titled ''Average Flow and Design Capacity for Technologies and Cost Documents.'' October 5, 1987.

EPA. U.S. Environmental Protection Agency. April 1996. ''ICR Comment Response Document'', EPA 811–R–96–001.

EPA. U.S. Environmental Protection Agency. April 1996. ''ICR Sampling Manual'', EPA 814–B–96–001.

EPA. U.S. Environmental Protection Agency. April 1996. ''DBP/ICR Analytical Methods Manual'', EPA 814–B–96–002.

EPA. U.S. Environmental Protection Agency. April 1996. ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178.

EPA. U.S. Environmental Protection Agency. April 1996. ''ICR Manual for Bench- and Pilot-scale Treatment Studies'', EPA 814–B–96–003.

EPA. U.S. Environmental Protection Agency. April 1996. ''Reprints of EPA Methods for Chemical Analyses under the Information Collection Rule'', EPA 814–B–96–006.

EPA. U.S. Environmental Protection Agency. April 1996. ''ICR Water Utility Database System Users' Guide'', EPA 814–B–96–004.

List of Subjects in 40 CFR Part 141

Administrative practice and procedure, Analytical methods, Chemicals, Incorporation by reference, Intergovernmental relations, Microorganisms, Monitoring, National Primary Drinking Water Regulations, Reporting and recordkeeping requirements, Water supply.

Dated: May 1, 1996.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, part 141 of title 40 of the Code of Federal Regulations is amended as follows:

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

1. 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.

2. Section 141.2 is amended by adding ''or PWS'' to the definition for ''Public water System'' to read as follows:

§ 141.2 Definitions.

* * * * *

Public water system or PWS * * *

* * * * *

3. Section 141.6 is amended in paragraph (a) by revising the reference ''(a) through (h)'' to read ''(a) through (i)'' and by adding paragraph (i) to read as follows:

§ 141.6 Effective dates.

* * * * *

(i) Regulations for information collection requirements listed in Subpart M are effective August 14, 1996, and shall remain effective until December 31, 2000.

4. A new Subpart M is added consisting of §§ 141.140 through 141.144 to read as follows:

Subpart M—Information Collection Requirements (ICR) for Public Water Systems

Sec.

Subpart M—Information Collection Requriements (ICR) for Public Water Systems

§ 141.140 Definitions specific to subpart M.

The following definitions apply only to the requirements of subpart M of this part and are arranged alphabetically.

Distribution system means the components of a PWS that are under the control of that PWS located after the point where the finished water sample is taken and that provide distribution, storage, and/or booster disinfection of finished water.

Distribution System Equivalent (DSE) sample means a sample collected from the distribution system for the purpose of comparing it with the ''simulated distribution system (SDS) sample''. The DSE sample shall be selected using the following criteria:

(1) No additional disinfectant added between the treatment plant and the site where the DSE sample is collected;

(2) Approximate detention time of water is available; and

(3) There is no blending with finished water from other treatment plants.

Entry point to distribution system means a location following one or more finished water sample points but prior to the beginning of the distribution system.

Finished water means water that does not undergo further treatment by a treatment plant other than maintenance of a disinfection residual.

Haloacetic acids (five) (HAA5) means the sum of the concentration in micrograms per liter of the haloacetic acids mono-, di-, and trichloroacetic acid; mono-, and di-, bromoacetic acid, rounded to two significant figures.

Haloacetic acids (six) (HAA6) means the concentration in micrograms per liter of the haloacetic acids mono-, di-, and trichloroacetic acid; mono-, and di- bromoacetic acid; and bromochloroacetic acid, rounded to two significant figures.

Haloacetonitriles (HAN) means the concentration in micrograms per liter of the haloacetonitriles dichloro-, trichloro-, bromochloro-, and dibromo-acetonitrile, rounded to two significant figures.

Haloketones (HK) means the concentration in micrograms per liter of the haloketones 1,1-dichloropropanone and 1,1,1- trichloropropanone, rounded to two significant figures.

Intake means the physical location at which the PWS takes water from a water resource. Thereafter, the water is under the control of that PWS.

Notice of applicability means a notice sent by EPA to a PWS that indicates that EPA believes that the PWS must comply with some or all requirements of subpart M. The PWS is required to reply to this notice by providing information specified in the notice (e.g., retail and wholesale population served, types of water sources used, volume of water treated) by the date provided in subpart M.

Process train means some number of unit processes connected in series starting from the treatment plant influent and ending with finished water. A particular unit process may be in more than one process train.

Purchased finished water means finished water purchased by one PWS from another PWS (the wholesaler). Purchased finished water includes both purchased finished water that is redisinfected and purchased finished water that is not.

Simulated distribution system (SDS) sample means a finished water sample incubated at the temperature and detention time of a ''DSE sample'' collected from the distribution system. Analytical results of the SDS sample will be compared with the DSE sample to determine how well the SDS sample predicts disinfection byproduct formation in the actual distribution system sample.

Total finished water means the flow (volume per unit of time) of finished water obtained from all treatment plants operated by a PWS and includes purchased finished water. This flow includes water entering the distribution system and water sold to another PWS.

Treatment plant means the PWS components that have as their exclusive source of water a shared treatment plant influent and that deliver finished water to a common point which is located prior to the point at which finished water enters a distribution system or is diverted for sale to another PWS. For these components of the PWS to be considered part of one treatment plant, the PWS must be able to collect one representative treatment plant influent sample, either at a single sample point or by a composite of multiple influent samples, and there must exist a single sampling point where a representative sample of finished water can be collected. For the purpose of subpart M, a treatment plant is considered to include any site where a disinfectant or oxidant is added to water prior to the water entering the distribution system. Facilities in which ground water is disinfected prior to entering a distribution system, and facilities in which purchased finished water has a disinfectant added prior to entering a distribution system, are considered treatment plants.

Treatment plant influent means water that represents the water quality challenge to a particular plant.

Treatment system means all treatment plants operated by one PWS.

Trihalomethanes (four) (THM4) means the sum of the concentration in micrograms per liter of the trihalomethanes chloroform, bromodichloromethane, dibromochloromethane, and bromoform, rounded to two significant figures.

Unit process means a component of a treatment process train which serves any treatment purpose such as mixing or sedimentation for which design and operating information is requested in § 141.142(a), Table 6c, of this subpart.

Water resource means a body of water before it passes through an intake structure. Examples of a water resource

include a river, lake, or aquifer. For a PWS which purchases finished water, the water resource is the wholesale PWS which supplies the purchased finished water. Generally water resources are not under the direct control of a PWS.

Watershed control practice means protection of a water resource from microbiological contamination prior to the water entering an intake. These protective measures might include, but are not limited to, a watershed control program approved under § 141.71(b)(2) of this part, or land use restrictions.

§ 141.141 General requirements, applicability, and schedule for information collection.

(a) *General requirements.* (1) The purpose of subpart M is to collect specified information from certain PWSs for a limited period of time. Accordingly, subpart M is of limited duration and is effective for a defined period (see § 141.6 (i) and § 141.141(e) of this part). Since subpart M does not establish continuing obligations, a PWS that has completed all of its requirements at the required duration and frequency may discontinue its information collection efforts even if subpart M is still in effect.

(2) For the purpose of this subpart, a PWS shall make applicability determinations based on completion of data gathering, calculations, and treatment plant categorization specified in Appendix A to paragraph (a) of this section.

(3) For the purpose of this subpart, a PWS that uses multiple wells drawing from the same aquifer and has no central treatment plant is considered to have one treatment plant for those wells and shall conduct required monitoring under this specification. A PWS with multiple wells in one or more aquifers that are treated in the same treatment plant is considered to have one treatment plant for those wells and shall conduct required monitoring under this specification.

(i) To the extent possible, the PWS should sample at the well with the largest flow and at the same well each month for the duration of required monitoring.

(ii) A PWS must report information from § 141.142(a) Tables 6a through 6e of this subpart for each well that the PWS sampled.

(4) For the purpose of this subpart, a PWS shall treat ground water sources that have been classified by the State as under the direct influence of surface water by May 14, 1996, as surface water sources. A PWS shall treat ground water sources that either have not been classified by the State (as under the direct influence of surface water or not) or have been classified by the State as ground water, by May 14, 1996, as ground water sources.

Appendix A to 40 CFR 141.141(a)

Purpose. The purpose of this appendix is to enable the PWS to assign proportional amounts of its retail and wholesale population served to specific treatment plants. The PWS shall then use these values to determine which specific requirements in subpart M that it must comply with and on what schedule.

Period of applicability determination. For the purpose of this appendix, a PWS shall make applicability determinations based on population calculated as annual averages based on PWS records of treatment system or treatment plant operation during calendar year 1995.

—If a natural disaster made a treatment system or treatment plant inoperable for one or more calendar months in 1995, the applicability determination will be based on those months in 1995 during which the treatment system or treatment plant was in operation, plus the calendar months from 1994 that are representative of those months of 1995 during which the treatment system or treatment plant was inoperable. The total time period shall be 12 months.

—If the treatment system or treatment plant was not in operation during one or more calendar months during 1995 due to a seasonal reduction in demand for finished water, the months that the treatment system or treatment plant was not in operation are to be included in the 12 months of applicability determination with zero flow indicating no operation.

—If the treatment system or treatment plant was not in operation for one or more calendar months in 1995 due to construction and/or maintenance, the applicability determination will be based on those months in 1995 during which the treatment system or treatment plant was in operation, plus the calendar months from 1994 that correspond to those months of 1995 during which the treatment system or treatment plant was inoperable. The total time period shall be 12 months.

—Treatment systems or treatment plants whose total operational lifetime is fewer than 12 calendar months as of December 1995 are not required to comply with subpart M requirements.

—PWSs that purchase all their water from one or more other PWSs and do not further treat any of their water are not required to comply with subpart M requirements.

Applicability determination. To determine applicability, the PWS is required to collect certain operational data and perform specified mathematical operations. All operational data and calculated values will be expressed as either ''F'' (for flow) or ''P'' (for population), with a one or two character subscript. Table A–1 contains a more detailed explanation.

TABLE A–1.—: APPENDIX A SUBSCRIPT IDENTIFICATION PROTOCOL

General.

1. ''F'' indicates a flow value. The PWS must use million gallons per day (MGD) to express the flow throughout its calculations.
2. ''P'' indicates a population value, expressed as a number of people.

Subscripts.

1. ''P_R'' is retail population, ''F_W'' is wholesale flow, and ''F_N'' is purchased finished water that is not further treated.
2. Each ''F'' value (in Table A–2) or ''P'' value (in Table A–4) will have a two character designator.
   a. The first character in the subscript indicates the source type. Possible entries are ''S'' (for surface water or ground water under the direct influence of surface water), ''G'' (for ground water not under the direct influence of surface water), ''P'' (for finished water purchased from another PWS and further treated at the entrance to the distribution system, such as by redisinfection), and ''C'' (for combined, or the sum of all water treated by the PWS, including purchased water that is further treated at the entrance to the distribution system).
   b. The second character in the subscript indicates the specific identification of the treatment plant. This will be a number (e.g., 1, 2, 3, * * *, with # being a non-specific designator) and ''T'' (for a Total).

Data from operational records. The PWS shall determine the following information based on operational records.

—P_R=Retail population served by the PWS =_____ (number of people)

—F_N=treated water bought from one or more other PWSs and not further treated at the entry point to the distribution system =_____ (MGD)

—F_W= finished water sold to one or more other PWSs, regardless of whether buying PWSs further treat the finished water =_____ (MGD)

—Flows from specific water resources to specific treatment plants. For each treatment plant operated by the PWS, the PWS must determine the flow from each water resource that provides water to the treatment plant. In the following table, the PWS must enter flow from each type of water resource into the appropriate block, using the subscript identification protocol in Table A–1.

—$F_{S\#}$=surface water treated at treatment plant ''#'' =_____ (MGD) (enter into Table A–2)

—$F_{G\#}$=ground water treated at treatment plant ''#'' =_____ (MGD) (enter into Table A–2)

—$F_{P\#}$=treated water bought from one or more other PWSs and further treated at treatment plant ''#'' prior to the entry point to the distribution system =_____ (MGD) (enter into Table A–2)

TABLE A–2.—TREATED FLOW VALUES

Water resources (by type source)	Sources of treated water (FLOW)			
	Treatment plants			
	#1	#2	#3	#4
Surface water (S)	(F_{S1})	(F_{S2})	(F_{S3})	(F_{S4})
Ground water (G)	(F_{G1})	(F_{G2})	(F_{G3})	(F_{G4})
Purchased finished water that is further treated (P)	(F_{P1})	(F_{P2})	(F_{P3})	(F_{P4})
Combined (C)	(F_{C1})	(F_{C2})	(F_{C3})	(F_{C4})

NOTE: The $F_{C\#}$ value is calculated by adding the $F_{S\#}$, $F_{G\#}$, and $F_{P\#}$ values in the column above.

—F_{CT}=finished water produced in all of the PWS's treatment plants (calculated by adding the combined flows from each treatment plant (Σ ($F_{C\#}$)). =_____ (MGD)

Calculated values. The PWS must calculate the following values.

—Population equivalents. Divide the flow values in Table A–2 by the conversion factor K below (a PWS-specific per capita finished water usage rate) and enter in the corresponding box in Table A–3 below. For each treatment plant operated by the PWS, the PWS must determine the population served by each type of water resource that provides water to the treatment plant.

Conversion factor=K=(F_{CT}+F_N − F_W)/P_R=_____

For Table A–3, P=F/K, using F values from Table A–2 (e.g., P_{S1}=F_{S1}/K).

TABLE A–3: POPULATION SERVED VALUES

Water resources (by type source)	Population served by treated water (number of people)			
	Treatment plants			
	#1	#2	#3	#4
Surface water (S)	(P_{S1})	(P_{S2})	(P_{S3})	(P_{S4})
Ground water (G)	(P_{G1})	(P_{G2})	(P_{G3})	(P_{G4})
Purchased finished water that is further treated (P)	(P_{P1})	(P_{P2})	(P_{P3})	(P_{P4})
Combined (C)	(P_{C1})	(P_{C2})	(P_{C3})	(P_{C4})

Note: The $P_{C\#}$ value is calculated by adding the $P_{S\#}$, $P_{G\#}$, and $P_{P\#}$ values in the column above.

—P_{CT}=number of people served by finished water produced in all of the PWS's treatment plants (calculated by adding the combined populations served by each treatment plant (Σ ($P_{C\#}$))) =_____ (people)

Note: A PWS that sells all its finished water and thus has no retail population must calculate the population served by the PWS by raising the PWS's average treated flow (in MGD) to the 0.95 power and multiplying the result by 7,700. As an equation, this would appear as:

PWS population served=7,700 (PWS's average treated flow in MGD)$^{0.95}$

The PWS may then calculate the population served by each of its treatment plants by multiplying the PWS population served times the average treated flow from the treatment plant divided by the average treated flow for the PWS. As an equation, this would appear as:

$$\text{Treatment plant population served} = \frac{\text{PWS population served} \times \text{treatment plant flow}}{\text{PWS average treated flow}}$$

Treatment plant categorization. A PWS must categorize its treatment plants to determine its specific compliance requirements by reviewing Table A–4 below.

TABLE A–4.—TREATMENT PLANT CATEGORIES

Treatment plant category	P_{CT}	$P_{C\#}$	$P_{S\#}$	$P_{G\#}$
A	≥100,000	≥100,000	≥1	NA.
B	≥100,000	≥100,000	Zero	NA.
C	≥100,000	$P_{C\#}$ is <100,000 and is largest $P_{C\#}$ in PWS.	≥1	NA.
D	≥100,000	$P_{C\#}$ is <100,000 and is largest $P_{C\#}$ in PWS.	Zero	NA.
E	≥100,000	<100,000 and is not largest $P_{C\#}$ in PWS	≥1	NA.
F	≥100,000	<100,000 and is not largest $P_{C\#}$ in PWS	Zero	NA.
G	50,000–99,999 and P_{GT} ≥ 50,000.	NA	NA	Largest $P_{G\#}$.

NA—not applicable.

(b) Applicability.

(1) Table 1 of this paragraph is a summary of treatment plant categorization under the provisions of Appendix A to paragraph (a) of this section.

TABLE 1.—TREATMENT PLANT CATEGORIES

Treatment plant category	PWS combined population served	Treatment plant combined population served	Treatment plant surface water population served	Treatment plant ground water population served
A	≥100,000	≥100,000	≥1	NA.
B	≥100,000	≥100,000	zero	NA.
C	≥100,000	Plant serves <100,000 and is largest plant.	≥1	NA.
D	≥100,000	Plant serves <100,000 and is largest plant.	zero	<100,000.
E	≥100,000	Plant serves <100,000 and is not largest plant in PWS.	≥1	NA.
F	≥100,000	Plant serves <100,000 and is not largest plant in PWS.	zero	<100,000.
G	50,000–99,999 and ≥ 50,000 served by ground water.	NA	NA	Largest ground water plant.

NA–not applicable.

(2) Table 2 of this paragraph specifies applicability for requirements contained in §§ 141.142, 141.143, and 141.144 of this part, based on treatment plant categorization determined under the provisions of Appendix A to paragraph (a) of this section.

TABLE 2—SUBPART M APPLICABILITY

Subpart M Requirements	Categories of treatment plants[1]						
	A	B	C	D	E	F	G
§ 141.142.—DBP and Related Monitoring							
Table 1a and 1b	X	X	X	X	X	X	
Table 2[2]	X	X	X	X	X	X	
Table 3[2]	X	X	X	X	X	X	
Table 4a and 4b[2]	X	X	X	X	X	X	
Table 5a and 5b[2]	X	X	X	X	X	X	
Table 6	X	X	X	X	X	X	
§ 141.143—Microbiological Monitoring							
Treatment plant influent monitoring	X		X		X		
Finished water monitoring[3]	X		X		X		
§ 141.144—Applicability Monitoring and Treatment Studies							
Treatment study applicability monitoring	X	X	X	X			X
Pilot-scale treatment studies[4]	X	X					
Bench- or pilot-scale treatment studies[4]	X	X	X	X			X

[1] As determined by Appendix A to paragraph (a) of this section.

[2] Table 2 required only for treatment plants using chloramines. Table 3 required only for treatment plants using hypochlorite solution. Table 4a and 4b required only for treatment plants using ozone. Table 5a and 5b required only for treatment plants using chlorine dio xide.

[3] Only required for a PWS that, during any of the first twelve months of monitoring at the treatment plant influent, detects 10 or more *Giardia* cysts, or 10 or more *Cryptosporidium* oocysts, or one or more total culturable viruses in one liter of water; or calculates a numerical value of the *Giardia* or *Cryptosporidium* concentration equal to or greater than 1000 per 100 liters or virus concentration equal to or greater than 100 per 100 liters; or detects no pathogens in the sample and calculates a numerical value of the detection limit for *Giardia* or *Cryptosporidium* concentration equal to or greater than 1000 per 100 liters or virus concentration equal to or greater than 100 per 100 liters.

[4] Pilot-scale treatment studies are required for treatment plants that serve a population of 500,000 or greater. Bench- or pilot-scale treatment studies are required for treatment plants that serve a population of fewer than 500,000.

(c) *Disinfection Byproduct and Related Monitoring.* A PWS must comply with the monitoring requirements in § 141.142 of this subpart for treatment plants in treatment plant categories A, B, C, D, and E listed in Table 1 in paragraph (b)(1) of this section. The PWS shall monitor monthly for 18 consecutive months at each treatment plant, even if a treatment plant was not used for one or more calendar months. When the treatment plant is not operating, the PWS shall file the report required under § 141.142(c) of this subpart to indicate zero flow, and need only conduct treatment plant influent monitoring under the provisions of § 141.142 of this subpart. A PWS must comply with the monitoring requirements in § 141.142 of this subpart for treatment plants in treatment plant categories F listed in Table 1 in paragraph (b)(1) of this section monthly for 18 consecutive months at each treatment plant, except if a treatment plant was not used for one or more calendar months. When the treatment plant is not operating, the PWS shall file the report required under § 141.142(c) of this subpart to indicate zero flow, and is not required to conduct treatment plant influent monitoring under the provisions of § 141.142 of this subpart.

(d) *Microbiological Monitoring.* A PWS must comply with the monitoring requirements in § 141.143 of this subpart for treatment plants in treatment plant categories A, C, and E listed in Table 1 in paragraph (b)(1) of this section and Table 3 of this paragraph. The PWS shall conduct 18 consecutive months of microbiological monitoring at each treatment plant, even if it is not operated each calendar month.

TABLE 3.—MICROBIOLOGICAL MONITORING REQUIREMENTS FOR SUBPART M

Microbial sample	Treatment plant category	
	A, C and E	
	Treatment plant influent	Finished water [1]
Total culturable viruses	1/month [2]	1/month.
Total coliforms	1/month	1/month.
Fecal coliforms or *E. coli*	1/month	1/month.
Giardia	1/month	1/month.[3]
Cryptosporidium	1/month	1/month.[3]

[1] Only required for a PWS that, during any of the first twelve months of monitoring at the treatment plant influent, detects 10 or more *Giardia* cysts, or 10 or more *Cryptosporidium* oocysts, or one or more total culturable viruses in one liter of water; or calculates a numerical value of the *Giardia* or *Cryptosporidium* concentration equal to or greater than 1000 per 100 liters or virus concentration equal to or greater than 100 per 100 liters; or detects no pathogens in the sample and calculates a numerical value of the detection limit for *Giardia* or *Cryptosporidium* concentration equal to or greater than 1000 per 100 liters or virus concentration equal to or greater than 100 per 100 liters. The PWS shall collect one sample of finished water during each month that the treatment plant is operated at each such treatment plant beginning in the first calendar month after the PWS learns of such a result. A PWS shall continue finished water monitoring monthly until 18 months of treatment plant influent monitoring has been completed.

[2] A PWS may avoid virus monitoring if the PWS has monitored total coliforms, fecal coliforms, or *E. coli* in the source water for at least five days/week for any period of six consecutive months beginning after January 1, 1994, and 90% of all samples taken in that six-month period contained no greater than 100 total coliforms/100 ml, or 20 fecal coliforms/100 ml, or 20 *E. coli*/100 ml.

[3] A PWS may avoid the requirement for finished water monitoring of *Giardia* and *Cryptosporidium* if the PWS notifies EPA that it will comply with the alternative monitoring requirements in § 141.143(a)(2)(iii). The PWS must still conduct finished water monitoring for all other microorganisms, except that *Giardia* and *Cryptosporidium* monitoring in the finished water is not required.

(e) *Disinfection Byproduct Precursor Removal Studies (Treatment Studies).*

(1) A PWS shall comply with treatment study applicability monitoring in paragraph (e)(2) of this section at each treatment plant in treatment plant categories A, B, C, D, and G listed in Table 1 in paragraph (b)(1) of this section. A PWS shall comply with the treatment study requirements in § 141.144 of this subpart at each such treatment plant, except for those treatment plants:

(i) Meeting the source water quality, disinfection practice, or disinfection byproduct precursor removal practice criteria in paragraph (e)(3) of this section, for which no treatment study is required; or

(ii) Meeting the common water resource criteria in paragraph (e)(4) of this section, for which several PWSs may conduct treatment studies jointly, in lieu of separately; or

(iii) Meeting the common water resource criteria in paragraph (e)(5) of this section, for which a PWS may contribute funds towards research, in lieu of conducting a treatment study; or

(iv) At which a previous treatment study that meets the criteria in paragraph (e)(6) of this section has already been conducted, for which a PWS may use the results of this previous treatment study, in lieu of conducting another treatment study; or

(v) Operated by the PWS that use the same water resource, as classified by the procedure in paragraph (e)(4) of this section. The PWS is not required to conduct more than one treatment study for those treatment plants. If both pilot-scale and bench-scale treatment studies would otherwise be required for treatment plants on the same water resource, the PWS shall conduct a pilot-scale study. A PWS with multiple water resources shall conduct treatment studies for each treatment plant that uses different water resources.

(2) Treatment study applicability monitoring.

(i) PWSs shall monitor total organic carbon (TOC) monthly for 12 months. Treatment plants using surface water shall monitor treatment plant influent. Treatment plants using ground water shall monitor finished water.

(ii) Treatment study applicability monitoring for THM4 and HAA5 is only required by a PWS that intends to qualify for avoiding a treatment study under the provisions of paragraph (e)(3)(i) of this section.

(iii) Total organic halides formed under the uniform formation conditions (UFCTOX) monitoring is only required by a PWS that intends to qualify for a joint treatment study under the provisions of paragraph (e)(4)(i)(A)(*2*) of this section or for the alternative to conducting a treatment study under the provisions of paragraph (e)(5) of this section.

(3) *Criteria under which no treatment study is required.* A PWS identified in paragraph (e)(1) of this section is not required to conduct a treatment study at any treatment plant that satisfies any criteria in paragraphs (e)(3) (i) through (iv) of this section, provided that the PWS has also complied with the requirements in paragraph (e)(7)(i) of this

section and EPA has approved the PWS's request to avoid the treatment study.

(i) Treatment plants that use chlorine as both the primary and residual disinfectant and have, as an annual average of four quarterly averages, levels of less than 40 μg/l for THM4 and less than 30 μg/l for HAA5. Quarterly averages are the arithmetic average of the four distribution system samples collected under the requirements of § 141.142(a)(1) of this subpart.

(ii) Treatment plants using surface water that do not exceed a TOC annual average of 4.0 mg/l in the treatment plant influent, measured in accordance with §§ 141.141(f)(4) and 141.144(a) of this subpart and calculated by averaging the initial 12 monthly TOC samples.

(iii) Treatment plants using only ground water not under the direct influence of surface water that do not exceed a TOC annual average of 2.0 mg/l in the finished water, measured in accordance with §§ 141.141(f)(4) and 141.144(a) of this subpart and calculated by averaging the initial 12 monthly TOC samples.

(iv) Treatment plants that already use full scale membrane or GAC technology. For a treatment plant that already uses full-scale GAC or membrane technology capable of achieving precursor removal, a PWS shall conduct monitoring and submit full-scale plant data required for disinfection byproduct and related monitoring by § 141.142(a) of this subpart, ensuring that the GAC or membrane processes are included in the process train being monitored. For a treatment plant to be considered to have membrane technology to achieve precursor removal, the PWS shall have used nanofiltration or reverse osmosis membranes. GAC capable of removing precursors is defined as GAC with an empty bed contact time (EBCT) of 15 minutes or greater, with a time between carbon reactivation or replacement of no more than nine months. PWSs that operate treatment plants that use GAC with either an EBCT of less than 15 minutes or a replacement or reactivation frequency for GAC longer than nine months may submit a request to avoid treatment studies under the provisions of paragraph (e)(7)(i) of this section by including data demonstrating effective DBP precursor removal.

(4) *Criteria under which joint treatment studies are allowed.* (i) PWSs that use common water resources and have similar treatment trains may conduct joint treatment studies. A common water resource for all types of surface water resources requires the mean treatment plant influent TOC or UFCTOX of each of the cooperating treatment plants to be within 10% of the average of the mean treatment plant influent TOCs or UFCTOX of all the cooperating treatment plants. A common water resource for all types of ground water resources requires the mean treatment plant finished water TOC or UFCTOX of each of the cooperating treatment plants to be within 10% of the average of the mean treatment plant finished water TOCs or UFCTOX of all the cooperating treatment plants. The mean is calculated from the monthly TOC or UFCTOX monitoring data for the initial twelve months of monitoring under § 141.144(a) of this subpart. Similar treatment trains means that, for example, softening plants may not conduct joint studies with conventional treatment plants. In addition, the applicable requirements in paragraphs (e)(4)(i) (A) through (C) of this section shall be met for the water resource to be considered a common water resource. If otherwise eligible, a PWS may choose to either perform a joint treatment study with other eligible systems or contribute funds to a cooperative research program, as described in paragraph (e)(5) of this section, as an alternative to conducting a treatment study.

(A) *River sources.* Treatment plants with river intakes are considered to have a common water resource if the PWS meets either criteria in paragraphs (e)(4)(i)(A) (*1*) or (*2*) of this section.

(*1*) The intakes are no more than 20 river miles apart and TOC at each treatment plant influent is within 10% of the mean TOC of all the treatment plant influents.

(*2*) The intakes are at least 20, but no more than 200, river miles apart and the PWS demonstrates that the mean water resource UFCTOX is within 10% of the mean UFCTOX of all the treatment plant influents, based on UFCTOX analytical results of the same 12 consecutive months for all cooperating treatment plants.

(B) *Lake/reservoir.* Treatment plants with lake or reservoir intakes are considered to have a common water resource if the same lake or reservoir serves all the cooperating treatment plants and TOC at each treatment plant influent is within 10% of the mean TOC of all the treatment plant influents.

(C) *Ground water not under the direct influence of surface water.* Treatment plants with intakes from a single aquifer are considered to have a common water resource if treatment plant finished water TOC at each treatment plant is within 10% of the mean finished water TOC of all the treatment plants.

(ii) PWSs that meet the requirements of paragraph (e)(4)(i) of this section shall conduct at least the number and type of joint studies noted in the following tables. Joint studies shall only be conducted among treatment plants in the same size category, i.e. a population served of either ≥500,000 or of <500,000. The maximum number of treatment plants with a population served ≥500,000 persons allowed to join together to conduct a study is three. The maximum number of treatment plants with a population served <500,000 persons allowed to join together to conduct a study is six.

JOINT STUDIES REQUIREMENT FOR TREATMENT PLANTS WITH A POPULATION SERVED OF <500,000

Number of plants	Minimum studies to be conducted
2	1 pilot (GAC or membrane).
3	1 pilot and 1 bench (GAC or membrane).
4	2 pilots (GAC and/or membrane).
5	2 pilots (GAC and/or membrane), 1 bench (GAC or membrane).
6	2 pilots and 2 bench (GAC and/or membrane).

JOINT STUDIES REQUIREMENT FOR TREATMENT PLANTS WITH A POPULATION SERVED OF ≥500,000

Number of plants	Minimum studies to be conducted
2	1 pilot (GAC or membrane), 2 bench (GAC and/or membrane).
3	2 pilots (GAC and/or membrane).

(5) *Criteria under which an alternative to conducting a treatment study is allowed.* In lieu of conducting the required treatment study, a PWS may apply to EPA to contribute funds to a cooperative research effort. The PWS shall submit an application to EPA Technical Support Division, ICR Precursor Removal Studies Coordinator, 26 W. Martin Luther King Drive, Cincinnati, OH 45268. The application shall show that the treatment plant for which the waiver of the treatment study is sought uses a common water resource, as described in paragraph (e)(4) of this section, that is being studied by another PWS or cooperative of PWSs operating treatment plants in the same size category. A PWS operating treatment plants serving a population of fewer than 500,000 may also contribute to this fund if there is a common water resource (as defined in paragraph (e)(4) of this section) treatment plant serving 500,000 or more conducting a treatment study. If EPA approves the application, the PWS shall contribute funds in the amount specified in paragraph (e)(5)(i) of this section to the Disinfection Byproducts/Microbial Research Fund, to be administered by the American Water Works Association Research Foundation (AWWARF) under the direction of an independent research council, for use in a dedicated cooperative research program related to disinfectants, disinfection byproducts, and enhanced surface water treatment.

(i) The PWS shall contribute $300,000 for a treatment plant with a population served of 500,000 or more. The PWS shall contribute $100,000 for a treatment plant with a population served of fewer than 500,000.

(ii) The PWS shall send the contribution to the address specified in EPA's approval letter not later than 90 days after EPA approves the PWS application for waiver of the treatment study.

(6) *Criteria under which a previous treatment study is acceptable (grandfathered studies).* A PWS that has conducted studies of precursor removal that meet all the criteria in paragraphs (e)(6)(i) and (ii) of this section may use the results of that study in lieu of conducting another treatment study.

(i) The PWS used analytical methods specified in Table 7 of § 141.142(b)(1) of this subpart and used the analytical and quality control procedures described in ''DBP/ICR Analytical Methods Manual'', EPA 814–B–96–002.

(ii) The PWS followed a protocol similar to that specified and supplies the data specified in ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996).

(7) *Process for a PWS to obtain EPA approval of criteria applicability.* A PWS wanting to avoid the requirements for a treatment study under the provisions of paragraphs (e)(3) through (6) of this section shall submit the applicable information in paragraphs (e)(7)(i) through (iv) of this section and in ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996) and all monitoring data required under §§ 141.142(a) and 141.143(a) of this subpart to EPA, Technical Support Division, ICR Precursor Removal Studies Coordinator, 26 W. Martin Luther King Drive, Cincinnati, OH 45268.

(i) *Approval of request to avoid treatment studies.* A PWS that believes it qualifies to avoid the requirements for a treatment study under the provisions of paragraph (e)(3)(i) through (iii) of this section shall submit the information showing the applicable criterion for not conducting the study has been met not later than November 14, 1997. A PWS wanting to avoid the requirements for a treatment study under the provisions of paragraph (e)(3)(iv) of this section shall submit the supporting information, including any pilot- or full-scale data showing effective precursor removal, not later than November 14, 1997. A PWS that applies to avoid a treatment study under the provisions of paragraph (e)(4) through (6) of this section and subsequently qualifies to avoid a treatment study under the provisions of paragraph (e)(3)(i) through (iii) of this section may elect to avoid a treatment study under the provisions of paragraph (e)(3)(i) through (iii) of this section. If the PWS elects to avoid a treatment study under the provisions of paragraph (e)(3)(i) through (iii) of this section, the PWS shall notify all PWSs that were associated with the application to avoid a treatment study under the provisions of paragraph (e)(4) through (6) of this section.

(ii) *Approval of request to conduct joint studies.* A PWS that believes it qualifies to avoid the requirements for a treatment study under the joint study provisions of paragraph (e)(4) of this section shall submit a letter of intent to EPA with the information in paragraphs (e)(7)(ii)(A) through (F) of this section for all treatment plants to be included in the joint study not later than May 14, 1997. The letter shall be signed by all PWSs planning to participate in the joint study. All PWSs shall submit a combined application for joint studies approval to EPA (including 12 months of treatment plant influent TOC or finished water TOC results or UFCTOX results, as appropriate, for each treatment plant to be included in the joint study) not later than November 14, 1997.

(A) Data to support their common water resource designation.

(B) Information to demonstrate that treatment plants have similar treatment trains.

(C) Information that treatment plants are in the same size category.

(D) The treatment plant influent TOC or finished water TOC results, or UFCTOX results, as appropriate, from the first six months of monitoring.

(E) What studies will be conducted (i.e., combination of bench/pilot and GAC/membrane).

(F) Any additional supporting data.

(iii) *Approval of request for alternative to treatment studies.* A PWS that believes it qualifies to avoid the requirements for a treatment study under the provisions for an alternative in paragraph (e)(5) of this section shall submit a letter of intent expressing its intention to contribute funds to the cooperative research effort not later than May 14, 1997. The letter shall identify the other treatment plants using the same water resource which will be conducting studies. Each PWS shall submit an application for approval of alternative to treatment studies to EPA (including 12 months of treatment plant influent TOC or finished water TOC results or UFCTOX results, as appropriate) not later than November 14, 1997. EPA shall notify the PWS whether a treatment study is required (because there is no other appropriately sized treatment plant using the same water resource conducting a treatment study) or if the PWS can avoid the study by contributing funds to the cooperative research effort specified in paragraph (e)(5) of this section.

(iv) *Approval of request to use grandfathered studies.* A PWS that believes it qualifies to avoid the requirements for a treatment study under the grandfathered study provisions of paragraph (e)(6) of this section shall submit the following information not later than February 14, 1997: a description of the study, the equipment used, the experimental protocol, the analytical methods, the quality assurance plan, and any reports resulting from the study. EPA shall review the information and inform the PWS whether or not the prior study meets the ICR requirements. Not later than November 14, 1997, the PWS must submit study data in the format specified in ''ICR Manual for Bench- and Pilot-scale Treatment Studies'', EPA 814–B–96–003, April 1996. An approved grandfathered study can be justification for common water resource PWSs contributing to the cooperative research effort under the provisions of paragraph (e)(5) of this section, but may not be used as joint treatment studies unless it incorporates the requirements listed in § 141.141(e)(4) of this section and the PWS submits written concurrence of the PWS which conducted the study.

(f) *Effective dates.* (1) A PWS shall respond to the Notice of Applicability sent by EPA within 35 calendar days of receipt of that notice. The PWS's response to the Notice shall indicate what requirements in subpart M apply to each treatment plant operated by the PWS. If a PWS meets the applicability criteria in paragraph (b) of this section and has not received a Notice of Applicability from EPA by June 28, 1996, that PWS must request a Notice of Applicability from EPA by contacting the ICR Utilities Coordinator, TSD, USEPA, 26 West Martin Luther King Drive, Cincinnati, OH 45268, not later than July 15, 1996.

(2) A PWS required to monitor under both paragraphs (c) and (d) of this section shall begin monitoring to comply with the provisions of § 141.142 (Disinfection Byproduct and Related Monitoring) and § 141.143 (Microbiological Monitoring) of this subpart in the same month. The PWS must submit the sampling plans required by §§ 141.142(c)(2)(ii) and 141.143(c)(3)(ii) of this subpart at the same time.

(3) *Disinfection Byproduct and Related Monitoring.* A PWS operating a treatment plant required to comply with § 141.142 of this subpart shall begin monitoring in the calendar month following approval of the DBP and related monitoring sampling plan submitted under the provisions of § 141.142(c)(2)(ii) of this subpart. Once a PWS has begun monitoring, it shall continue to monitor for 18 consecutive months.

(4) *Microbiological Monitoring.* A PWS operating a treatment plant identified in paragraph (d) of this section shall begin monitoring under the provisions of § 141.143 of this subpart in the calendar month following approval of the sampling plan submitted under the provisions of § 141.143(c)(3)(ii) of this subpart. Once a PWS has begun monitoring, it shall continue to monitor for 18 consecutive months.

(5) DBP precursor removal studies. (i) *TOC, UFCTOX, THM4, and HAA5 monitoring.* A PWS required to comply with § 141.144 of this subpart shall begin TOC, UFCTOX, THM4, and HAA5 monitoring specified in paragraph (e)(2) of this section not later than August 14, 1996 and continue this monitoring for 12 consecutive months for TOC and UFCTOX and four consecutive quarters for THM4 and HAA5.

(ii) A PWS required to conduct a disinfection byproduct precursor removal study (treatment study) under the provisions of paragraph (e)(1) of this section shall begin conducting such treatment studies not later than April 14, 1998 and submit the report(s) of the completed study to EPA not later than July 14, 1999.

§ 141.142 Disinfection byproduct and related monitoring.

(a) *Monitoring requirements.* Samples taken under the provisions of this section shall be taken according to the procedures described in the ''ICR Sampling Manual,'' EPA 814–B–96–001, April 1996. If a treatment plant configuration results in two required sampling points from any table in this section when in fact it is a single location, duplicate analyses are not required for the same location and time. A PWS that uses purchased finished water shall determine whether any monitoring of treatment plant influent is required under paragraphs (a)(2) through (5) of this section because of certain treatment (e.g., use of hypochlorite or chlorine dioxide) of the water provided by the selling PWS.

(1) A PWS shall obtain a complete set of samples at the frequency and location noted in Tables 1a and 1b of this section for treatment plants required to test under § 141.141(b) of this subpart. Samples shall be taken according to the sampling plan approved under the provisions of paragraph (c)(2)(ii) of this section.

(i) Samples of finished water shall be collected at a point after which all treatment processes for a particular treatment plant are complete (including the clearwell and final point of chlorination) and before the distribution system begins. A PWS that purchases finished water shall collect a sample before additional disinfectant is added to the purchased finished water. A PWS shall collect a sample of purchased finished water only if the PWS redisinfects the purchased finished water. A sample of finished water is a sample representing the final product water from a particular treatment plant.

(ii) A sample of treatment plant influent for a PWS that treats untreated water shall be taken at a location at the upstream end of a treatment plant where waters from all intakes are blended prior to any treatment or chemical addition. For treatment plants that have multiple intakes and add chemicals at the intake, the sample of treatment plant influent shall be a flow proportional composite of intake samples collected before chemical addition and before pretreatment. If the intakes are expected to have the same source water quality, one representative intake sample may be taken. If a disinfectant is added at or before the intake (e.g., for zebra mussel control), the sample shall be taken in the vicinity of the intake so that the sample is not contaminated by the disinfectant. A sample of treatment plant influent for a PWS that treats purchased finished water is taken at a location just before the purchased finished water is treated. An intake sample is collected after the intake but before blending with waters from other intakes and before addition of chemicals or any treatment.

TABLE 1A.—MONTHLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS

Sampling point	Monthly analyses [1]
Treatment plant influent for non-finished water	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, UV_{254}, Bromide, Ammonia.
Treatment plant influent for purchased finished water [2].	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, UV_{254}, Disinfectant residual [3].
Before first point of oxidant addition	Chlorine demand test.
Washwater return between washwater treatment plant and point of addition to process train [4].	pH, Alkalinity, Turbidity, Temperature, Calcium and Total hardness, TOC, UV_{254}, Bromide, Ammonia, Disinfectant residual [3] if disinfectant is used.
Additional water sources added to process train after treatment plant influent. The sample point is before additional water is blended with the process train.	pH, Alkalinity, Turbidity, Temperature, Calcium and Total hardness, TOC, UV_{254}, Bromide, Ammonia, Disinfectant residual [3] if disinfectant is used.
Before Filtration	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, and UV_{254}.
After Filtration	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, and UV_{254}.
Before each Point of Disinfection [5]	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, and UV_{254}.
After every unit process that is downstream from the addition of chlorine or chloramines.	Disinfectant Residual [3].
Finished water sample point (Plant effluent)	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, UV_{254}, Disinfectant Residual [3].
Entry point to distribution system [6]	pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, TOC, UV_{254}, Disinfectant Residual [3].

[1] TOC: total organic carbon. UV_{254}: absorbance of ultraviolet light at 254 nanometers.

[2] Samples of purchased finished water shall be taken prior to addition of any more disinfectant.

[3] Free chlorine residual and total chlorine residual shall be measured in treatment systems using free chlorine. Total chlorine residual, but not free chlorine residual, shall be measured in treatment systems using chloramines as the residual disinfectant.

[4] Washwater return shall be sampled prior to blending with the process train.

[5] For utilities using ozone or chlorine dioxide, Tables 4 and 5, respectively, of this section, show additional monitoring requirements at this sampling point. Addition of ammonia for the purpose of converting free chlorine to chloramines is considered a point of disinfectant addition. PWSs that disinfect just before filtration may use the ''before filtration'' sampling point analytical results to meet the monitoring requirement for this point.

[6] Entry point to distribution system only required for treatment plants that blend finished water with finished water from other treatment plant(s) prior to entry point of distribution system. For most treatment plants, the finished water sample point and the entry point to the distribution system are the same.

TABLE 1B.—QUARTERLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS

Sampling point	Quarterly analyses [1]
Treatment plant influent for non-finished water	TOX.
Treatment plant influent for purchased finished water.	THM4, HAA6[7], HAN, CP, HK, CH, TOX.
Washwater Return between washwater treatment plant and point of addition to process train.	TOX.
After filtration if disinfectant is applied at any point in the treatment plant prior to filtration.	THM4, HAA6[7], HAN, CP, HK, CH, TOX.
Finished water sample point (Plant Effluent)	THM4, HAA6[7], HAN, CP, HK, CH, TOX.
Entry point to distribution system [2]	THM4, HAA6[7], HAN, CP, HK, CH, TOX.
SDS [3]	THM4, HAA6[7], HAN, CP, HK, CH, TOX, pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, Disinfectant Residual [5].

TABLE 1B.—QUARTERLY MONITORING REQUIREMENTS FOR TREATMENT PLANTS—Continued

Sampling point	Quarterly analyses[1]
Four monitoring points in distribution system[4,6]	THM4, HAA6[7], HAN, CP, HK, CH, TOX, pH, Alkalinity, Turbidity, Temperature, Calcium and Total Hardness, Disinfectant Residual[5].

[1] TOC: total organic carbon. THM4: trihalomethane (four). HAA6: haloacetic acids (six). HAN: Haloacetonitriles. CP: chloropicrin. HK: haloketones. CH: chloral hydrate. TOX: total organic halide. For THM4, HAA6, HAN, and HK, analytical results for individual analytes shall be reported.
[2] Entry point to distribution system only required for treatment plants that blend finished water with finished water from other treatment plant(s) prior to entry point of distribution system. For most treatment plants, the finished water sample point and the entry point to the distribution system are the same.
[3] Simulated Distribution System (SDS) sample shall be collected at the finished water sampling point (or entry point to distribution system if finished water from two or more plants are blended prior to entering the distribution system) and analyzed using the method specified in § 141.142. PWSs using purchased finished water are not required to take an SDS sample at treatment plants that use only purchased finished water.
[4] For each treatment plant, one distribution system equivalent sample location (known as DSE) shall be chosen to correspond to the SDS sample, one sample location shall be chosen to be representative of maximum residence time for the treatment plant, and the remaining two sample locations shall be representative of the average residence time in the distribution system for the treatment plant. PWSs using purchased finished water shall take three samples representing the average residence time in the distribution system for the treatment plant and one representing the maximum residence time for the treatment plant (no DSE sample required).
[5] Free chlorine residual and total chlorine residual shall be measured in treatment systems using free chlorine. Total chlorine residual, but not free chlorine residual, shall be measured in treatment systems using chloramines as the residual disinfectant.
[6] A PWS may use TTHM compliance monitoring locations and analytical results under § 141.30 of this part to the extent that such locations and analytical results are consistent with the requirements of this section.
[7] PWSs are encouraged to also analyze for the additional haloacetic acids bromodichloro-, chlorodibromo-, and tribromo-acetic acid, and report the results as part of the reports specified in paragraph (c)(1) of this section.

(2) *Additional requirements for PWSs using chloramines.* For each treatment plant that uses chloramines for treatment or disinfection residual maintenance, a PWS shall also conduct the additional sampling identified in Table 2 of this section. A PWS shall send samples of cyanogen chloride taken under the provisions of this paragraph for analysis to EPA, following the procedures contained in the ''ICR Sampling Manual,'' EPA 814–B–96–001, April 1996.

TABLE 2.—ADDITIONAL QUARTERLY MONITORING FOR TREATMENT PLANTS USING CHLORAMINES

Sampling point	Quarterly analyses
Treatment plant influent for purchased finished water[1]	Cyanogen Chloride[2].
Finished water sample point (plant effluent)	Cyanogen Chloride[2].
Distribution system sample point representing a maximum residence time in distribution system relative to the treatment plant.	Cyanogen Chloride[2].

[1] Applicable only when wholesale water provider is using chloramines.
[2] EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.

(3) *Additional requirements for PWSs using hypochlorite solutions.* For each treatment plant that uses hypochlorite solutions for treatment or disinfection residual maintenance, a PWS shall also conduct the additional sampling identified in Table 3 of this section.

TABLE 3.—ADDITIONAL QUARTERLY MONITORING FOR TREATMENT PLANTS USING HYPOCHLORITE SOLUTIONS

Sampling point	Quarterly analyses
Treatment plant influent for non-finished water	Chlorate.
Treatment plant influent for purchased finished water[1]	Chlorate.
Hypochlorite Stock Solution	pH, Temperature, Free Residual Chlorine, Chlorate.
Finished Water Sample Point (Plant Effluent)	Chlorate.

[1] Applicable only when wholesale water provider is using hypochlorite solutions.

(4) *Additional requirements for PWSs using ozone.* For each treatment plant that uses ozone for treatment, a PWS shall also conduct the additional sampling identified in Tables 4a and 4b of this section. A PWS shall collect samples for bromate taken under the provisions of this paragraph in duplicate, with the PWS analyzing one aliquot and submitting the other aliquot for analysis to EPA, following the procedures contained in the ''ICR Sampling Manual,'' EPA 814–B–96–001, April 1996. A PWS shall submit samples for aldehydes taken under the provisions of this paragraph for analysis to EPA, following the procedures contained in the ''ICR Sampling Manual,'' EPA 814–B–96–001, April 1996.

TABLE 4a.—ADDITIONAL MONTHLY MONITORING FOR TREATMENT PLANTS USING OZONE

Sampling point	Monthly analyses
Ozone Contactor Influent	Bromide, bromate[2,3], and ammonia.

TABLE 4a.—ADDITIONAL MONTHLY MONITORING FOR TREATMENT PLANTS USING OZONE—Continued

Sampling point	Monthly analyses
Each Ozone Contact Chamber Effluent [1]	Ozone residual.
Ozone Contactor Effluent	Bromate[2].
Finished Water Sample Point (Plant Effluent)	Bromate[2].

[1] Each ozone contactor can be subdivided into its contact chambers. Measure ozone residual in effluent of all contact chambers until <0.05 mg/l is measured in two consecutive chambers.
[2] EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
[3] PWSs are not required to analyze a bromate sample at this location. However, PWSs are still required to submit a sample to EPA for analysis.

Table 4B.—ADDITIONAL QUARTERLY MONITORING FOR TREATMENT PLANTS USING OZONE

Sampling point	Quarterly analyses
Ozone Contactor Influent	Aldehydes [1] and AOC/BDOC [2].
Ozone Contactor Effluent	Aldehydes [1] and AOC/BDOC [2].
Finished Water Sample Point (Plant Effluent)	Aldehydes [1] and AOC/BDOC [2].

[1] EPA shall measure the following aldehydes: formaldehyde, acetaldehyde, propanal, butanal, pentanal, glyoxal, and methyl glyoxal. EPA may analyze for other aldehydes. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
[2] Analysis and submission of data for both assimilable organic carbon (AOC) and biodegradable organic carbon (BDOC) are optional. Analytical methods for AOC and BDOC are listed in ''DBP/ICR Analytical Methods Manual,'' EPA 814–B–96–002, April 1996.

(5) *Additional sampling requirements for PWSs using chlorine dioxide.* For each treatment plant that uses chlorine dioxide for treatment or disinfection residual maintenance, a PWS shall also conduct the additional sampling identified in Tables 5a and 5b of this section. A PWS shall collect samples for bromate taken under the provisions of this paragraph in duplicate, with the PWS analyzing one aliquot and submitting the other aliquot for analysis to EPA, following the procedures contained in the ''ICR Sampling Manual,'' EPA 814–B–96–001, April 1996. A PWS shall submit samples for aldehydes taken under the provisions of this paragraph for analysis to EPA, following the procedures contained in the ''ICR Sampling Manual,'' EPA 814–B–96–001, April 1996.

TABLE 5A.—ADDITIONAL MONTHLY MONITORING FOR TREATMENT PLANTS USING CHLORINE DIOXIDE

Sampling point	Monthly analyses
Treatment plant influent for purchased finished water [1]	Chlorine Dioxide Residual, Chlorite, Chlorate.
Before first chlorine dioxide application	Chlorate, bromate [2,3].
Before application of ferrous salts, sulfur reducing agents, or GAC	Chlorine Dioxide Residual, Chlorite, Chlorate, pH.
Finished water sample point (plant effluent)	Chlorine Dioxide Residual, Chlorite, Chlorate, Bromate [2].
Three distribution system sampling points (1 near first customer, 1 in middle of distribution system, and 1 representative of maximum residence time in the distribution system).	Chlorine Dioxide Residual, Chlorite, Chlorate, pH, and Temperature.

[1] Applicable only when wholesale water provider is using chlorine dioxide.
[2] EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
[3] PWSs are not required to analyze a bromate sample at this location. However, PWSs are still required to submit a sample to EPA for analysis.

TABLE 5b.—ADDITIONAL QUARTERLY MONITORING FOR TREATMENT PLANTS USING CHLORINE DIOXIDE

Sampling point	Quarterly analyses
Before First Chlorine Dioxide Application	Aldehydes [1] and AOC/BDOC [2].
Before First Point of Downstream Chlorine/Chloramine Application After Chlorine Dioxide Addition.	Aldehydes [1] and AOC/BDOC [2].
Finished Water Sample Point (Plant Effluent)	Aldehydes [1] and AOC/BDOC [2].

[1] EPA shall measure the following aldehydes: formaldehyde, acetaldehyde, propanal, butanal, pentanal, glyoxal, and methyl glyoxal. EPA may analyze for other aldehydes. EPA shall provide all analytical results to the PWS. The PWS shall report all results in its monthly report.
[2] Analysis and submission of data for both assimilable organic carbon (AOC) and biodegradable organic carbon (BDOC) are optional. Analytical methods for AOC and BDOC are listed in ''DBP/ICR Analytical Methods Manual,'' EPA 814–B–96–002, April 1996.

(6) *Additional requirements.* A PWS shall also report the applicable information in Tables 6a through 6e of this section. A PWS is required to provide the information in paragraphs (a)(6)(i) through (iii) of this section for each unit process listed in Table 6c. The PWS may provide the information in paragraphs (a)(6)(iv) and (v) of this section for each unit process listed in Table 6c. T_{10} and T_{50} tracer studies shall be conducted as specified in ''Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources'', Appendix C.

(i) Unit process flow (MGD) at time of sampling.

(ii) T_{10} (minutes). A PWS shall determine T_{10} based on a one-time tracer study in the clearwell of all treatment plants required to conduct

microbiological monitoring under the provisions of § 141.141(d) of this subpart. The PWS may use results of a tracer study conducted to meet the requirements of subpart H (Filtration and Disinfection) of this part to meet this requirement. For subsequent T_{10} determinations, the PWS shall use a flow-proportional interpolation of the clearwell tracer study. For unit processes other than a clearwell, a PWS shall either estimate T_{10} or use an interpolation of tracer study T_{10} using multiple flows for each unit process in which a disinfectant residual exists.

(iii) Chemicals in use at time of sampling. Report chemical name, chemical dose at time of sampling, and measurement formula. Measurement formulas (e.g., mg/l as Aluminum) shall be provided to determine the correct amount of the chemical compound being added.

(iv) Short circuiting factor (optional). The short circuiting factor is an assumed value for the ratio of T_{10} to nominal contact time (volume divided by flow).

(v) T_{50} (minutes) (optional). T_{50} should be reported only if based on a tracer study.

TABLE 6a.—PUBLIC WATER SYSTEM INFORMATION

Permanent data	Design data	Monthly data
Public Water System:		
Utility Name		Sampling Dates: From (date) To (date).
Public Water Supply Identification Number (PWSID)		Retail population on day of sampling.
Water Industry Data Base (WIDB) Number [Optional]		Wholesale population on day of sampling.
Official Contact Person:		Monthly average Retail flow (MGD).
Name		Monthly average Wholesale flow (MGD).
Mailing Address		
Phone Number [optional]		
FAX Number [optional]		
ICR Contact Person:		
Name		
Mailing Address		
Phone Number [optional]		
FAX Number [optional]		
E-Mail Address [optional]		
Treatment Plant: [1]		
Plant name	Plant type (e.g., Conventional Filtration, Direct Filtration, In-Line Filtration, Two Stage Softening, Disinfection Only/Groundwater, Other Groundwater treatment)	Hours of operation (hours per day)
ICR plant number assigned by EPA [2]		Sludge solids production (lb/day)
PWSID number of treatment plant [3]		Percent solids in sludge (%)
State approved (permitted) plant capacity (MGD)		
Historical minimum water temperature (°C)		
Installed sludge handling capacity (lb/day)		
Process Train:		
Name	Process Train Type (e.g., Conventional Filtration, Direct Filtration, In-Line Filtration, Two Stage Softening, Disinfection Only/Groundwater, Other Groundwater treatment)	

[1] A PWS that operates more than one treatment plant shall report treatment plant information in this table for each treatment plant.
[2] EPA shall assign ICR plant number after the PWS submits sampling plan.
[3] PWSID of treatment plant if different from the PWSID reported in ''Public Water System''.

TABLE 6b.—PLANT INFLUENT INFORMATION

Permanent data	Monthly data
Water Resource [1]	
Name of resource: Type of resource (One of the following): 1 Flowing stream 2 Reservoir/Lake 3 Ground water classified as under the direct influence of surface water (GWUDI) 4 Ground water 5 Purchased finished water 6 Non-Fresh (such as salt water)	If Reservoir/Lake: Mean Residence Time (days).
Intake-Surface Water [2]	
Location of intake: [3] Latitude (deg/min/sec) Longitude (deg/min/sec) Hydrologic unit code (8 digit), if known [4] Stream Reach Code (3 digit) (if known) River mile number (mile) (if known) Is watershed control practiced? (yes/no)	Flow on day of sampling (MGD).

TABLE 6b.—PLANT INFLUENT INFORMATION—Continued

Permanent data	Monthly data
Intake-Ground Water [5] [6]	
Location of intake: Latitude (deg/min/sec) Longitude (deg/min/sec) Hydrological unit code (8 digit), if known [4] Is wellhead protection practiced? (yes/no)	Flow on day of sampling (MGD).
Intake-Purchased Finished Water [7]	
Name of supplying utility ..... PWSID of supplying utility	Flow on day of sampling (MGD).
Plant Influent [8]	
	Monthly average flow (MGD). Flow at time of sampling (MGD).

[1] Each treatment plant shall have at least one water resource. Each water resource shall have at least one intake. A treatment plant that uses more than one water resource shall report water resource information in this table for each water resource.

[2] Intake-Surface Water describes the physical location of an intake structure located in a river, lake, or other surface water resource or, for ground water under the direct influence of surface water, the physical location of a well.

[3] The location of the intake will allow cross referencing into other data bases containing information on possible contamination threats to the intake.

[4] The hydrologic unit code will allow cross referencing into other data bases containing information on possible contamination threats to the intake.

[5] An Intake-Ground Water describes the physical location of a well or well field (if multiple wells draw from a common aquifer.

[6] A PWS is not required to report information for ground water that is not treated.

[7] A PWS is required to report information for purchased finished water only if that water is further treated.

[8] Multiple ''Intakes'' combine into one ''Plant Influent.'' Each treatment plant has only one treatment plant influent. The treatment plant influent shall mark the point in the treatment plant where the ''Plant Influent'' sample shall be collected as described in Tables 1, 2, 3 and 5 of this section.

TABLE 6c.—UNIT PROCESS INFORMATION

Design data	Monthly data
Presedimentation Basin [1]	
Tube Settler Brand Name Plate Settler Brand Name Baffling type[2]	Liquid volume (gallons). Surface area (ft^2). Projected Tube Settler Surface Area (ft^2). Projected Plate Settler Surface Area (ft^2).
Ozone Contact Basin	
Information for the complete ozone contact basin: Type of Ozone Contactor (One of the following) 1 Bubble Diffusion 2 Turbine Number of Chambers Information for each ozone contact chamber: Chamber sequence number Liquid volume (ft^3) Surface area (ft^2) Water/Ozone flow regime (one of the following) 1 Counter-current 2 Co-current	Information for the complete ozone contact basin: Ozone CT (mg min/l).[10] Ozone Giardia Inactivation (logs). Ozone Virus Inactivation (logs). Ozone concentration in feed gas (% by weight). Total Ozone Gas Flow Rate to Contactor (SCFM).[3] Type of feed gas used to generate ozone (one of the following). 1 Air. 2 Oxygen. Total Ozone Applied Dose (mg/l). Information for each ozone contact chamber: Percent ozone gas flow split to this chamber (%). Hydrogen peroxide dose (mg/l).
Washwater Return Point [8]	
Indicate which washwater treatment processes are being used on day of sampling Is there treatment (yes/no):	Flow of returned washwater at time of sampling (MGD). 24 hr average flow prior to sampling (MGD).

TABLE 6c.—UNIT PROCESS INFORMATION—Continued

Design data	Monthly data
If yes: Plain sedimentation (yes/no) Coagulation/sedimentation (yes/no) Filtration (yes/no) Disinfection (yes/no) Other Treatment (Text)	
Rapid Mix	
Type of mixer (one of the following): 1 Mechanical 2 Hydraulic 3 Static 4 Other Baffling type [2]	Mean velocity gradient ''G'' (sec^{-1}).[4] Liquid volume (gallons).
Flocculation Basin	
Type of mixer (one of the following): 1 Mechanical 2 Hydraulic Number of stages Baffling type [2]	Mean velocity gradient ''G'' (sec^{-1}) in each stage.[4] Liquid volume of each stage (gallons).
Sedimentation Basin	
Tube settler brand name Plate settler brand name Baffling type [2]	Liquid volume (gallons). Surface area (ft^2). Projected tube settler surface area (ft^2). Projected plate settler surface area (ft^2).
Solids Contact Clarifier	
Brand name: Type (check all that apply): Rectangular basin Upflow Reactor-clarifier Sludge blanket Tube settler brand name Plate settler brand name Baffling type [2]	Liquid volume (gallons). Surface area of settling zone (ft^2). Projected tube settler surface area (ft^2). Projected plate settler surface area (ft^2).
Adsorption Clarifier	
Brand Name Baffling type [2]	Liquid volume (gallons). Surface area (ft^2).
Dissolved Air Flotation	
Baffling type [2]	Liquid volume (gallons). Surface area (ft^2). Percent recycle rate (%). Recycle stream pressure (psi).
Recarbonation Basin	
Baffling type [2]	Liquid volume (gallons). Surface area (ft^2).

TABLE 6c.—UNIT PROCESS INFORMATION—Continued

Design data	Monthly data
Filtration	
Media Type (one of the following): 1 Dual media (Anthracite/Sand) 2 GAC over sand 3 Tri media (Anthracite/Sand/Garnet) 4 Sand 5 Deep bed monomedia anthracite 6 Deep bed monomedia GAC 7 Greensand 8 Other Design depth of GAC (inch) Type and manufacturer of activated carbon Design media depth (inch) Minimum water depth to top of media (ft) Depth from top of media to top of backwash trough (ft)	Liquid volume (gallons). Surface area (ft^2). Average filter run time (hr).
Slow Sand Filtration	
Media type Media depth Media size	Surface area (ft^2). Average filter run length. Cleaning method.
Diatomaceous Earth Filter	
	Effective DE filter surface (ft^2). Precoat (lb/ft^2). Bodyfeed (mg/l). Run length (hours).
Granular Activated Carbon—Post-Filter Adsorber	
Manufacturer of activated carbon Type of activated carbon	Liquid volume (gallons). Surface area (ft^2). Carbon volume (ft^3). Empty bed contact time (minutes). Operating reactivation frequency (days).
Membranes	
Model name: Type (one of the following): 1 Reverse osmosis 2 Nanofiltration 3 Ultrafiltration 4 Microfiltration 5 Electrodialysis Number of stages Molecular weight cutoff (daltons) Design flux (gpd/ft^2) Design pressure (psi)	Surface area (ft^2). Percent recovery (%). Operating pressure (psi). Operating flux (gpd/ft^2). Cleaning method (one of the following) Hydraulic. Chemical. Cleaning frequency (days).
Air Stripping	
Packing height (ft) Design air to water ratio (volume/volume) Type of packing (Name) Nominal size of packing (inch)	Horizontal cross-section area (ft^2). Air flow (SCFM).[3]
Ion Exchange	
Resin (Name) Resin manufacturer Design exchange capacity (equ/ft^3) [3] Bed depth (ft)	Liquid volume (gallons). Surface area (ft^2).

TABLE 6c.—UNIT PROCESS INFORMATION—Continued

Design data	Monthly data
Disinfection Contact Basin [5 6]	
Baffling type [2]	Liquid volume (gallons). Surface area (ft^2).
Clearwell [7]	
Baffling type [2] Minimum liquid volume (gallons) Covered or Open	Liquid volume (gallons). Surface area (ft^2).
Additional Water Sources [9]	
Type of water source: Purchased Finished water Untreated ground water Treated ground water Untreated surface water Treated surface water Other	Flow of additional source (MGD).[6]
Other Treatment	
Purpose	Surface area (ft^2) [optional]. Liquid Volume (gallons) [optional].

[1] A reservoir to which oxidants, disinfectants, or coagulants are added is considered a presedimentation basin.
[2] Baffling type classified as one of the following: 1 (Unbaffled (mixed tank)), 2 (Poor (inlet/outlet only)), 3 (Average (Inlet/Outlet and intermediate)), 4 (Superior (Serpentine)), or 5 (Perfect (Plug flow)). Information on classifying baffling types can be found in ''Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources'', Appendix C.
[3] ''SCFM'' is standard cubic feet per minute. ''Equ/ft^3'' is equivalents per cubic foot.
[4] The mean velocity gradient is typically computed as G=square root of (P/uV) where P=power expended, u=viscosity, and V=liquid volume.
[5] The disinfection contact basin shall have a stable liquid level.
[6] Disinfection Contact Basin can be used to represent a pipe with a long contact time.
[7] A clear well may have a variable liquid level.
[8] The ''Washwater Return'' shall mark the point in the process train where washwater joins the main flow.
[9] Additional water sources includes water that is added to the process train after the influent.
[10] Ozone CT calculated using the procedure contained in ''Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources'', Appendix O, 1991.

TABLE 6d.—ADDITIONAL PROCESS TRAIN INFORMATION

Design data	Monthly data
Disinfectant Addition	
	Disinfectants in use at time of sampling. Dose (mg/l). Chemical formula (e.g., mg/l as chlorine).
Finished Water Sample Point (Plant Effluent) [1 2]	
	Monthly average flow (MGD). Flow at time of sampling (MGD).

[1] This shall mark the end of a treatment plant.
[2] Unless the finished water of this treatment plant is blended with finished water from another treatment plant, this point is also the entry point to the distribution system.

TABLE 6e.—FINISHED WATER DISTRIBUTION INFORMATION

Design data	Monthly data
Entry Point to Distribution System [1]	
	Monthly average flow (MGD). Flow at time of sampling (MGD).

TABLE 6e.—FINISHED WATER DISTRIBUTION INFORMATION—Continued

Design data	Monthly data
Wholesale Information [2]	
Name of purchaser PWSID of purchaser	Flow at time of sampling (MGD).
Distribution System	
Typical maximum residence time (days) Average residence time (days) Design volume of distribution system storage (million gallon) Total surface area of open reservoirs in distribution system storage (ft^2)	Maximum residence time (days). Average residence time (days). Number of disinfection booster stations in operation at time of sampling: Chlorine. Chloramine. Chlorine dioxide. Range of distribution system disinfectant dosages. Chlorine: High (mg/l) Low (mg/l). Chloramine: High (mg/l) Low (mg/l). Chlorine dioxide: High (mg/l) Low (mg/l).

[1] Multiple treatment plants can feed into one entry point to the distribution system. If there is only one treatment plant then ''Finished Water Sample Point (Plant Effluent)'' and ''Entry Point to Distribution System'' are the same.
[2] The supplying public water system shall report ''Wholesale Information'' for each public water system which purchases finished water.

(b) Analytical methods. (1) A PWS shall use the methods identified in Table 7 of this section for conducting analyses required by this subpart.

TABLE 7.—ANALYTICAL METHODS APPROVED FOR SUBPART M

Analyte	Methodology [1]		
	40 CFR reference [2]	EPA method	Standard method [3]
pH, alkalinity, calcium hardness, temperature.	§ 141.23(k)(1)		
Turbidity	§ 141.74(a)(1)		
Disinfectant residuals: free chlorine, total chlorine, chlorine dioxide, ozone.	§ 141.74(a)(2)		4500–Cl B [9]
Trihalomethanes: chloroform, bro	§ 141.24(e)	551.1 [4]	
modichloromethane, dibro			
mochloromethane, bromoform			
Haloacetic acids: mono-, di-, and trichloroacetic acids; mono- and dibromoacetic acid; bromochloroacetic acid.		552.1, [5] 552.2 [4]	6251 B
Chloral hydrate		551.1 [4]	
Haloacetonitriles: di- and trichloroacetonitrile; bromochloroacetonitrile; dibromoacetonitrile.		551.1 [4]	
Haloketones: 1,1-Dichloropropanone; 1,1,1-trichloropropanone.		551.1 [4]	
Chloropicrin		551.1 [4]	
Chlorite		300.0 [6]	
Chlorate		300.0 [6]	
Bromide		300.0 [6]	
Bromate		300.0 [6]	
Total Organic Halide (TOX)			5320 B
Total Organic Carbon			5310 B, 5310 C, 5310 D
UV absorbance at 254 nm			5910
Simulated Distribution System Test (SDS).			5710 C
Total Hardness			2340 B,[7] 2340 C
Ammonia	§ 136.3, Table 1b [8]	350.1 [6]	4500–NH_3 D, 4500–NH_3 G
Chlorine Demand Test			2350 B

[1] Analyses shall be conducted by using mandatory analytical and quality control procedures contained in ''DBP/ICR Analytical Methods Manual'', EPA 814–B–96–002.
[2] Currently approved methodology for drinking water compliance monitoring is listed in Title 40 of the Code of Federal Regulations in the sections referenced in this column. The 18th and 19th editions of *Standard Methods for the Examination of Water and Wastewater,* American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 20005, are equivalent for the methods cited in these sections. Therefore, either edition may be used.

[3] Except where noted, all methods refer to the 19th edition of *Standard Methods for the Examination of Water and Wastewater,* American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 20005.

[4] Analytical method reprinted in ''Reprints of EPA Methods for Chemical Analyses Under the Information Collection Rule'', EPA 814–B–96–006. Originally published in ''Methods for the Determination of Organic Compounds in Drinking Water—Supplement III,'' EPA/600/R–95/131, August 1995, PB95–261616.

[5] Analytical method reprinted in ''Reprints of EPA Methods for Chemical Analyses Under the Information Collection Rule'', EPA 814–B–96–006. Originally published in ''Methods for the Determination of Organic Compounds in Drinking Water—Supplement II,'' EPA/600/R–92/129, August 1992, PB92–207703.

[6] Analytical method reprinted in ''Reprints of EPA Methods for Chemical Analyses Under the Information Collection Rule'', EPA 814–B–96–006. Originally published in ''Methods for the Determination of Inorganic Substances in Environmental Samples,'' EPA/600/R–93/100, August 1993, PB94–121811.

[7] The following methods, cited at § 141.23(k)(1) of this part, can be used to determine calcium and magnesium concentrations for use in conjunction with Standard Method 2340 B: EPA Method 200.7, Standard Method 3111 B, Standard Method 3120 B, or ASTM Method D511–93 B.

[8] PWSs may use only the automated electrode method from § 136.3, Table 1b.

[9] Standard Method 4500–Cl B is approved only for determining free chlorine residual concentrations in hypochlorite stock solutions. This method may not be used for any other disinfectant residual analyses.

(2) Analyses under this section shall be conducted by laboratories that have received approval from EPA to perform sample analysis for compliance with this rule. Laboratories that wish to become approved shall contact EPA in writing at USEPA, Technical Support Division, ICR Laboratory Coordinator, 26 W. Martin Luther King Drive, Cincinnati, OH 45268 not later than November 14, 1996. Requirements for approval are included in ''DBP/ICR Analytical Methods Manual'', EPA 814–B–96–002.

(c) *Reporting.* (1) A PWS shall report required data and information collected under the provisions of paragraph (a) of this section to EPA, using an EPA-specified computer readable format. A PWS shall submit a monthly report that indicates the analytical results of all samples collected, including quarterly samples taken in that same month, and all process train data. These reports shall be submitted on a diskette no later than the fourth month following sampling. In addition to the information in Tables 1 through 6 in paragraph (a) of this section, reports shall include PWSID, ICR plant identification, sample date, analysis date, laboratory identification numbers, analytical methods used, sample identification numbers, quality assurance code, internal standards, surrogate standards, and preserved sample pH, if appropriate.

(2) *Additional Requirements.* A PWS shall submit a DBP and related monitoring sampling plan for EPA approval, using software provided by EPA, for each treatment plant specified in § 141.141(b)(2) of this subpart that indicates sampling point locations and monitoring to be conducted at each point, and process treatment train information. This sampling plan shall be submitted to EPA at the same time and on the same diskette as the microbiological sampling plan required by § 141.143(c)(3) and no later than eight weeks after the PWS receives the Notice of ICR Final Applicability Determination from EPA, using the procedure specified in ''ICR Sampling Manual'', EPA 814–B–96–001, April 1996.

(3) All reports required by this section shall be submitted to USEPA (ICR4600), ICR Data Center, Room 1111 East Tower, 401 M Street SW., Washington, DC 20460.

(4) The PWS shall keep all data for at least three years following data submission to EPA.

(d) *Incorporation by reference.* The documents and methods listed in paragraphs (d) (1) and (2) of this section are incorporated by reference for purposes specified in this section. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be inspected at USEPA, Drinking Water Docket (4101), 401 M Street SW., Washington, DC 20460, or at Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(1) ''Standard Methods for the Examination of Water and Wastewater,'' 19th edition, 1995. Available from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005.

(2) ''Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems using Surface Water Sources'', Appendices C and O, 1991. Available from American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235.

§ 141.143 Microbial monitoring.

(a) Monitoring requirements. (1) *Parameters.* A PWS shall sample for the following parameters for the period specified in § 141.141(d) of this subpart and at the location specified and using the analytical methods specified in paragraphs (a)(2) and (b), respectively, of this section. For each sample, a PWS shall determine the densities of total coliforms, fecal coliforms or *Escherichia coli, Giardia, Cryptosporidium*, and total culturable viruses for each treatment plant required to monitor under the provisions of § 141.141(b) of this subpart.

(2) *Monitoring locations.* (i) A PWS shall collect one sample of the treatment plant influent at the frequency specified in § 141.141(d) of this subpart.

(A) A sample of treatment plant influent shall be taken at a location at the upstream end of a treatment plant where waters from all intakes are blended prior to any treatment or chemical addition.

(B) For treatment plants that have multiple intakes and add chemicals at the intake, the PWS shall take an intake sample of the water resource with the poorest microbiological quality (or, if that cannot be determined, the water resource with the highest flow) collected before chemical addition and before pretreatment. If the intakes are expected to have the same source water quality, one representative intake sample may be taken. If a disinfectant is added at or before the intake (e.g., for zebra mussel control), the sample shall be taken in the vicinity of the intake in such manner that the sample is not contaminated by the disinfectant.

(ii) A PWS that, during any of the first twelve months of monitoring at the treatment plant influent, detects 10 or more *Giardia* cysts, or 10 or more *Cryptosporidium* oocysts, or one or more total culturable viruses, in one liter of water; or calculates a numerical value of the *Giardia* or *Cryptosporidium* concentration equal to or greater than 1000 per 100 liters or virus concentration equal to or greater than 100 per 100 liters; or detects no pathogens in the sample and calculates a numerical value of the detection limit for *Giardia* or *Cryptosporidium* concentration equal to or greater than 1000 per 100 liters or virus concentration equal to or greater than 100 per 100 liters; shall also collect one sample of finished water per month at each such treatment plant, beginning in the first calendar month after the PWS learns of such a result. The sample of finished water shall be collected at a point after which all treatment

processes for a particular treatment plant are complete (including the clearwell and final point of disinfection) and before the distribution system begins. For each sample of finished water, PWSs shall determine the density of total coliforms, fecal coliforms or *E. coli*, *Giardia*, *Cryptosporidium*, and total culturable viruses. A PWS shall continue finished water monitoring monthly until 18 months of treatment plant influent monitoring has been completed.

(iii) In lieu of conducting finished water monitoring of *Giardia* and *Cryptosporidium* specified in paragraph (a)(2)(ii) of this section, a PWS may notify EPA in its response to the notice of applicability required by paragraph (c)(3)(i) of this section that the PWS will comply with the alternative monitoring requirements in paragraphs (a)(2)(iii) (A) and (B) of this section. The PWS shall still conduct finished water monitoring for all other microorganisms, except for *Giardia* and *Cryptosporidium* monitoring in the finished water.

(A) The PWS measures the particle counts in the treatment plant influent, at points immediately prior to filtration and after filtration (but before the addition of post-filtration chemicals). Particle counting shall be conducted on the same treatment train as is sampled for monitoring conducted under the provisions of § 141.142(a) of this subpart. Such samples shall be collected monthly during the entire 18-month monitoring period, using the procedures contained in the ''ICR Sampling Manual'', EPA 814–B–96–001, April 1996. The PWS may use either grab or continuous particle counting. Particle counting shall be conducted during the same time as protozoa monitoring required by paragraph (a)(2)(iii)(B) of this section.

(*1*) If grab sampling is conducted, the PWS shall collect 12 samples per location at the treatment plant influent, filter influent, and filter effluent, over either a 24-hour period or the duration of the filter run, whichever is shorter.

(*2*) If continuous particle counting is conducted, the PWS shall collect 12 instrument readings per location, evenly spaced in time, at the treatment plant influent, filter influent, and filter effluent, over either a 24-hour period or the duration of the filter run, whichever is shorter.

(*3*) For each sample, the PWS shall measure particle counts per milliliter in the size ranges of 3μm-5μm, 5μm-7μm, 7μm-10μm, 10μm–15μm, and >15μm, and shall report to EPA the mean value in each size range of the 12 values collected over the sampling period.

(B) The PWS collects and analyzes at least four consecutive months of *Giardia* and *Cryptosporidium* samples at the same locations specified in paragraph (a)(2)(iii)(A) of this section, within the first 12 months of the 18 months of sampling. The PWS shall collect *Giardia* and *Cryptosporidium* samples during the same time period as it is conducting particle counting. The minimum sample volume for *Giardia* and *Cryptosporidium* analyses shall be 100 liters for treatment plant influent and 1,000 liters for water that has undergone any treatment. The PWS may use results of monitoring for *Giardia* and *Cryptosporidium* in the treatment plant influent specified in paragraph (a)(2) of this section to meet the requirements of this paragraph as long as such monitoring meets the requirements of both this paragraph and paragraph (a)(2) of this section.

(iv) If a PWS has monitored total coliforms, fecal coliforms, or *E. coli* in the treatment plant influent for at least five days/week for any period of six consecutive months beginning after January 1, 1994 and 90% of all samples taken in that six-month period contained no greater than 100 total coliforms/100 ml, or 20 fecal coliforms/100 ml, or 20 *E. coli*/100 ml, the PWS may request to not conduct virus monitoring for that treatment plant, for the duration of the requirement. Even if approved, the PWS may subsequently be required to monitor under the criteria in paragraph (a)(2)(iv)(A) of this section. This request shall be submitted as part of the response to the notice of applicability required by paragraph (c)(3)(i) of this section.

(A) If the PWS is subsequently required to monitor the finished water under the provisions of paragraph (a)(2)(ii) of this section, the PWS shall monitor, along with the other specified organisms, total culturable viruses, as specified in paragraph (a)(2)(i) of this section for treatment plant influent and as specified in paragraph (a)(2)(ii) of this section for finished water, until 18 months of microbial monitoring is completed.

(B) A PWS may use coliform data collected under § 141.71(a)(1) of this part for this purpose but, if this is done, the PWS shall submit two separate monitoring reports. One report, to meet the requirements of § 141.71(a)(1) of this part, shall continue to be submitted as required by subpart H of this part. The other report shall be submitted to meet the requirements of paragraph (c)(3) of this section.

(C) If a PWS does not provide EPA with six months of suitable coliform results as part of its response to the notice of applicability, the PWS shall begin virus monitoring. If a PWS begins virus monitoring and subsequently provides EPA with six months of coliform results that are at or below the indicated density limit, and EPA approves the request to not conduct virus monitoring, the PWS may avoid subsequent treatment plant virus monitoring.

(b) Analytical Methods. (1) A PWS shall use the methods listed in paragraphs (b)(1)(i) through (v) of this section for monitoring under this subpart.

(i) Fecal coliforms—specified at § 141.74(a)(1) of this part, except that whenever paired source water samples and finished water samples are to be collected, only the fecal coliform procedure (Standard Method 9221E), as specified in § 141.74(a)(1) of this part, using EC Medium, can be used. The time between sample collection and initiation of sample analysis shall not exceed eight hours. Samples shall be chilled, but not frozen, and shipped at a temperature of less than 10°C. Samples not processed immediately at the laboratory shall be refrigerated. The laboratory must invalidate samples that arrive frozen or at a temperature greater than 10°C.

(ii) Total coliforms—specified at § 141.74(a)(2) of this part. The time between sample collection and initiation of sample analysis shall not exceed eight hours. Samples shall be chilled, but not frozen, and shipped at a temperature of less than 10°C. Samples not processed immediately at the laboratory shall be refrigerated. The laboratory must invalidate samples that arrive frozen or at a temperature greater than 10°C.

(iii) *E. coli*—as specified by § 141.21(f)(6)(i) through (iii) of this part, except that the density shall be reported. PWSs using the EC+MUG and ONPG-MUG tests shall use either a 5-tube or 10-tube 10-ml configuration, with serial dilutions of the original sample as needed, and report the Most Probable Number. PWSs may also use a commercial multi-test system for *E. coli* enumeration, as long as they use M-Endo medium for the initial isolation of the organisms, pick every colony on the plate with the appearance of a total coliform, and streak it for purification before subjecting the colony to a multi-test system. The time between sample collection and initiation of sample analysis, regardless of method used, shall not exceed eight hours. Samples shall be chilled, but not frozen, and shipped at a temperature of less than 10°C. Samples not processed immediately at the laboratory shall be

refrigerated. The laboratory must invalidate samples that arrive frozen or at a temperature greater than 10°C.

(iv) *Giardia* and *Cryptosporidium*—ICR Protozoan Method, as described in ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178, April 1996.

(v) Total culturable viruses—Virus Monitoring Protocol, as described in ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178, April 1996.

(2) *Laboratories.* A PWS shall use EPA-approved laboratories to analyze for *Giardia, Cryptosporidium,* and total culturable viruses. A PWS shall use laboratories certified for microbiology analyses by either EPA or a State under the EPA or State drinking water program for the analysis of total coliforms, fecal coliforms, and *E. coli.* Laboratories that wish to become approved shall contact EPA in writing at USEPA, Technical Support Division, ICR Laboratory Coordinator, 26 W. Martin Luther King Drive, Cincinnati, OH 45268 not later than August 14, 1996. Laboratory approval criteria for *Giardia, Cryptosporidium,* and total culturable viruses are found in the ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178, April 1996.

(3) A PWS shall send EPA a virus archive sample prepared as described in Chapter VIII of ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178, April 1996, for each water sample identified in paragraph (b)(3)(i) or (ii) of this section.

(i) Samples of treatment plant influent and finished water, for every month after the PWS learns that viruses were detected in any previous sample of finished water.

(ii) Samples of treatment plant influent and finished water, regardless of whether viruses are detected in the finished water, for every month after the PWS learns that a density of at least 10 viruses/L was detected in any previous treatment plant influent water sample.

(iii) A PWS may arrange to have virus samples shipped directly to EPA by its virus laboratory for archiving.

(iv) Samples shall be sent on dry ice to ICR Virus Archiving Coordinator following the procedures specified in ''ICR Microbial Laboratory Manual'', EPA 600/R–95/178, April 1996.

(c) *Reporting.* (1) A PWS shall report data and information required under paragraphs (a) and (b) of this section using an EPA-specified computer readable format. A PWS shall submit a monthly report on a diskette, no later than the fourth month following sampling, that indicates the analytical results of all samples collected. Reports shall include PWSID, ICR plant identification, sample date, analysis date, laboratory identification numbers, analytical methods used, sample identification numbers, analytical batch numbers, quality assurance code, and processing batch numbers, if appropriate.

(2)(i) For a PWS using the alternative to *Giardia* and *Cryptosporidium* monitoring in paragraph (a)(2)(iii) of this section, the PWS shall report to EPA the mean value in each size range of the 12 particle counting values collected over the sampling period. In addition, during the four consecutive months when the PWS collects *Giardia* and *Cryptosporidium* samples specified in paragraph (a)(2)(iii)(B) of this section, the PWS shall report to EPA, for each measured site, the densities of *Giardia* and *Cryptosporidium* at each measured site. This information shall be submitted at the same time as the report required by paragraph (c)(1) of this section.

(ii) A PWS that is not required to monitor for total culturable viruses under the provisions of paragraph (a)(2)(iv) of this section shall report to EPA the dates and results of all total coliform, fecal coliform, or *E. coli* monitoring used by the PWS to determine that additional virus monitoring is unnecessary. The report shall indicate all data collected during the six-month time period, and how the data were used to calculate compliance with this requirement.

(3) *Additional Requirements.* A PWS shall submit a microbiological sampling plan for EPA approval, using software provided by EPA, for each treatment plant specified in § 141.141(b) of this subpart that indicates sampling point locations and monitoring to be conducted at each point. This sampling plan shall be submitted to EPA at the same time and on the same diskette as the DBP and related monitoring sampling plan required by § 141.142(c)(2) and no later than eight weeks after the PWS receives the Notice of ICR Final Applicability Determination from EPA, using the procedure specified in ''ICR Sampling Manual'', EPA 814–B–96–001, April 1996.

(4) All reports required by this section shall be submitted to USEPA (ICR4600), ICR Data Center, Room 1111 East Tower, 401 M Street SW., Washington, DC 20460.

(5) The PWS shall keep all data for at least three years following data submission to EPA.

§ 141.144 Disinfection byproduct precursor removal studies.

(a) *TOC, UFCTOX, THM4, and HAA5 applicability monitoring.* A PWS required to comply with this section shall conduct TOC, UFCTOX, THM4, and HAA5 monitoring specified in § 141.141(e)(2) of this subpart. A PWS may use monitoring results from samples required by § 141.142(a) of this subpart to meet this requirement to the extent that all requirements in each section are met.

(b) *Treatment study requirements.* A PWS identified in § 141.141(b) of this subpart shall conduct disinfection byproduct precursor removal studies (treatment studies). The treatment study shall use bench-and/or pilot-scale systems for at least one of the two appropriate candidate technologies (GAC or membrane processes) for the reduction of organic DBP precursors. The treatment studies shall be designed to yield representative performance data and allow the development of national treatment cost estimates for different levels of organic disinfection byproduct control. The treatment objective of the studies is the achievement of levels of byproducts less than 40 μg/L TTHM and 30 μg/L HAA5, as an annual average. The treatment study shall be conducted with the effluent from treatment processes already in place that remove disinfection byproduct precursors and TOC, to simulate the most likely treatment scenario. PWSs are permitted to optimize these processes or pilot additional processes appropriate for pretreatment for treatment studies. In order to minimize the formation of DBPs, the test water for both the bench- and pilot-scale tests shall be obtained from a location before the first point at which oxidants or disinfectants that form halogenated disinfection byproducts are added. If the use of these oxidants or disinfectants precedes any full-scale treatment process that removes disinfection byproduct precursors, then bench- and pilot-scale treatment processes that represent these full-scale treatment processes are required prior to the GAC or membrane process. A PWS should exercise sound judgement in its selection of treatment process to study and the point at which to obtain water for study. Depending upon the type of treatment study, the study shall be conducted in accordance with the following criteria.

(1) Bench-scale tests are continuous flow tests using rapid small scale column test (RSSCT) for GAC and small scale membrane test apparatus as specified in ''ICR Manual for Bench- and Pilot-scale Treatment Studies'' (EPA 814–B–96–003, April 1996).

(i) GAC bench-scale testing shall include information on the experimental conditions and results necessary to adequately determine the scaled-up breakthrough curves under

the conditions of each RSSCT. At least two empty bed contact times (EBCTs) shall be tested using the RSSCT. These RSSCT EBCTs shall be designed to represent a full-scale EBCT of 10 min and a full-scale EBCT of 20 min. Additional EBCTs may be tested. The RSSCT testing is described in the ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996). The RSSCT tests at each EBCT shall be run quarterly to ascertain the impact of seasonal variation. Thus a total of four RSSCTs at each EBCT should be run. When seasonal variation is not significant, as is the case in most ground waters, the quarterly tests should be run to investigate other variables, as described in the ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996). The RSSCT shall be run until the effluent TOC concentration is at least 70% of the average influent TOC concentration or the effluent TOC reaches a plateau at greater than 50% of the influent TOC (i.e., the effluent TOC does not increase over a two-month full-scale-equivalent time period by more than 10% of the average influent TOC concentration) or a RSSCT operation time that represents the equivalent of one year of full-scale operation, whichever is shorter. The average influent TOC is defined as the running average of the influent TOC at the time of effluent sampling. If, after completion of the first quarter RSSCTs, the PWS finds that the effluent TOC reaches 70% of the average influent TOC within 20 full-scale equivalent days on the EBCT=10 min test and within 30 full-scale equivalent days on the EBCT=20 min test, the last three quarterly tests shall be conducted using membrane bench-scale testing with only one membrane, as described in paragraph (b)(1)(ii) of this section.

(ii) Membrane bench-scale testing shall include information on the experimental conditions and results necessary to determine the water quality produced by the membrane treatment and a preliminary estimate of productivity. The testing procedures and monitoring and reporting requirements are described in the ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996). A minimum of two different membrane types with nominal molecular weight cutoffs of less than 1000 shall be investigated. Membrane tests shall be conducted quarterly over one year to determine the seasonal variation. Thus, a total of four bench-scale tests with each membrane shall be run. If seasonal variation is not significant, as is the case of most ground waters, the quarterly tests should be run to evaluate the impact of other variables, such as pretreatment, or additional membranes could be tested. Alternatively, a PWS may choose to conduct a long-term, single element study using a single membrane type in lieu of evaluating two membranes in four quarterly short-term tests, using the protocol in the ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996).

(2) A PWS shall conduct pilot-scale testing as continuous flow tests. For GAC, the PWS shall use GAC of particle size representative of that used in full-scale practice, a pilot GAC column with a minimum inner diameter of 2.0 inches, and hydraulic loading rate (volumetric flow rate/column cross-sectional area) representative of that used in full-scale practice. The PWS shall design a pilot-scale membrane system as a staged array of elements as described in ''ICR Manual for Bench- and Pilot-scale Treatment Studies'', EPA 814–B–96–003, April 1996.

(i) GAC pilot-scale testing. (A) The pilot testing procedures and monitoring and reporting requirements are prescribed in the ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996).

(B) At least two EBCTs shall be tested, EBCT=10 min and EBCT=20 min, using the pilot-scale plant. Additional EBCTs may be tested.

(C) The pilot tests at each EBCT shall continue until the effluent TOC concentration is at least 70% of the average influent TOC concentration on two consecutive TOC sample dates that are at least two weeks apart or the effluent TOC reaches a plateau at greater than 50% of the influent TOC (i.e., the effluent TOC does not increase over a two-month period by more than 10% of the average influent TOC concentration). If either of these criteria is met for the 20-minute EBCT prior to six months run time, a second pilot test at each EBCT shall be conducted following the same sampling requirements. In all cases the maximum length of the pilot study (one or two tests) is one year. The average influent TOC is defined as the running average of the influent TOC at the time of sampling. The pilot-scale testing shall be timed to capture seasonal variation. If seasonal variation is not significant, as is the case with most ground waters, the pilot-scale test runs shall be designed to evaluate the impact of other variables, such as pretreatment.

(ii) Membrane pilot-scale testing.

(A) The membrane pilot testing procedures and monitoring and reporting requirements are prescribed in the ''ICR Bench- and Pilot-scale Treatment Study Manual'' (EPA 814–B–96–003, April 1996).

(B) The membrane test system shall be designed to yield information on loss of productivity (fouling), pretreatment requirements, cleaning requirements, and permeate quality and operated at a recovery representative of full-scale operation.

(C) The pilot-scale testing shall be run for one year.

(3) Chlorination under simulated distribution system (SDS) conditions shall be used prior to the measurement of THM4, HAA6, TOX, and chlorine demand. These conditions are described in ''ICR Manual for Bench- and Pilot-scale Treatment Studies'' (EPA 814–B–96–003, April 1996) and represent the average conditions in the distribution system at that time with regard to holding time, temperature, pH, and chlorine residual. If chlorine is not used as the final disinfectant in practice, then a chlorine dose shall be set to yield a free chlorine residual of 1.0 to 0.5 mg/l after a holding time, temperature, and pH equal to those representative of the distribution system averages.

(c) *Analytical Methods.* All analyses required by paragraphs (a) and (b) of this section shall be conducted using the methods and the mandatory analytical and quality control procedures contained in either ''DBP/ICR Analytical Methods Manual'' (EPA 814–B–96–002, April 1996) or ''ICR Manual for Bench- and Pilot-scale Treatment Studies'' (EPA 814–B–96–003, April 1996). In addition, TOC analyses required by paragraph (a) of this section shall be conducted by a laboratory approved under the provisions of § 141.142(b)(2) of this subpart.

(d) *Reporting.* (1) TOC and UFCTOX reporting. A PWS shall submit the monthly results of 12 months of TOC or UFCTOX monitoring required by paragraph (a)(1) of this section and the annual average of those monthly results not later than October 14, 1997. This report is not required to be submitted electronically. Although a PWS may use monitoring results from samples required by § 141.142(a) of this subpart to meet this requirement, it shall submit separate reports to meet this reporting requirement and the reporting requirement in § 141.142(c)(1) of this subpart.

(2) A PWS shall report all data collected under the provisions of paragraph (b) of this section. In addition, a PWS shall report the information for water resource and full-scale and pilot- or bench-scale

pretreatment processes that precede the bench/pilot systems. These data and information shall be reported in the format specified in ''ICR Manual for Bench- and Pilot-scale Treatment Studies'' (EPA 814–B–96–003, April 1996) not later than July 14, 1999.

(3) All reports required by this section shall be submitted to USEPA, Technical Support Division, ICR Precursor Removal Studies Coordinator, 26 West Martin Luther King Drive, Cincinnati, OH 45268.

[FR Doc. 96–11370 Filed 5–13–96; 8:45 am]

BILLING CODE 6560–50–P