IDEXX
Literature Cover Sheet

IDEXX #: 5G

Title: Federal Register - National Primary Drinking Water Regulations; Total Coliforms (including Fecal Coliforms and *E.coli*); Final Rule

Date: June 29, 1989

Source: EPA

Topic: Colilert Approved for Total Coliforms

Highlights:

- EPA approves the use of Colilert (referred to as MMO-MUG) as an analytical method for monitoring the presence or absence of total coliforms in a 100-ml water sample.
- Colilert is less vulnerable to interference by high levels of heterotrophic bacteria. When other Standard Methods are used and a laboratory observes evidence of interference with total coliform analysis caused by high levels of heterotrophs, the laboratory should consider using Colilert.

* See page 27556 & 27557.

Federal Register

Thursday,
June 29, 1989

Part III

Environmental Protection Agency

40 CFR Parts 141 and 142
Drinking Water; National Primary Drinking Water Regulations; Total Coliforms (Including Fecal Coliforms and E. Coli); Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 141 and 142

[WH-FRL-3540]

Drinking Water; National Primary Drinking Water Regulations; Total Coliforms (Including Fecal Coliforms and E. Coli)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: This rule, promulgated under the Safe Drinking Water Act (42 U.S.C. 300f *et seq.*), amends the current national primary drinking water regulation (NPDWR), including the maximum contaminant level, monitoring requirements, and analytical requirements, for total coliform bacteria ("total coliforms"), including fecal coliforms and *Escherichia coli* (*E. coli*). This rule applies to all public water systems. In this notice, EPA is also publishing a maximum contaminant level goal of zero for total coliforms, including fecal coliforms and *E. coli*.

EFFECTIVE DATE: This rule is effective December 31, 1990. The incorporation by reference of certain publications listed in the rule was approved by the Director of the Federal Register as of December 31, 1990.

ADDRESSES: Public comments on the proposal, the comment/response document, applicable Federal Register notice, other major supporting documents, and a copy of the index to the public docket for this rulemaking are available for review at EPA's Drinking Water Docket: 401 M Street, SW.; Washington, DC 20460. For access to docket materials call (202) 382-3027 between 9 a.m. and 3:30 p.m. In addition, criteria documents for total coliforms and heterotrophic bacteria are available from the National Technical Information Center, 5285 Port Royal Road, Springfield, VA 22161. The toll-free number is (800) 336-4700; the local number is (703) 487-4650. Major supporting documents cited in the reference section of this notice are available for inspection at the Drinking Water Supply Branches in EPA's Regional Offices, listed below.

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FOR FURTHER INFORMATION CONTACT: Paul S. Berger, Ph.D., Microbiologist, Office of Drinking Water (WH-550D), Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, telephone (202) 382-3039. Information also may be obtained from the EPA Safe Drinking Water Hotline. Callers within the United States (except Washington, DC and Alaska), Puerto Rico, and the Virgin Islands may reach the Safe Drinking Water Hotline at (800) 426-4791; callers in the Washington, DC area and Alaska may reach the Hotline at (202) 382-5533. The Safe Drinking Water Hotline is open Monday through Friday, excluding Federal holidays, from 8:30 a.m. to 4:00 p.m. Eastern Time.

SUPPLEMENTARY INFORMATION:

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Abbreviations Used in This Notice

BAT: Best Available Technology
CWS: Community Water System
EIA: Economic Impact Analysis
HPC: Heterotrophic Plate Count
MCL: Maximum Contaminant Level
MCLG: Maximum Contaminant Level Goal
MF: Membrane Filter
MMO-MUG Test: Minimal Medium ONPG-MUG Test (previously referred to as the Colilert System)
MTF: Multiple Tube Fermentation
NCWS: Non-community Water System
NIPDWR: National Interim Primary Drinking Water Regulation
NPDWR: National Primary Drinking Water Regulation
PWS: Pulic Water System
RMCL: Recommended Maximum Contaminant Level
SDWA or "The Act": Safe Drinking Water Act, as amended in 1986

I. Statutory Authority

The Safe Drinking Water Act ("SDWA" or "the Act"), as amended in

1986 (Pub. L. No. 99-339, 100 Stat. 642), requires EPA to publish "maximum contaminant level goals" (MCLGs) for contaminants which, in the judgment of the Administrator, "may have any adverse effect on the health of persons and which are known or anticipated to occur in public water systems." Section 1412(b)(3)(A). MCLGs are to be set at a level at which "no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety." Section 1412(b)(4).

At the same time EPA publishes an MCLG, which is a non-enforceable health goal, it also must promulgate a national primary drinking water regulation (NPDWR) which includes either (1) a maximum contaminant level (MCL), or (2) a required treatment technique. Section 1401(1), 1412(a)(3), and 1412(b)(7)(A). A treatment technique may be set only if it is not "economically or technologically feasible" to ascertain the level of a contaminant. Sections 1401 (1) and 1412(b)(7)(A). An MCL must be set as close to the MCLG as feasible. Section 1412(b)(4). Under the Act, "feasible" means "feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration)." Section 1412(b)(5). The legislative history of SDWA indicates that EPA is to base MCLs on treatment technology affordable by large public water systems with relatively clean source water supplies. 132 *Cong. Rec.* S6287 (daily ed., May 21, 1986). Each NPDWR which establishes an MCL must list the best available technology, treatment techniques, and other means which are feasible for meeting the MCL (BAT). Section 1412(b)(6). NPDWRs including monitoring and analytical requirements, specifically, "criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels . . ." Section 1401(1)(D). Section 1445 also authorizes EPA to promulgate monitoring requirements.

Section 1414(c) requires each owner or operator of a public water system to give notice to persons served by it of (1) any failure to comply with a maximum contaminant level, treatment technique, or testing procedure required by a NPDWR; (2) any failure to comply with any monitoring required pursuant to section 1445 of the Act; (3) the existence of a variance of exemption; or (4) any failure to comply with the requirements of any schedule prescribed pursuant to a variance of exemption.

Under the 1986 amendments to the SDWA, EPA was to promulgate NPDWRs for 83 contaminants, in three phases, by June 19, 1989. A group of related bacteria known as total coliforms is one of the 83 contaminants which EPA must regulate. Total coliforms include fecal coliforms and *E. coli*.

II. Summary of Final Rule

EFFECTIVE DATE: December 31, 1990. Current rule remains in force until December 31, 1990.

Maximum Contaminant Level Goal: Zero.

Maximum Contaminant Level

- Compliance is based on presence/absence of total coliforms in sample, rather than on an estimate of coliform density.
- MCL for systems analyzing at least 40 samples/month: no more than 5.0 percent of the monthly samples may be total coliform-positive.
- MCL for systems analyzing fewer than 40 samples/month: no more than 1 sample/month may be total coliform-positive.
- A public water system must demonstrate compliance with the MCL for total coliforms each month it is required to monitor.
- MCL violations must be reported to the State no later than the end of the next business day after the system learns of the violation.

Monitoring Requirements for Total Coliforms

- Each public water system must sample according to a written sample siting plan. Plans are subject to State review and revision. The State must establish a process which ensures the adequacy of the sample siting plan for each system.
- Monthly monitoring requirements are based on population served (see Table 1).
- A system must collect a set of repeat samples for each total coliform-positive routine sample (see Table 2) and have it analyzed for total coliforms. At least one repeat sample must be from the same tap as the original sample; other repeat samples must be collected from within five service connections of the original sample. At least one must be upstream and another downstream. The system must collect all repeat samples within 24 hours of being notified of the original result, except where the State waives this requirement on a case-by-case basis. If a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the State may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.
- If total coliforms are detected in any repeat sample, the system must collect another set of repeat samples, as before, unless the MCL has been violated and the system has notified the State (in which case the State may reduce or eliminate the requirement to take the remaining repeat samples).
- If a system has only one service connection, the State has the discretion to allow the system to either collect the required set of repeat samples at the same tap over a four-day period or to collect a larger volume repeat samples(s) (e.g., a single 400-ml sample).
- If a system which collects fewer than five routine samples/month detects total coliforms in any routine or repeat sample (and the sample is not invalidated by the State), it must collect a set of five routine samples the next month the system provides water to the public, except that the State may waive this requirement if (1) it performs a site visit to evaluate the contamination problem, or (2) it has determined why the sample was total coliform-positive and (a) this finding is documented in writing, along with what action the system has taken or will take to correct this problem before the end of the next month the system serves water to the public, (b) this document is signed by the supervisor of the State official who makes the finding, (c) the documentation is made available to EPA and the public, and (d) in certain cases (described in the rule), the system collects at least one additional sample.
- Unfiltered surface water systems and systems using unfiltered ground water under the direct influence of surface water must analyze one coliform sample each day the turbidity of the source water exceeds one NTU. (This sample counts toward the system's minimum monitoring requirements.)
- Tables 1 and 2 summarize the routine and repeat sample monitoring requirements for total coliforms.

TABLE 1.—TOTAL COLIFORM SAMPLING REQUIREMENTS, ACCORDING TO POPULATION SERVED

Population served	Minimum number of routine samples per month[1]
25 to 1,000[2]	*1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4

TABLE 1.—TOTAL COLIFORM SAMPLING REQUIREMENTS, ACCORDING TO POPULATION SERVED—Continued

Population served	Minimum number of routine samples per month[1]
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

[1] In lieu of the frequency specified in this table, a non-community water system using only ground water (except ground water under the direct influence of surface water) and serving 1,000 persons or fewer may monitor at a lesser frequency specified by the State (in writing) until a sanitary survey is conducted and the State reviews the results. Thereafter, such systems must monitor in each calendar quarter during which the system provides water to the public, unless the State determines (in writing) that some other frequency is more appropriate. Beginning June 29, 1994 such systems must monitor at least once/year.

A non-community water system using surface water, or ground water under the direct influence of surface water, regardless of the number of persons served, must monitor at the same frequency as a like-sized community water system, i.e., the frequency specified in the table. A non-community water system using ground water (which is not under the direct influence of surface water) and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized community water system, i.e., the frequency specified in the table, except that the State may reduce the monitoring frequency (in writing) for any month the system serves 1,000 persons or fewer. However, in no case may the State reduce the sampling frequency to less than once/year.

[2] Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

[3] For a community water system serving 25–1,000 persons, the State may reduce this sampling frequency (in writing), if it has no history of coliform contamination in its current configuration and a sanitary survey conducted in the past five years indicates that the system is supplied solely by a protected groundwater source and is free of sanitary defects. However, in no case may the State reduce the sampling frequency to less than once/quarter.

TABLE 2.—MONITORING REQUIREMENTS FOLLOWING A TOTAL COLIFORM-POSITIVE ROUTINE SAMPLE

No. routine samples/month	No. repeat samples[1]	No. routine samples next month[2]
1/mo or fewer	4	5/mo.
2/mo	3	5/mo.
3/mo	3	5/mo.
4/mo	3	5/mo.
5/mo or more	3	Table 1[3].

[1] Number of repeat samples in the same month for each total coliform-positive routine sample.

[2] Except where State has invalidated the original routine sample, or where State substitutes an on-site evaluation of the problem, or where the State waives the requirement on a case-by-case basis. See 40 CFR 141.21a(b)(5) for more detail.

[3] Systems need not take any additional samples beyond those it is required to take according to Table 1.

Invalidation of Total Coliform-Positive Samples

• Each total coliform-positive sample counts in compliance calculations, unless it has been invalidated by the State. Invalidated samples do not count toward the minimum monitoring frequency.

• A State may invalidate a sample only if: (1) The analytical laboratory acknowledges that improper sample analysis caused the positive result; (2) the system determines that the contamination is a domestic or other non-distribution system plumbing problem on the basis that one or more repeat samples taken at the same tap as the original total coliform-positive sample is total coliform-positive, but all repeat samples at nearby sampling locations are total coliform-negative; or (3) the State has substantial grounds to believe that a total coliform-positive result is due to some circumstance or condition which does not reflect water quality in the distribution system, if (a) the basis for this determination is documented in writing, (b) this document is signed and approved by the supervisor of the State official who makes this determination, and (c) the documentation is made available to EPA and the public.

Variances and Exemptions: None allowed.

Sanitary Surveys:

• Periodic sanitary surveys are required for all systems collecting fewer than 5 samples/month, according to the schedule in Table 3:

TABLE 3.—SANITARY SURVEY FREQUENCY FOR PUBLIC WATER SYSTEMS COLLECTING FEWER THAN FIVE SAMPLES/MONTH [1]

System type	Initial survey completed by	Frequency of subsequent surveys
Community water system.	June 29, 1994	Every 5 years.
Non-community water system.	June 29, 1999	Every 5 years. [2]

[1] Annual on-site inspection of the system's watershed control program and reliability of disinfection practice is also required by 40 CFR 141.71(b) for systems using unfiltered surface water or ground water under the direct influence of surface water. The annual on-site inspection, however, is not equivalent to the sanitary survey. Thus, compliance with 40 CFR 141.71(b) alone does not constitute compliance with the sanitary survey requirements of the coliform rule (141.21a(d), but a sanitary survey during a year can substitute for the annual on-site inspection for that year.

[2] For a non-community water system which uses only protected and disinfected ground water, the sanitary survey may be repeated every ten years, instead of every five years.

Fecal Coliforms/E. coli; Heterotrophic Bacteria (HPC)

• If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture to determine if fecal coliforms are present, except that the system may test for *E. coli* in lieu of fecal coliforms. If fecal coliforms or *E. coli* are detected, the system must notify the State before the end of the same business day, or, if detected after the State office is closed, by the end of the next business day.

• If any repeat sample is fecal coliform-or *E. coli*-Positive, or if a fecal coliform-or *E. coli*-positive original sample is followed by a total coliform-positive repeat sample, and the original total coliform-positive sample or the repeat sample is not invalidated, the system is in violation of the MCL for total coliforms. This is an acute violation of the MCL for total coliforms.

• The State has the discretion to allow a water system, on a case-by-case basis, to forgo fecal coliform or *E. coli* testing on total coliform-positive samples if the system treats every total coliform-positive sample as if it contained fecal coliforms, i.e., the system complies with all requirements which apply when a sample is fecal coliform-positive.

• State invalidation of a total coliform-positive sample invalidates subsequent fecal coliform or *E. coli*-positive results on the same sample.

• Heterotrophic bacteria can interfere with total coliform analysis. Therefore, if the total coliform sample produces: (1) A turbid culture in the absence of gas production using the Multiple Tube Fermentation (MTF) Technique; (2) a turbid culture in the absence of an acid reaction using the Presence-Absence (P–A) Coliform Test; or (3) confluent growth or a colony number that is "too numerous to count" using the Membrance Filter (MF) Technique, the sample is invalid (unless total coliforms are detected, in which case, the sample is valid) and the system must, within 24 hours of being notified of the result, collect another sample from the same location as the original sample and have it analyzed for total coliforms. In such cases, EPA recommends using media less prone to interference from heterotrophic bacteria for analyzing the replacement sample. The Sate may waive the 24-hour time limit on a case-by-case basis.

Analytical Methodology

• Total coliform analyses are to be conducted using the 10-tube MTF Technique, the MF Technique, the Presence-Absence (P–A) Coliform Test, or the Minimal Media ONPG–MUG (MMO–MUG) Test (Autoanalysis Colilert System). A system may also use the 5-tube MTF Technique (using 20-ml sample portions) of a single culture bottle containing the MTF medium, as long as a 100-ml water sample is used in the analysis.

• A 100-ml standard sample volume must be used in analyzing for total coliforms, regardless of the analytical method used.

• Fecal coliform analysis must be conducted using the method set out in the rule.

• EPA will promulgate analytical methods of *E. coli* before the effective date of this rule.

III. Background

A. Regulatory Background

As required by the SDWA of 1974, on December 24, 1975, EPA published National Interim Primary Drinking Water Regulations (NIPDWRs). The NIPDWRs (renamed "national primary drinking water regulations"(NPDWRs) by the 1986 amendments to the Act) include requirements for total coliforms. See 40 CFR 141.14 and 141.21. EPA based these requirements, including the MCL and the monitoring frequency, on the U.S. Public Health Service drinking water regulations of 1962. The NPDWR for coliforms, which is still in effect, applies to both community water systems (systems which serve year-round residents) and non-community water systems (all other systems). Currently there are approximately 60,000 community water systems and 143,000 non-community water systems.

Despite existing drinking water regulations, waterborne disease outbreaks continue to occur. For example, between 1971 and 1983 there were 427 reported outbreaks with over 100,000 cases of waterborne disease. However, EPA believes the vast majority of waterborne disease outbreaks and cases are not reported. Few States have an active outbreak surveillance program, and disease outbreaks are often not recognized in a community or, if recognized, are not traced to the drinking water source. One EPA-funded study in Colorado found that only about one-quarter of the waterborne disease outbreaks were being recognized and reported (Hopkins et al., 1985).

The under-reporting may be even more serious, according to the results of several other studies. For instance, Hauchild and Bryan (1980) report that the ratio of all outbreaks to reported outbreaks for waterborne and foodborne disease may be 25:1. Another study (Archer and Kvenberg, 1985) suggests under-reporting of an order of magnitude even greater than Hauchild and Bryan.

EPA believes that a major factor in the failure to recognize waterborne disease outbreaks is that the vast majority of people experiencing gastroenteritis, some of which may be waterborne in origin, do not seek medical attention, and physicians generally cannot attribute gastroenteritis to any specific source. The Agency also understands that, in some States, a lack of communication between agencies responsible for public health and water supply creates an obstacle to reliable waterborne disease outbreak recognition and reporting.

Based on this information, EPA believes that the number of cases of waterborne disease is much higher (as many as ten to several hundred-fold higher) than is actually recognized and recorded. The Agency believes that the number of actual outbreaks and cases of disease is unacceptably higher and therefore additional measures are needed for further control. Some of these measures are incorporated into the revised coliform rule described in this notice. Other measures are incorporated into the surface water treatment requirements, also promulgated in today's Federal Register. EPA believes that this revised total coliform rule, including the revised MCL and requirements for monitoring, sanitary surveys for systems collecting fewer than five samples/month, State review of sample siting plans, and fecal coliform or *E. coli* testing, together with the surface water treatment requirements, and forthcoming groundwater disinfection requirements (also required by the 1986 SDWA amendments) will decrease the risk of waterborne illness, compared to the current rule.

On November 3, 1987, EPA proposed to amend the national primary drinking water regulation for total coliforms (52 FR 42224). On May 6, 1988, EPA solicited specific data, offered additional regulatory options for comment, and clarified and corrected statements made in the November 3, 1987, proposal (53 FR 16348). The public comment period closed on July 5, 1988. Three public hearings were held, two in Washington, DC, on November 23, 1987 and June 27, 1988, and one in Denver, Colorado on December 2–3, 1987. On September 28, 1988, EPA made available to the public draft outline which summarized the provisions which the Agency was considering including in the final rule for total coliforms (53 FR 37801).

B. Public Comments on the Proposal

EPA requested comments on all aspects of both the November 3, 1987, proposal and May 6, 1988, notice of availability. The description of the final rule provisions in the following sections includes summaries of the major public comments and the Agency's response to the issues raised. A detailed recitation of the comments and the Agency's responses are presented in the "Comment/Response Document for the Proposed Coliform Rule," which is available in the public docket.

IV. Explanation of Final Provisions

A. Maximum Contaminant Level Goal (MCLG)

As explained in the November 3, 1987, notice, total coliform levels have been used for decades as the primary measure of the microbial quality of drinking water. Coliforms are usually present in water contaminated with human and animal feces and are often associated with outbreaks of disease. Although total coliforms are usually not pathogenic themselves, their presence in drinking water indicates that fecal pathogens may also be present. EPA believes that treatment which provides total coliform-free water will reduce fecal pathogens to minimal levels.

On November 13, 1985 (50 FR 46902), EPA proposed a recommended maximum containment level (RMCL), renamed maximum contaminant level goal (MCLG) by the 1986 SDWA amendments, for total coliforms of zero. Since then, the 1986 amendments

streamlined the rulemaking process. Under the amended Act, EPA must propose both the MCLG and the NPDWR for a contaminant simultaneously, and it then must publish the MCLG and promulgate the NPDWR simultaneously. Section 1412(a)(3). To bring the rulemaking for total coliforms in line with the amended process, in the November 3, 1987 notice, EPA reproposed the RMCL as an MCLG at the same level, i.e., zero, on the same basis set out in the November 1985 notice and in the Criteria Document for Total Coliforms (USEPA, 1984).

The majority of comments addressing the proposed MCLG supported the proposed value of zero. No commenter suggested another value. Some commenters questioned the rationale for using total coliforms as the primary tool to assess the microbiological quality of drinking water; a few of these commenters stated that it was inappropriate to set an MCLG for coliforms since coliforms are not generally pathogenic.

After reviewing the comments in response to both the November 1985 and November 1987 proposals, EPA has decided to promulgate an MCLG of zero for total coliforms, as proposed. Because fecal coliforms and *E. coli* are a subset of the total coliform group, the MCLG for total coliforms includes these organisms. The Agency is not aware of any data in the scientific literature supporting a particular value for coliform density, below which there are no known or anticipated adverse health effects, with an adequate margin of safety. In fact, waterborne disease outbreaks and specific pathogen levels have been associated with coliform densities from less than one/100 ml to very high levels.

It is important to note that SDWA specifically requires EPA to regulate total coliforms, and that coliform analysis, along with sanitary surveys, have been the foundation of programs to assure a sanitary water supply for many decades. By proposing and publishing an MCLG of zero, EPA is stating that, conceptually, coliforms should not be present in drinking water, because they may indicate the presence of pathogenic organisms in the water.

Regulation of total coliforms is not the only tool EPA is using to assess and assure the microbiological quality of water. For example, the Agency is also using specified surface water treatment requirements (published elsewhere in today's Federal Register), and the forthcoming groundwater disinfection requirements for this purpose.

B. Maximum Contaminant Level

1. Presence-Absence Concept

The November 3, 1987, notice proposed that coliform MCLs be based on their presence or absence in a water sample rather than on an estimation of coliform density, as is the case with the current coliform rule. The Agency received a number of comments on this issue. Many commenters supported the presence-absence concept over a density determination. Almost all of those commenters who opposed the presence-absence concept prefer to retain the current coliform rule because they believe it has been effective (e.g., they believe there have been no or few waterborne disease outbreaks in their State or community). However, as stated above, EPA believes that the number of outbreaks and cases of waterborne disease is much higher than is recognized and recorded, and therefore more effective measures are needed for further control.

As explained in the November 3, 1987, notice, EPA believes the presence-absence concept is simpler and mathematically more precise than the current density standard for total coliforms, and therefore has decided to use presence-absence as the basis for the coliform MCL in this revised rule. The advantages of the presence-absence concept include the following: (1) It is easier to determine the presence or absence of coliforms than to determine their density, (2) the presence-absence determination is less influenced by sample transit time than a density determination, and (3) use of the presence-absence concept eliminates calculation difficulties implicit in the statistical methodology of coliform density calcualtions.

2. Monthly MCL

The November 3, 1987, notice proposed a monthly MCL for all community and non-community public water systems. The monthly MCL was designed to prevent adverse health effects by providing high quality water on a consistent basis. Under the proposal, for public water systems that analyzed fewer than 40 samples/month for total coliforms, more than one total coliform-positive sample/month would violate the monthly MCL. For systems that analyzed 40 or more samples/month for total coliforms, the occurrence of total coliforms in more than five percent of the samples would violate the monthly MCL.

The majority of commenters supported the proposed monthly MCL, while a few preferred retention of the current MCLs, which are based on coliform density. For the reasons explained in the November 3 notice, EPA believes the proposed monthly MCL is more scientifically defensible than the current coliform MCLs. As explained in that notice, given that total coliforms are ubiquitous in water, EPA believes that an infrequent single coliform-positive sample does not necessarily represent a health risk. For this reason, the Agency has decided to promulgate the monthly MCL as proposed. EPA has concluded that the final MCL is as close to the final MCLG of zero as is feasible.

EPA has clarified rounding-off procedures for the MCL by specifying that no more than 5.0 percent, rather than 5 percent, of the samples analyzed during a month may be total coliform-positive for systems collecting at least 40 samples/month to be in compliance. Thus, a system which collects 75 samples/month would violate the MCL if four samples were coliform-positive, i.e., $4/75 = 5.3$ percent, because it is greater than 5.0 percent.

EPA has also more clearly defined the compliance period for this rule by specifying that a public water system must demonstrate compliance with the MCL for total coliforms each month it is required to monitor. Thus, a system which collects fewer than 40 samples/month will be in compliance with the MCL if fewer than two samples during a month are total coliform-positive. On the other hand, if one sample is total coliform-positive during each of two or more consecutive months, the system remains in compliance with the MCL.

3. Long-term MCL

In the November 3, 1987, notice, EPA proposed a long-term MCL in addition to the monthly MCL. For systems collecting fewer than 60 samples/year, no more than five percent of the most recent 60 samples could be total coliform-positive. For systems collecting at least 60 samples/year, no more than five percent of the total number of samples collected during the most recent 12 months could be total coliform-positive. The rationale for the proposed long-term MCL was presented in the November 3, 1987, notice. The May 6, 1988, notice requested public comment on various alternatives to the long-term MCL, including limiting the time-frame for determining compliance with the long-term MCL to one year for all systems and deleting the long-term MCL entirely but specifying that the States require systems to take one or more specific

actions (e.g., perform a sanitary survey, issue a boil water notice, disinfect continuously), on a case-by-case basis, whenever the number of total coliform-positive samples from a system exceeded five percent of the total number of samples during a specified time period.

The majority of commenters addressing the proposed long-term MCL opposed it; primarily, they were concerned that long-term compliance tracking of small systems by the State would be difficult, and that a small system might find itself in violation of the long-term MCL long after a transient contamination problem had been corrected. The Agency believes that control of intermittent contamination (i.e., across several compliance periods) is important for ensuring safe drinking water, and that national regulations to address this problem may be appropriate. However, it is difficult to devise a practical approach for collecting and processing the amount of data necessary to detect intermittent contamination. Thus, EPA has decided not to promulgate a long-term MCL at this time. It is important to note, however, that other measures, such as the surface water treatment requirements in Part 141, Subpart H (published elsewhere in today's Federal Register), will reduce intermittent contamination. Similarly, the forthcoming Congressionally-mandated regulation requiring disinfection as a treatment technique for all public water systems using ground water will also reduce intermittent contamination. Moreover, as described below, today's rule requires a system to perform additional monitoring after it detects a total coliform-positive sample, which will have the effect of identifying systems with intermittent contamination. In addition, the State has the authority to establish additional requirements to identify systems with intermittent contamination and to require corrective action.

C. Monitoring Requirements

A system which has failed to comply with a coliform monitoring requirement (including, but not limited to, a sample siting plan requirement, a sanitary survey requirement, a routine sample requirement, a repeat sample requirement, and a fecal coliform/*E. coli* test requirement) must report the monitoring violation to the State within ten days after the system discovers the violation, and notify the public in accordance with § 141.32 (the general public notification requirements).

1. Basis: Population Served vs. Other Alternatives

The November 3, 1987, notice proposed to retain population as the basis for setting monitoring frequency. There were very few public comments on this issue. Most of the commenters who discussed the basis for monitoring frequency, however, supported the concept proposed. Based on the public comments and the reasons explained in the November 3, 1987, notice, EPA has retained population as the basis for setting monitoring frequency.

2. Sampling Sites

The interim regulations state that samples are to be taken at points representative of conditions within the distribution system. The November 3, 1987, notice proposed to refine this provision by requiring systems to collect samples from at least three times the number of sites every year as the number of monthly samples required or the total number of service connections. In addition, EPA recommended, but did not propose, that systems select new sampling sites every year. The intent of these provisions was to insure that the system would eventually collect samples from all major sections of the distribution system.

EPA received numerous comments on this issue. Most commenters opposed the proposed requirement. Many commenters claimed that the increase in the number of sampling sites would force systems to use private homes, with possible problems of access, or that the requirement would preclude systems from monitoring water quality at specific representative sites over time, which would prevent collection of historical data and trend information. A number of commenters recommended that EPA allow all, or at least some, sampling sites, to be fixed.

EPA has decided to replace the proposed approach with an alternative presented in the May 6, 1988, notice. This alternative, which would require the system to use a sample siting plan acceptable to the State, was supported by many commenters. Thus, under the final rule, each system must develop and monitor according to a written sample siting plan, which is subject to State review and revision. The State must develop and implement a process which ensures the adequacy of the sample siting plan for each public water system in the State, including periodic review of each system's plan. For the vast majority of systems, EPA expects the State will conduct this periodic review as part of the periodic sanitary survey. The siting plan should ensure that the system will eventually detect contamination in any portion of the distribution system if it is present. While reviewing the siting plan, the State should also review the sample collection timing patterns for each system to determine whether the system should collect samples on a regular basis throughout the month, or whether it is acceptable to collect some or all required samples at the same time.

3. Sanitary Surveys

In the November 3, 1987, Federal Register notice, EPA proposed to require all systems that exercised the Agency's option for collecting fewer than five samples/month to have a periodic sanitary survey at the frequency shown in Table 1 of the proposed rule. The May 6, 1988, notice requested public comment on whether EPA should specify a date by which the initial sanitary surveys were to be performed, and, if so, what this date should be, and whether this initial time period or the time period between sanitary surveys should depend on system size or system type.

Many commenters supported the concept of a periodic sanitary survey. Although the proposed rule put the burden to complete the sanitary survey on the system rather than the State, many of these commenters assumed that many States would very likely choose to perform all or most sanitary surveys themselves, and they questioned whether resources would allow the State to perform the sanitary surveys in the time frame specified in the proposed rule. Some commenters indicated that sanitary surveys should be performed no less than every five years. Others suggested that the frequency of sanitary surveys be left to State discretion. Some commenters thought that, given resource limitations, EPA or the States should set priorities among different categories of systems for completing sanitary surveys.

EPA believes that sanitary surveys and action to correct any defects identified in the course of the surveys are indispensable for assuring the long-term quality and safety of drinking water in systems which collect fewer than five samples/month. Monitoring and sanitary surveys complement each other to achieve this result. Therefore, to ensure that sanitary surveys are performed regularly, in this final rule, EPA is specifying the maximum allowable time for the system to complete both the initial sanitary survey and subsequent surveys. EPA expects that many States will perform most or all of the sanitary surveys themselves, and recognizes that, because of resource constraints, they cannot perform the

surveys all at once; thus, it is appropriate to set priorities. Moreover, because the final rule generally retains the monitoring frequency of the interim rule, rather than adopting the frequency in the proposed rule, EPA anticipates that many more systems will sample fewer than five times/month than was contemplated under the proposed rule. Thus, the Agency believes it appropriate to increase the time between sanitary surveys, compared to what was proposed, and stagger the deadlines because of State resource constraints. The sanitary survey requirements of the final rule appear in Table 3.

As Table 3 indicates, the initial sanitary surveys must be completed within five years of promulgation of this rule for community water systems, and within ten years of promulgation for non-community water systems. Table 3 also shows the schedule for subsequent surveys, which is either every five or ten years, depending on the type of system.

The sanitary survey frequencies in Table 3 take into account the fact that there is lower potential health risk associated with ground water systems which disinfect than with other systems. This schedule also takes into account that there are two to three times as many non-community water systems as community water systems and, as a result, more time will be necessary to complete sanitary surveys for the non-community systems. Although sanitary surveys are already being performed in many States (EPA data indicate that in FY 1987, States collectively performed about 35,000 on-site evaluations), EPA recognizes that a number of States will need some period of time to establish a mechanism for ensuring that sanitary surveys are conducted for the thousands of affected systems in the State. Given these considerations, EPA believes the required frequencies for sanitary surveys are reasonable.

Under this rule, the system is responsible for insuring that the sanitary survey is accomplished. Only the State or an agent approved by the State may conduct a sanitary survey. States are required to review the results of each sanitary survey to determine whether the existing monitoring frequency is still appropriate, and if not, what the new frequency should be, and whether the system needs to undertake any specific measures to improve water quality. EPA intends to provide guidance on the design and implementation of sanitary surveys and other site-specific evaluations.

4. Invalidation of Total Coliform-Positive Samples

The November 3, 1987 notice proposed that all coliform-positive samples be used in determining MCL compliance, unless the laboratory establishes that improper sample analysis caused the positive result. Several commenters suggested that the State be allowed to invalidate total coliform-positive samples in certain other situations as well.

EPA is aware that a number of States and systems currently invalidate a total coliform-positive sample on the basis of subsequent "check" samples which are total coliform-negative. In other words, when subsequent repeat samples at the same and/or nearby taps/service connections are total coliform-negative, it is assumed that the original total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem or improper sample collection and handling. Consequently, they invalidate the original total coliform-positive sample. EPA believes there is no valid justification for using coliform-negative check samples alone to invalidate an initial coliform-positive sample.

As indicated in the November 3, 1987, notice, Pipes and Christian (1982) and Christian and Pipes (1983) have shown that the distribution of coliforms in the distribution system is far from being uniform. Hence, repeat samples alone are not adequate to determine the validity of a total coliform-positive sample. Even if a repeat sample is taken from the same sampling tap as the total coliform-positive sample, the results of the analysis of the repeat sample will not necessarily be representative of conditions when the original sample was taken. Therefore, under this final rule, States may not invalidate a total coliform-positive sample simply because a subsequent sample taken at the same tap and/or nearby taps/service connections are total coliform-negative. However, EPA believes that if any repeat sample is total coliform-positive at the same tap as the original total coliform-positive sample, but all repeat samples at nearby service connections are total coliform-negative, this is a strong indication of a domestic or other non-distribution system plumbing problem. Therefore, in this case, the final rule allows the State to invalidate the original total coliform-positive sample. When the State determines that a coliform-positive result is a domestic or other non-distribution system plumbing problem rather than a distribution system problem, EPA recommends that the State instruct the system to inform all consumers at the affected location of the problem and to advise them to boil their drinking water until the problem is corrected.

This rule also provides the State discretion to invalidate a total coliform-positive sample when it determines that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. States should use their discretion to invalidate a sample on this basis sparingly. They should hesitate to assume that an error by the sample collector is responsible for a total coliform-positive sample, and thus invalidate the sample, since Pipes and Christian (1982) have shown that contamination by a sample collector is unlikely to be the cause of a total coliform-positive result, i.e., it is unlikely that a person who collects samples can unintentionally render a sample total coliform-positive. Whenever a State official invalidates a sample for this reason, the basis for this determination must be documented in writing, signed by the supervisor of the State official who makes this determination, and the documentation must be made available to EPA and the public. The written documentation must include the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State cannot invalidate a total coliform-positive sample under this provision unless all repeat samples are total coliform-negative. States cannot invalidate a total coliform-positive sample *solely* on the grounds that all repeat samples are total coliform-negative.

The final rule also allows the State to invalidate a total coliform-positive sample if the laboratory establishes that improper sample analysis caused the positive result.

The State may not invalidate a total coliform-positive sample for any other reason than those described above. A total coliform-positive sample invalidated for any of the above reasons does not count towards meeting the minimum monitoring requirements.

5. Monitoring Frequency

a. *Monitoring frequency for small community water systems and all non-community water systems*—(1) *General.* The November 3, 1987, notice proposed to require all public water systems serving 3,300 persons or fewer to collect and analyze a minimum of five total coliform samples/month. As explained in that notice, EPA's primary rationale for this higher level of monitoring, compared to the requirements of the

current total coliform rule, is based on the study which demonstrated that coliforms are distributed very unevenly in distribution systems (Pipes and Christian, 1982; Christian and Pipes, 1983). To reduce the economic burden of additional monitoring on small systems, while still assuring reasonable protection of public health, EPA proposed to allow certain systems to monitor less frequently than five samples/month, if the State, or an agent acceptable to the State, performed a periodic sanitary survey and the results of that survey were acceptable to the State.

EPA received numerous comments on this issue. The vast majority opposed the proposed monitoring frequency, primarily because they believed the requirement would be too expensive, too inconvenient, and/or unnecessary because their systems had never had a waterborne disease outbreak or any other contamination problem. The Agency continues to believe, however, given the scientific data, that the monitoring requirements of the interim regulations, alone, are not adequate to fully assess the microbiological quality of drinking water. In response to the extensive comments, therefore, EPA solicited comments in the May 6, 1988, notice on several additional options for ensuring adequate monitoring, without a large increase in costs.

In response to the public comments on the two notices, the Agency has decided, for small systems, to place less emphasis on collecting many routine samples every month when there is no apparent problem (based on the results of the sanitary survey, historical monitoring data, and other considerations) and greater emphasis on evaluating the severity and extent of any contamination problem when it does occur and the success of any corrective action (as indicated by coliform monitoring results). To this end, EPA has generally retained the monitoring frequency specified in the interim rule (40 CFR 141.21) for systems serving 4100 persons or fewer (see Table 1), except that increased monitoring is required, at least temporarily, when contamination is found. Thus, under the final rule, when contamination is found, i.e., there is a total coliform-positive sample in the community or non-community water system normally collecting fewer than five samples/month, that system must collect three or four repeat samples, depending on the system's size (see Section IV.C.5.c, below) and, if the original sample is not invalidated, at least five routine samples the next month the water system is in operation. If these repeat and additional routine samples are total coliform-negative, the system may revert to the regular frequency of less than five samples/month. (The State, or an agent of the State, may perform an on-site evaluation in lieu of the system taking five routine samples the next month, as explained in greater detail below.) By retaining the current monitoring frequency for small systems, and requiring additional samples only when a system detects contamination, systems and States can concentrate their limited resources on identifying and correcting problems, rather than simply requiring that many more samples are collected across the board.

An integral part of this approach is the periodic sanitary survey requirement. The Agency believes that a system collecting fewer than five samples/month does not have an adequate grasp on the quality of its drinking water unless this limited sampling is supplemented by a periodic sanitary survey, and the results are reviewed by the State. These sanitary surveys, along with additional information such as the system's history of coliform monitoring results, should provide the State with sufficient information to judge whether a system is adequately constructed and operated or has a potential contamination problem. For systems collecting fewer than five samples/month, the total coliform samples will serve as a periodic check of the findings of the most recent sanitary survey. States would be expected to increase the monitoring frequency and/or require various preventive measures for a particular system if coliforms are detected or if the most recent sanitary survey reveals deficiencies. EPA believes this approach will minimize the financial burden to small systems which do not have an apparent contamination problem, while safeguarding public health, by ensuring these systems are subject to periodic sanitary surveys and increasing the monitoring requirements for systems with demonstrated problems.

Regarding the appropriate timing for collecting water samples, in the November 3, 1987, notice, EPA proposed to require systems to collect water samples at regular time intervals throughout the month, except that systems which used ground water exclusively and which served 3,300 persons or fewer could collect up to five samples from different parts of the distribution system on a single day. Very few commenters addressed this issue. EPA has decided to promulgate this provision as proposed for the reasons given in the November 3 notice, except that, to be consistent with the population categories used in this final rule, the rule provides that systems using ground water and serving 4,900 persons or fewer may collect all required samples from different parts of the distribution system on a single day.

(2) *Non-community water systems.* The interim regulations at § 141.21(c) provide the State discretion to allow a non-community public water system to monitor less than quarterly, based on the results of a sanitary survey. The final rule retains this provision only for non-community water systems which use ground water and which serve 1,000 persons or fewer. The Agency, believes, however, that all systems must perform at least some monitoring to insure the continuing validity of the most recent sanitary survey results and the actual absence of coliforms. Thus, the final rule requires non-community systems using ground water and serving 1,000 persons or fewer to collect at least one total coliform sample per year. The Agency believes this requirement is reasonable, and represents the bare minimum that is adequate for protection of public health. EPA also believes that this provision will not impose a financial burden on non-community systems or on States which collect and analyze samples for non-community systems. For States already requiring at least quarterly monitoring for such systems, the Agency encourages them to continue this policy. Some States, however, have not required their non-community systems to monitor at all under the interim regulations, while others require monitoring less frequently than annually, and thus will probably need some lead time to develop resources to implement the new provision requiring, at a minimum, annual monitoring. For this reason EPA is phasing in the new monitoring frequency requirements. A non-community water system using ground water (which is not under the direct influence of surface water) and serving 1,000 persons or fewer must begin monitoring no later than five years from June 29, 1989, and at least annually thereafter. The Agency believes this phase-in period is ample for States and systems to implement this requirement.

EPA believes these small groundwater systems, which tend to have good quality source water and be simpler in configuration, are less likely to develop contamination problems. EPA is not allowing surface water systems to monitor only annually, however, because surface water often varies in quality and is much more likely to contain coliforms; thus reduced

monitoring is unwarranted. Accordingly, non-community water systems using surface water must monitor at the same frequency as a like-sized community water system, i.e., at the frequency specified in Table 1. For the same reason, non-community water systems using ground water under the direct influence of surface water must also monitor at the same frequency as a like-sized community water system. The final rule allows such a groundwater system six months after the State determines that the system is under the direct influence of surface water to begin monitoring at this frequency.

EPA is also requiring non-community systems using ground water serving more than 1,000 persons during any months to monitor at the same frequency as a like-sized community public water system since a greater number of people are at risk if there is contamination of the system, and since these systems are likely to be larger and more complex, resembling community water systems in size and configuration. Under this rule, however, the State may reduce the monitoring frequency, as appropriate, for such a system for any month the system serves 1,000 persons or fewer.

TABLE 4.—MONITORING FREQUENCY FOR NON-COMMUNITY WATER SYSTEMS [1]

Water source	Population served	Minimum monitoring frequency	Effective date of requirement
Surface	any	Same as CWS [2]	Beginning December 31, 1990.
Ground	1>1,000	Same as CWS [2]	Beginning December 31, 1990.
Ground	>1,000	State discretion	December 31, 1990 until June 29, 1994.
Ground	>1,000	State discretion [4]	After June 29, 1994.
Ground water under direct influence of surface water.	Any	Same as CWS [2]	Within one year of State or State classification.

[1] Includes both transient and non-transient non-community water systems.
[2] System must monitor at same frequency as a like-sized community water system.
[3] State may reduce the monitoring frequency for any month the system serves 1,000 persons or fewer.
[4] State may not permit a system to monitor less than once per year.

b. *Monitoring frequency for large community water systems.* The November 3, 1987, notice proposed to retain the current monitoring frequency for systems which serve greater than 3,300 persons, except that EPA proposed to reduce the number of population size categories for communities above 10,000 from 84 to 43 to simplify and streamline the monitoring frequency requirements.

As a consequence of consolidation, some systems would have been required to take a few more samples than they are currently taking. Although there were very few public comments on this issue, a few commenters stated that there was no need for these additional samples. EPA agrees. Therefore, in the final rule, EPA has modified the categories so no system is required to increase its routine sampling frequency above that in the interim coliform rule. With this modification, shown in Table 1, the monitoring scheme in this rule is even simpler; the total number of population categories has been reduced from 84 to 34.

c. *Repeat samples/additional routine samples.* The November 3, 1987, notice proposed that public water systems collect five repeat samples for each total coliform-positive routine or repeat sample if the positive routine or repeat sample did not contain fecal coliforms. The May 6, 1988, notice described several alternatives to the requirement for five repeat samples, including four repeat samples, two repeat samples, and four repeat samples for systems collecting fewer than five samples/month and two repeat samples for systems collecting at least five samples/month.

EPA received many comments on the required number of repeat samples. Most commenters who addressed this issue opposed the requirement for five repeat samples because of the cost or because they thought that five repeat samples were simply unnecessary. Many of these commenters thought that two repeat samples, as specified in the current rule, are adequate.

As stated in the November 3, 1987, proposal, given the non-uniform distribution of total coliforms in the distribution system, EPA does not believe that two repeat samples are sufficient to assess the extent or degree of contamination. Furthermore, as described above, the fact that a total coliform-positive sample is followed by two negative samples at the same or nearby sampling point does not necessarily mean there is no contamination in the system and, thus, that the original positive sample is invalid. Yet, EPA also recognizes that five repeat samples for systems collecting more than five samples/month probably is unnecessary, given that such systems are likely to detect and confirm the presence of any contamination in the course of the more frequent routine monitoring required by the rule. For this reason, EPA has decided to require these larger systems to collect only three repeat samples, one at the same tap as the original coliform-positive sample, one at a tap within five service connections upstream, and one at a tap within five service connections downstream of the original sampling site. EPA believes that, for these systems, these extra samples, in conjunction with routine monitoring, will allow the system and the State to determine the source and extent of any contamination.

In addition, EPA has decided to require systems collecting two, three, or four routine samples/month to collect three repeat samples, and systems collecting one sample/month or fewer to collect four repeat samples, for a total of five or more samples, whenever a total coliform-positive sample is found. Also, as indicated previously, whenever a total coliform-positive sample is detected and the State does not invalidate it, any system collecting fewer than five routine samples/month ("small system") must collect at least five routine samples the next month it serves water to the public, even if the MCL is not violated. To meet this requirement, a small system may count any routine sample it normally collects the next month it serves water to the public toward this set of five routine samples, i.e., if a small system normally collects one sample/month, it need only collect four additional routine samples the next month it serves water to the public; if a system normally collects five or more samples/month, it need not collect any additional samples the next month it serves water to the public. Under these requirements, a small system with a total coliform-positive sample will have the results from at least five samples during the month

when the total coliform-positive sample was detected, and five more the next month is serves water to the public, for a total of ten samples over the two-month period. This repeat sample requirement should not be a burden to most systems, since repeat samples count toward the monthly monitoring requirement. (Routine samples differ from repeat samples in that systems may collect routine samples at any tap in the distribution system, consistent with the sampling siting plan, while repeat samples must be collected at specific locations.)

The primary reason for requiring a contaminated small system to collect at least ten samples during a two-month period is based on the statistical analysis described in the November 3, 1987, notice which indicates that, for example, if 60 or more samples are collected and 95 percent or more are total coliform-negative, there is a 95 percent confidence that the fraction of water with coliforms present is less than 10 percent. By collecting at least five samples (routine plus repeat samples) during the month when a total coliform-positive sample is found, and five additional routine samples the next month the system serves water to the public, these small systems will more quickly collect an increasingly valid number of samples upon which to assess both the effectiveness of any corrective action taken and the current microbiological quality of its water, even in the absence of a recent sanitary survey. The Agency believes this would also provide the system a larger, and thus more valid, data set than most systems would have taken under the proposed requirement (which would have required five samples/month but allowed reductions based on sanitary survey results). EPA concludes that it is important to temporarily require increased monitoring for small systems where the water quality is suspect (especially since sanitary surveys will be performed only every five years or less), and that these requirements are consistent with comments suggesting that increased monitoring is not necessary in systems that are not experiencing problems.

In addition, these provisions have many of the same benefits of the proposed long-term MCL. EPA is concerned that, in small systems, intermittent contamination could go undetected if a system monitors infrequently, and regularly has one total coliform-positive sample, since this would not result in an MCL violation. However, a contaminated small system which collects a set of repeat samples during the same month it finds a total coliform-positive sample and at least five routine samples the next month it serves water to the public has a higher probability of detecting more than one total coliform-positive sample during a month, and thus incurring an MCL violation. As a result, this monitoring scheme is more likely to result in the discovery and correction of intermittent contamination problems.

The final rule allows the State to waive the requirement for a small system to collect five routine samples the next month it serves water to the public if the State, or an agent approved by the State, performs a site visit before the end of the month during which the system would otherwise be required to collect the five routine samples. The site visit need not be a complete or formal sanitary survey; the purpose is to investigate first-hand the reason for the total coliform-positive result, and decide whether any additional monitoring and corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

The rule also allows the State to waive the requirement that a small system take five routine samples the next month it serves water to the public after it has a total coliform-positive sample if the State has determined why the sample was total coliform-positive, and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the State must document this decision to waive the monitoring requirement in writing. This document must be signed by the supervisor of the State official who recommends such a decision, and made available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken or will take to correct this problem before the end of the next month the system serves water to the public. The State cannot waive the requirement for a small system to collect five routine samples the next month after it has a total coliform-positive sample solely on the grounds that all repeat samples were total coliform-negative. In addition, the State cannot waive the requirement for a system to collect repeat samples the same month the system has a total coliform-positive sample.

For systems collecting fewer than five routine samples/month, if the State decides to waive the requirement for that system to collect five routine samples the next month the system serves water to the public under the provision described in the previous paragraph, the system must still collect at least one routine sample before the end of the next month the system serves water to the public if the system collected the required set of repeat samples before the problem was corrected. This routine sample, which counts in determining compliance with the MCL, will assist the system in determining whether the corrective action has been successful. If such a system collects the required repeat samples after correcting the problem, and all repeat samples are total coliform-negative, then the system need not collect a routine sample the next month it serves water to the public. In this case, EPA believes the repeat sample results are sufficient to indicate the success of any corrective action. If any repeat sample is total coliform-positive, the system is out of compliance with the MCL for total coliforms.

Table 2 summarizes the follow-up (both repeat and routine) sampling requirements for a system which detects total coliforms in a sample.

The November 3, 1987, notice proposed that data from all routine samples and repeat samples be included in the calculations to determine MCL compliance. A number of commenters approved this approach, but the majority opposed it. Reasons given for opposing this approach included the following: (1) Repeat samples should not be used to determine compliance, but only to confirm the results of an original coliform-positive sample; (2) the use of results from repeat samples to determine compliance would reduce the level of monitoring in the rest of the system, since all of the samples collected at or near the problem tap would fulfill (or nearly fulfill) the monthly monitoring requirements; and (3) contamination in a single location of the distribution system might result in an MCL violation if one or more repeat samples were total coliform-positive, even though there might not be a system-wide problem.

EPA believes the first comment is invalid because, as described above and in the November 3, 1987, notice, total coliforms are not distributed uniformly in the distribution system, and thus, repeat samples cannot be used to confirm a total coliform-positive routine sample. As for the other two reasons, EPA believes it makes sense to focus sampling at or near the site of the original total coliform-positive sample, given the documented non-uniform

distribution of coliforms, and to consider all samples that are not invalidated in determining whether a system is in compliance with the MCL. Hence, for the reasons discussed above and in the November 3, 1987, notice, the Agency has incorporated the proposed method for calculating compliance, i.e., inclusion of all samples, into the final rule. For the purposes of calculating compliance, a system must count all repeat sample results in the same month as the routine total coliform-positive sample which prompted those repeat samples. States have the authority to increase the number of required samples if they determine that it is necessary to assure that the water is safe.

The November 3, 1987, notice also proposed that systems collect repeat samples from the same sampling point as the original sample, except that some could be collected at the next service connection above and/or below the original sampling point. The intent was to allow systems to determine the source and extent of contamination, i.e., whether the contamination was a distribution system problem or not. A few commenters suggested that systems be allowed to collect repeat samples at any nearby site rather than just the adjacent sites; they were concerned that sampling adjacent sites only might be difficult (e.g., if residents are not home or they refuse entry). EPA recognizes that systems may sometimes have difficulty sampling at adjacent service connections. To account for this potential problem, the final rule allows systems to collect repeat samples up to five service connections away, in either direction, from the contaminated tap. EPA believes this broader repeat sampling range will still allow the system to determine the source and extent of contamination, while allowing it flexibilty to find sufficient sampling points. The final rule requires the system to collect at least one repeat sample from the same tap as the original total coliform-positive sample, at least one repeat sample upstream, *and* at least one repeat sample downstream. This provision will provide information to the system as to whether the contamination is a domestic or other non-distribution system plumbing problem.

Some commenters opposed the proposed requirement that systems collect all repeat samples within 24 hours of being notified of a coliform-positive result. EPA continues to believe that the 24-hour limit for collecting repeat samples is necessary to protect public health. Repeat samples are necessary to determine the severity and extent of contamination. Because of the nature of the analytical methods for coliforms, the positive finding may not be recognized for up to 96 hours after the sample is taken. Thus, time already is lost, so rapid collection of repeat samples is essential. The Agency does recognize, however, that some systems may have certain logistical problems in obtaining repeat samples promptly that are outside their control, e.g., a laboratory may not be available every day to ship empty sample bottles or receive water samples. To provide some allowance for such situations, while still safeguarding public health, the final rule allows the State to waive the 24-hour limit on a case-by-case basis. The State must grant any such waiver before the 24-hour period has passed; it cannot excuse late sampling after the fact. In this case, the State must specify the time by which the system must collect these repeat samples. In such cases, the Agency encourages the State to require repeat sampling as soon as possible.

A State cannot invalidate a total coliform-positive sample on the basis of repeat sample results in systems consisting of a single service connection, since they cannot collect upstream and downstream samples and demonstrate the problem was not in the distribution system. Thus, the primary reason for requiring such a system to collect repeat samples is to determine the effectiveness of any corrective actions. Since a system with a single service connection cannot collect repeat samples at different locations as other systems can, the final rule allows the State to authorize such systems to collect the required set of repeat samples over four days, rather than within 24 hours, after being notified of a total coliform-positive result. The final rule also provides the State discretion to allow such systems to collect a larger volume repeat sample(s) (e.g., a single 400-ml repeat sample or two 200-ml repeat samples) in one or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one routine sample/month). In addition, under the final rule, if a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the State may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

As noted above, the final rule requires systems with more than one service connection to collect the repeat samples within 24 hours of obtaining a total coliform-positive result from an original sample. EPA is not allowing such systems to collect repeat samples over a period of days as a routine matter because these systems usually serve more people than a system with one service connection, and thus more people would be at risk if contamination were to be present in the distribution system; these larger systems need to evaluate and eliminate any contamination quickly before it causes waterborne illness in a large population. For the same reason EPA encourages States to require larger and more complex systems with single service connections to sample quickly whenever they detect a total coliform-positive sample to ascertain the nature of a contamination problem and the effectiveness of any corrective action.

Some systems may collect one or more routine samples from within five adjacent service connections of a previously collected routine sample. If the previously collected routine sample(s) is later found to be total coliform-positive, then the system may count the subsequent routine sample as a repeat sample. (However, in such instances, a system may not count this sample(s) twice in compliance calculations, i.e., as both a routine sample and a repeat sample.) This provision will slightly reduce the cost burden to the system, since it can decrease the number of repeat samples a system needs to collect after it learns of a total coliform-positive result.

Some commenters opposed the proposal to require systems to collect and analyze another set of repeat samples if any repeat sample were total coliform-positive. The Agency, however, believes that, whenever a repeat sample is total coliform-positive, sampling should continue in order to clarify the extent of the contamination, and to assure that the problem is corrected; total coliform-positive repeat samples are of no less concern than total coliform-positive routine samples. Based on this conclusion, EPA has adopted the proposed provision in the final rule. Thus, whenever a system has one or more total coliform-positive repeat samples (and neither the original total coliform-positive sample nor the total coliform-positive repeat sample(s) is invalidated), the system must collect another set of repeat samples (either three or four, as specified in the rule). The system must collect this additional set of repeat samples within 24 hours of being notified of the total coliform-positive result(s), as before. This requirement should not be a burden to most systems, since repeat samples count toward the monthly monitoring requirement. Furthermore, smaller

systems are not required to collect any additional sets of repeat samples once they notify the State that they are in violation of the MCL for total coliforms. Thus, for a system which collects fewer than 40 samples/month, a total coliform-positive repeat sample (which is not invalidated) constitutes an MCL violation, so no additional repeat samples are required that month (unless the State requires otherwise), once the State is notified of the violation.

d. *Additional monitoring for unfiltered surface water systems.* The November 3, 1987, total coliform notice proposed to require each system using unfiltered surface water to collect one coliform sample near the first service connection within 24 hours after determining that its source water turbidity exceeds 1 NTU. Under the proposal, this coliform sample would count toward the total number required. EPA received very few comments on this issue. Thus, the Agency has incorporated this requirement into the final rule, for the reasons given in the November 3, 1987, notice. This requirement also applies to unfiltered groundwater systems under the direct influence of surface water. To improve clarity, EPA is specifying that systems collect this coliform sample within 24 hours of the first time during a day that the turbidity exceeds 1 NTU. Systems need only collect a single coliform sample near the first service connection once/day, even if the turbidity exceeds 1 NTU more than once/day.

The Agency recognizes that some systems which collect a sample within 24 hours after exceeding a turbidity level of 1 NTU may not be able to have the samples analyzed within 30 hours of collection for logistical reasons outside their control (e.g., the laboratory is closed during a weekend). To accommodate such situations, the State may waive the requirement, on a case-by-case basis, for a system to collect the coliform sample when the turbidity exceeds 1 NTU. The rationale for allowing States to provide this waiver is that high turbidity events are often short-lived; if the system were to collect the coliform sample more than 24 hours after such an event in order to ensure analysis within 30 hours of collection, it is unlikely that the sample would provide useful information about the disinfection conditions during that event. Thus, EPA believes it more appropriate to allow the State to waive the requirement on a case-by-case basis, rather than to extend the 24-hour limit.

EPA also has defined the term "near the first service connection" to mean one of the 20 percent of all service connections in the entire system that are nearest the water supply treatment facility, as measured by the water transport time within the distribution system. This requirement is discussed more fully in the final rule promulgating the surface water treatment requirements, published elsewhere in today's Federal Register.

e. *Chlorine substitution policy.* The interim coliform rule (40 CFR 141.21(h)) allows systems to substitute the use of chlorine residual monitoring results for up to 75 percent of the coliform samples required to be taken. In the November 3, 1987, notice, EPA did not propose to include this "chlorine substitution policy" in the revised coliform regulations for the reasons given in that notice. For the same reasons, this final rule does not include a chlorine substitution policy. However, as noted in the proposal, EPA will consider incorporating this concept in the upcoming groundwater disinfection rule which EPA must promulgate under section 1412(b)(8) of SDWA.

6. Fecal Coliform and E. coli Requirements

As explained in the November 3, 1987, notice, the presence of fecal coliforms in drinking water is strong evidence of recent sewage contamination. The presence of fecal coliforms indicates that an urgent public health problem probably exists, since human pathogens often co-exist with fecal coliforms. Therefore, EPA proposed to require that public water systems analyze each total coliform-positive sample (whether an original or repeat sample) to determine if it contains fecal coliforms. Under the proposal, if fecal coliforms were detected, the system would be in violation of the monthly MCL for total coliforms and would be required to notify the State within 48 hours of the violation. The violation would be considered "acute," requiring immediate public notification (i.e., within 72 hours) via electronic media, as well as written follow-up notification, in the case of a community water system (a non-community water system may choose an alternative method of immediate notification).

In the May 6, 1988, notice, EPA presented an alternative option which would require the system to report a fecal coliform-positive result to the State immediately instead of within 48 hours, and collect repeat samples. Then, if the system detected fecal coliforms in any repeat sample taken at the same location or an immediately adjacent service connection, the system would be in violation of the monthly MCL for total coliforms.

Many commenters opposed the classification of a single fecal coliform-positive sample as an acute violation, thus requiring immediate public notification. They stated that some fecal coliform-positive samples are due to "false-positives" (i.e., bacteria other than *E. coli*) and that some fecal coliform-positive samples might reflect a domestic or other non-distribution system plumbing problem, rather than a problem in the distribution system. Commenters also stated that it is common for systems which collect many samples to detect a fecal coliform-positive sample occasionally without any known adverse health effect, and that notifying the public in every such case might eventually cause indifference to public notices. In fact, several large, well-operated community water supplies have submitted data to EPA showing that they occasionally detect a fecal coliform-positive sample in the distribution system, among the hundreds or thousands of samples collected annually.

Under these circumstances, EPA agrees that it would be unnecessarily burdensome to require systems to provide immediate public notification each time a fecal coliform-positive result occurs, especially since EPA is also requiring systems to notify the State of any fecal coliform-positive result, so the State can require any measures necessary in appropriate circumstances. Nevertheless, the Agency still believes that any total coliform-positive sample which is not invalidated and which contains fecal coliforms very likely represents a serious health risk to the community. Therefore, under the final rule, a system must analyze each total coliform-positive sample to determine if it contains fecal coliforms. A system is in violation of the MCL for total coliforms whenever (1) any repeat sample is fecal coliform-positive, or (2) a fecal coliform-positive original sample is followed by a total coliform-positive repeat sample. This violation is "acute," as defined in 40 CFR 141.32(a)(1)(iii) (the public notification requirements) and as such, requires public notification by electronic media within 72 hours and subsequent written notification in the case of a community water system, as specified in 40 CFR 141.32 (a non-community system may choose an alternative method of immediate notification but the time limit is still 72 hours). EPA believes that this approach strikes a balance among the desirability of confirming analyses before acting on the results, the serious nature of fecal coliform-positive contamination, and the decreasing effectiveness of frequent,

urgent notifications of occasional localized distribution system problems.

The final rule provides the State with discretion to allow a public water system, on a case-by-case basis, to assume that a total coliform-positive sample is fecal coliform-positive without requiring it to be actually tested for fecal coliforms. This provision might reduce the cost of analysis. The Agency, however, does not believe that States should implement this waiver provision broadly, since States that did so would be unable to distinguish, and thus focus their limited resources on, systems which pose a major acute risk to the public. A State should limit implementation of this provision to special circumstances, e.g., to water systems which are known to be vulnerable to fecal contamination. If a system assumes that a total coliform-positive sample is also fecal coliform-positive, the system must comply with all requirements in the rule concerning fecal coliforms. If any repeat sample is total coliform-positive, then the system is in violation of the MCL for total coliforms and must notify the public of an acute risk to health.

On a related issue, in the November 3, 1987, and May 6, 1988, notices, EPA requested public comment on whether it would be appropriate to allow an analysis for the presence of *E. coli* in lieu of fecal coliforms whenever the system has a total coliform-positive sample. The vast majority of commenters who addressed this issue favored *E. coli* testing as an alternative to fecal coliform testing.

One reason commenters support *E. coli* testing in lieu of fecal coliform testing is that the fecal coliform test may produce a fecal coliform-positive result for *E. coli*, some thermotolerant strains of *Klebsiella*, and several thermotolerant strains in other genera. Many commenters pointed out that only *E. coli* is a contaminant of concern, not the other thermotolerant strains. In addition, as explained in the November 3, 1987, notice, several bathing beach studies have found that densities of *E. coli* were more closely related to gastroenteritis than were densities of fecal coliforms. Yet fecal coliform testing is very simple and inexpensive, and systems and laboratories are familiar with this test and thus may prefer to use it. In addition, any false-positive error is on the side of safety. For these reasons, the final rule allows the system to test for either *E. coli* or fecal coliforms whenever the system finds a total coliform-positive sample.

In the November 3, 1988, notice, EPA proposed to require a system to notify the State of a fecal coliform-positive sample within 48 hours. Some commenters indicated that this might be difficult to do on weekends, when State offices are closed. The Agency agrees. Therefore, under the final rule, systems must notify the State of a fecal coliform- or *E. coli*-positive sample by the end of the same business day that the system learns of it, or no later than the end of the next business day if the coliform-positive result becomes known after the close of State business for the day. However, EPA strongly encourages States to establish (or use existing) round-the-clock emergency response programs to obtain immediate reports of, and respond to, fecal coliform- and *E. coli*-positive results.

7. Heterotrophic Bacteria Interference

In the November 3, 1987, notice, EPA proposed that if a laboratory observed evidence of interference with the total coliform analysis caused by high levels of heterotrophic bacteria, as defined in that notice, the public water system would be required to: (1) Declare the sample total coliform-positive and collect the required number of repeat samples, or (2) invalidate the sample, collect another sample from the same location, and have the sample analyzed within eight hours (or 30 hours, if the sample was refrigerated) for both the presence or absence of total coliforms and the density of heterotrophic bacteria. Under the second option, if the sample contained greater than 500 colonies/ml, as measured by the heterotrophic plate count analytical method, then the sample would be counted as a total coliform-positive sample, even if total coliforms were not detected.

EPA received numerous comments on this proposed requirement. A number of commenters indicated that many systems would have difficulty meeting the eight-hour limit between sample collection and analysis. Several suggested that EPA should simply require a system to collect another coliform sample when the laboratory indicates there may have been interference with the first coliform analysis, and not require the system to enumerate heterotrophic bacteria, nor count a high level of heterotrophic bacteria as a total coliform-positive sample.

Based on the public comments, EPA has concluded that a sizable number of small systems would find it very difficult to meet the eight-hour limit between sample collection and analysis, and that refrigeration of these samples would be very costly and impractical for these systems. The Agency believes that, as a result, a large number of systems would end up declaring the sample as total coliform-positive when there was not necessarily a heterotrophic bacteria problem or total coliforms in the sample. This was not EPA's intent. The Agency's primary intent was to prevent a system from using total coliform-negative results in compliance calculations when those results were derived from a culture showing evidence of interference from high levels of heterotrophic bacteria, and thus were potentially unreliable. In response, the final rule does not require that public water systems test for levels of heterotrophic bacteria when there are indications of interference with total coliform measurements, nor do samples with high levels of heterotrophic bacteria count as total coliform-positive samples.

Instead, under the final rule, the system must invalidate any sample which has visual evidence of interference (*unless* total coliforms are detected), collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for total coliforms. In testing these replacement samples, the system should minimize sample transit time and transit temperature, and the laboratory should consider using an analytical method which is less vulnerable to interference by high levels of heterotrophic bacteria (e.g., the Minimal Medium ONPG-MUG test, described below). The results of the second sample must be included in compliance calculations, unless the laboratory reports that interference has again occurred, in which case the sample is invalid. The system must continue to re-sample within 24 hours and have the samples re-analyzed, as described above, until it obtains a valid result.

EPA believes that this requirement will help ensure that coliforms in a contaminated system will eventually be detected, and thereby protect the population served, without imposing a severe burden on small systems.

D. Analytical Methodology

1. Analytical Methods for Total Coliforms

In the November 3, 1987, notice, EPA proposed that analysis for total coliforms be conducted using either the Membrane Filter (MF) Technique, the 10-tube Multiple Tube Fermentation (MTF) Technique, or the Presence-Absence (P–A) Coliform Test. EPA also proposed that a standard volume of 100 ml be analyzed, regardless of the methodology employed. Only the

presence or absence of coliforms in a sample would be reported. In the May 6, 1988 notice, EPA also proposed a fourth analytical method for monitoring the presence or absence of total coliforms, the Colilert System, referred to in this rule by the more generic name, the Minimal Medium ONPG–MUG or MMO–MUG, test.

EPA received a number of comments on the proposed analytical methodologies. Most commenters supported the proposed methodologies and agreed that the use of a standard volume was appropriate. Some commenters, however, were opposed to the elimination of the 5-tube MTF Technique, using a sample 50 ml (a currently EPA-approved method). For the reasons stated in the November 3, 1987, notice, EPA is promulgating the 10-tube test, rather than the 5-tube test. However, under this final rule, it is permissible to run the 10-tube MTF Technique using only five tubes if the laboratory uses larger tubes which collectively analyze a 100-ml water sample. Likewise, the laboratory may use a single bottle containing the MTF medium if it is of sufficient volume to determine the presence or absence of coliforms in a 100-ml water sample.

If a system with a single service connection provides a laboratory with a large volume repeat sample(s), i.e., 200 ml or greater, the laboratory must analyze separate 100-ml portions, as required by the analytical methods. EPA is not allowing analysis of larger sample volumes because of the likelihood of interference with the analytical methodology by high densities of heterotrophic bacteria and turbidity.

Based on ample validity data, described in the record for this rule, which support the use of the proposed methodologies, EPA is promulgating all four of the proposed methods for use in monitoring the presence or absence of coliforms in a 100-ml sample of water.

2. Analytical Methods for Fecal Coliforms and E. coli

In the November 3, 1987, notice, EPA proposed to require the use of EC medium for determining the presence of fecal coliforms in a total coliform-positive culture. The ingredients and preparation of this medium are described in Standard Methods (APHA, 1985). The Agency also proposed a procedure for transferring growth from a total coliform-positive culture to EC medium. There were no significant public comments on this issue; EPA has decided to promulgate these provisions as proposed.

As explained above, EPA has decided to allow systems to test for *E. coli* in lieu of fecal coliforms. The Agency will propose analytical methods for *E. coli* in a subsequent Federal Register notice, and promulgate those methods before the effective date of this rule.

E. Laboratory Certification

Currently, analysis of drinking water samples to determine compliance with the MCLs for coliforms must be analyzed by a laboratory approved by the EPA or a State, as specified by 40 CFR 142.10(b)(4) and 141.28. In the November 3, 1987, notice, EPA solicited comment on, but did not propose, field inoculation and analysis as an alternate approach to requiring the use of certified laboratories for total coliform analysis. Under this approach, a system operator could either send the water sample to a certified laboratory or conduct the analysis on-site by adding a 100-ml water sample to a bottle containing commercially pre-sterilized medium, incubating the sample, and analyzing and recording the results.

Almost all commenters who addressed this issue opposed the field inoculation and analysis option for sample analysis. Commenters were concerned about the significantly greater potential for unreliable results and abuse compared to analysis performed in a certified laboratory, and lack of operator training in analytical methodology. EPA shares these concerns. For this reason, this final rule requires that systems use laboratories which are certified by EPA or a State to analyze compliance samples for total coliforms, fecal coliforms, and *E. coli*. This requirement, however, does not preclude systems from inoculating samples in the field and submitting these inoculated samples to a certified laboratory for incubation and analysis, whenever the analytical methods approved by EPA is 40 CFR 141.21a(f)(2) of the rule permit it.

The Agency is in the process of developing regulations under 40 CFR Parts 141 and 142 to improve State laboratory certification programs and prescribe other quality assurance measures for compliance samples and data management; the issue of self-analysis of compliance samples for total coliforms and other microbial and chemical contaminants will be evaluated as part of this process.

This rule has no specific laboratory certification criteria. EPA will allow any laboratory already certified by the Agency to perform total coliform analysis under the current rule to perform analysis for total coliforms, fecal coliforms, and *E. coli* under this rule until the Agency has established laboratory certification criteria for use with this rule, and has certified it to analyze for total coliforms and fecal coliforms and/or *E. coli* under those criteria. The Agency recommends that States use the same approach for State-certified laboratories. EPA believes this approach is reasonable, since the analytical methods being promulgated for the detection of total coliforms and fecal coliforms are similar to current methods. Furthermore, EPA expects that methods which will be promulgated for *E. coli* will be similar to current methods. Consequently, laboratories currently certified for the enumeration of total coliforms should be capable of making all analytical measurements required in this rule.

V. Variances and Exemptions

In the November 3, 1988, notice, EPA proposed that neither variances nor exemptions to the coliform rule be permitted.

Few commenters addressed this issue. Some agreed that variances and exemptions should not be allowed. Others stated that States should be allowed to issue variances or exemptions to small systems when: (1) The system has had a long record of compliance before development of the problem; (2) the system is in a sparsely populated area; and (3) the system is in an area where the geological formation is known to produce safe water.

As EPA explained in the November 3, 1978, notice, coliforms are the primary indicator of the microbiological quality of water. To the extent a variance or exemption would permit the continued presence of coliforms, the potential for pathogens to be present also would remain. EPA believes that water which exceeds the MCL for total coliforms generally poses an unreasonable risk to health. Therefore, EPA believes States would be unable to make the required determination that no unreasonable risk to health (URTH) would result from a variance or exemption, since a variance or exemption would permit the continued presence of total coliforms in drinking water above the MCL. In addition, in judging whether variances or exemptions are appropriate, it is important to recognize that the final coliform rule already provides some latitude by allowing coliforms to be present in a few, i.e., five percent, of the samples taken for larger systems and one sample per month for systems collecting fewer than 40 samples per month. Accordingly, EPA has concluded that variances and exemptions should not be allowed. However, the Agency is aware of systems where persistent coliforms are present due to distribution

system problems, but apparently are not associated with fecal or pathogenic contamination or with waterborne disease. EPA intends to study these cases to determine whether generic URTH criteria can be developed that could be used as the basis for permitting variances and exemptions under limited circumstances in the future.

Section 141.4 is being revised to reflect the Agency's conclusion that no variances or exemptions to the MCL for total coliforms are allowed. This revision to § 141.4 also prohibits variances from the treatment technique requirements of the surface water treatment requirements in Part 141, Subpart H, promulgated elsewhere in today's Federal Register. The rationale for not allowing variances from the treatment technique requirements is set out in that notice.

VI. Best Available Technologies (BATs) for Total Coliforms

In the November 3, 1987, notice EPA proposed the following BATs for total coliforms: protection of wells from contamination by coliforms by appropriate placement and construction; maintenance of a disinfectant residual of at least 0.2 mg/l throughout the distribution system; proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation andmaintenance of storage tanks and reservoirs, and continual maintenance of positive water pressure in all parts of the distribution system; and filtration and/or disinfection of surface water, as defined in 40 CFR Part 141, Subpart H (promulgated elsewhere in today's Federal Register), or disinfection of ground water using strong oxidants such as chlorine, chlorine dioxide, or ozone.

Since there is a very long history of success of these methods for significantly reducing coliform levels (especially when used together, where appropriate), no more effective technologies were identified by commenters, and they are "available" (taking cost into consideration). EPA is promulgating the proposed BATs in the final coliform rule, without changes. However, the Agency, while continuing to recommend that systems maintain a disinfectant residual, is not specifying a particular concentration value for that residual, since optimum values vary according to the disinfectant used, as well as other factors. Appropriate disinfectant residual concentrations for surface water systems are described in the surface water treatment requirements (published elsewhere in today's Federal Register) and also will be examined in the development of the forthcoming groundwater disinfection rule.

An additional means for achieving compliance with the MCL for total coliforms includes the development and implementation of an EPA-approved State Wellhead Protection Program under section 1428 of the Act. This program, which has been included as BAT in the final rule, is described in section IX below.

The technologies listed above for removal of microbial contamination are discussed extensively in *Technologies and Costs for the Treatment of Microbial Contaminants in Potable Water Supplies* (USEPA, 1988). Filtration, disinfection, and maintenance of the distribution system also will be discussed in EPA's forthcoming *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources*. The methods listed above represent the technology, treatment technique, and other means which EPA finds to be feasible for purposes of meeting the MCL for total coliforms, in accordance with section 1412(b)(6) of SDWA, but this regulation does not require the use of the above methods; if treatment is necessary, systems are free to meet the requirements of this regulation using the methods of their choice (provided they are acceptable to the State.)

VII. Reporting, Recordkeeping, and Public Notification

A. Reporting and Recordkeeping

In the November 3, 1987, notice, EPA proposed to require that a public water system report a violation of the total coliform MCL or coliform monitoring requirement (e.g., a failure to monitor) to the State within 48 hours. EPA also proposed to require a system that detected fecal coliforms in any sample (which was considered an MCL violation under the proposal) to report this violation to the State within 48 hours of its discovery. The Agency also proposed that systems report violations of the long-term coliform MCL to the State.

EPA received very few comments on this proposed reporting requirement. Some commenters indicated that the 48-hour time limit would sometimes be difficult to meet on weekends, when State employees are not at work. EPA agrees, and instead is requiring that systems notify the State of any MCL violation not later than the end of the next business day after the system has been notified of the analytical result which results in the violation. EPA is also requiring that a system notify the State of any monitoring violation, including a failure to complete a sanitary survey within the specified time frame, within ten days after the system learns of the violation. To implement this reporting requirement, EPA is revising § 141.31(b), which currently requires systems to report a violation of a national primary drinking water regulation to the State within 48 hours.

The Agency is not promulgating the proposed reporting requirements for a violation of the long-term MCL, since the proposed long-term MCL is not included in this final rule.

Systems must continue to comply with 40 CFR 141.33, which specifies recordkeeping requirements.

B. Public Notification Language: Total Coliforms

The revised public notification regulations at 40 CFR 141.32 require that notices of an MCL violation describe any adverse health effects. The description must include, at a minimum, language specified by EPA for that contaminant. In the November 3, 1987, notice, EPA proposed language for public notices for a violation of either the monthly or long-term MCL for total coliforms.

Several commenters opposed the proposed language. Some stated that it is too extreme and could cause undue alarm and undermine customer confidence in the water supply. Others claimed that the proposed wording implies that the presence of any total coliforms found in the drinking water will automatically produce disease, and were concerned that all diarrhea, nausea, headaches, etc. will be attributed to drinking water. Some commenters suggested specific changes in the wording of the public notice (primarily the deletion of references to specific diseases and disease symptoms).

EPA appreciates the concern that many individuals might blame the water system whenever they experience the disease symptoms listed in the public notice. Nevertheless, the Act requires public notices to identify what adverse health effects may result when a system exceeds the MCL, and EPA believes customers should be fully informed of possible consequences of a violation. Thus, the mandatory language promulgated today retains the list of potential symptoms. To address the concerns expressed by commenters, however, the Agency has added a statement in the public notice language that notes that factors other than drinking water may also cause the

symptoms noted. The Agency believes such a statement is warranted in the public notice for total coliforms even though it was not included in the public notice language promulgated for volatile organic chemicals and fluoride. The difference is that the chronic effects these other contaminants can cause, such as cancer, occur much less frequently than the acute effects associated with coliform contamination such as headaches and diarrhea; most people experience these symptoms at least several times per year. Thus, a public notice for total coliforms without the qualifying language may lead many individuals to blame the water system as the cause of their illness when this may not be appropriate. With the addition of this explanation, EPA does not believe that the mandatory language is too extreme.

In response to the public comments, EPA has revised the public notice to read as follows:

The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of total coliforms is a possible health concern. Total coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These sysptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for total coliforms to reduce the risk of these adverse health effects. Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe.

C. Public Notification Language: Fecal Coliforms/E. coli

In the November 3, 1987, and May 6, 1988, notices, EPA explained that it believes that the presence of fecal coliforms or *E. coli* in treated water is cause for grave concern and probably poses an acute risk to human health because when fecal coliforms or *E. coli* are detected, if is likely that human pathogens are present. For this reason, EPA believes that more urgent public notice language is needed when fecal coliforms or *E. coli* are detected, compared to when total coliforms are detected. Thus, in the November 3, 1987, notice, EPA proposed separate mandatory health effects language for public notices when fecal coliforms are detected.

The majority of individuals who commented on the proposed language for the two public notices did not distinguish between them. In these cases, EPA assumed that the commenters were referring to both notices. Regarding the comments expressing concern that all diarrhea, nausea, headaches, etc., will be attributed to drinking water, the Agency's position for the fecal coiform/*E. coli* notice is the same as for the total coliform notice, for the same reasons described above. In addition, some commenters thought erroneously that EPA had proposed to require systems to issue a boil water notice as part of the public notice whenever they were notified that a sample contained fecal coliforms; the Agency has clarified this point of confusion by omitting any reference to boiling the water in the mandatory language. Based on its evaluation of the comments, EPA has revised the mandatory health effects language for fecal coliforms/*E. coli* to read as follows:

The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of fecal coliforms or *E. coli* is a serious health concern. Fecal coliforms and *E. coli* are generally not harmful themselves, but their presence in drinking water is serious because they usually are associated with sewage or animal wastes. The presence of these bacteria in drinking water is generally a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and *E. coli* to reduce the risk of these adverse health effects. Under this standard all drinking water samples must be free of these bacteria. Drinking water which meets this standard is associated with little or none of this risk and should be considered safe. State and local health authorities recommend that consumers take the following precautions: [To be inserted by the public water systems, according to instrucitons from State or local authorities].

EPA is requiring the water system to include information at the end of the mandatory public notice on what precautions the public should take. The Agency believes that it is important to provide all of the system's consumers with specific information on the problem and suggestions for dealing with it; consumers should not have to take additional steps to obtain this information elsewhere.

VIII. Costs and Benefits of Complying With the NPDWR for Total Coliforms

A. Costs

The estimated cost of this rule consists of costs for routine and repeat monitoring and periodic sanitary surveys. Many commenters though that remedial action costs should be included as well. For accounting purposes, EPA is allocating the cost of remedial actions to the surface water treatment requirements, published elsewhere in today's Federal Register, or the forthcoming groundwater disinfection rule, rather than the total coliform rule, because the interrelationships between them make it impossible to clearly distinguish which costs should be attributed to each rule. Occasionally, as a result of meeting the provisions of the total coliform rule, a system may discover a contamination problem not addressed by the surface water treatment requirements and groundwater disinfection rule (e.g., cross-connections, biofilm problems in the presence of disinfectants). EPA believes that the cost of remedial action in these cause is negligible. Moreover, in these cases, while State or local requirements may dictate remedial action, this regulation does not. For these reasons, EPA has not attributed these remedial costs to this final rule.

Assuming that a commercial laboratory is used for all required analyses, EPA has estimated the increment of additional monitoring for all systems to cost from $20.5 to $31.5 million/year. This estimate is based on an average collection cost of $4/sample for large systems, and $10.50/sample for small systems. For small systems, depending on whether they are located in rural areas or near large metropolitan areas, collection costs are estimated to range from $4/sample to $17/sample. For the purposes of economic analysis, sample analysis costs for total coliforms are estimated at $12/sample. Fecal coliform or *E. coli* testing of total coliform-positive cultures is estimated to cost an additional $12/sample. This cost information is found in the Economic Impact Analysis (EIA) for this rule (USEPA, 1989).

Sanitary surveys for systems collecting fewer than five samples/

month must be performed at five-year intervals (except for systems using protected and disinfected ground water for which the interval is ten years). EPA estimates the total cost of these surveys, annualized over 20 years and assuming a three percent interest rate, at $28 million per year. In sum, the incremental cost of this rule over the interim rule is estimated to range from $64 to $76 million per year, including an incremental cost of $16 million which will be incurred by the States for implementing this revised rule. Systems already are also incurring costs to comply with the MCLs for total coliforms under the interim rule, which are estimated to be $67 million per year. When added to the incremental costs associated with today's rule, the total cost for systems to comply with the revised coliform requirements is estimated to range from $131 to $142 million per year (Table 5). These estimates are more fully discussed in the EIA (USEPA, 1989).

TABLE 5—NATIONAL COSTS OF THE TOTAL COLIFORM RULE

(In millions of dollars/year)

	Total		Incremental increase over interim requirements	
	Lower bound	Upper bound	Lower bound	Upper bound
Routine monitoring	67	67	1.5	1.5
Sanitary surveys	28	28	28	28
Repeat monitoring	20	31	19	30
State program costs	[1] 16	[1] 16	16	16
Total	131	142	64	76

[1] Baseline information is unknown. Therefore, only the incremental increase is listed.

B. Benefits

The benefit of the coliform rule is the identification of public water systems that are contaminated or vulnerable to contamination. The rule identifies such systems by requiring routine monitoring by all systems, requiring periodic sanitary surveys for small systems, requiring additional monitoring for systems which detect contamination, clarifying when a State may invalidate a total coliform-positive sample, requiring fecal coliform or *E. coli* testing on all total coliform-positive cultures, and requiring systems to develop (subject to State review and revision) the sample siting plan for each system. EPA believes that these elements of this revised total coliform rule will identify a significant number of water systems which will need to take action to improve the microbial quality of their water and others where preventive action will avoid future problems.

The remedial measures necessary to comply with the total coliform rule will also fulfill some or all of the surface water treatment requirements or the forthcoming groundwater disinfection requirements. As with costs, for accounting purposes, EPA is attributing all health benefits resulting from compliance with this rule to the surface water treatment requirements and the disinfection rule for groundwater systems, rather than the total coliform rule, because the interrelationships among them make it impossible to clearly distinguish which benefits are attributable to each rule.

IX. State Implementation of Total Coliform Requirements

A. General Primacy Requirements

Section 1413 of the SDWA establishes requirements a State must meet in order to receive primary enforcement responsibility (primacy) for public water systems. These include: (1) Adopting drinking water regulations no less stringent than the NPDWRs in effect under sections 1412(a) and 1412(b); (2) adopting and implementing adequate procedures for enforcement; (3) keeping records and making such reports with respect to its activities as EPA may require by regulation; (4) issuing variances and exemptions (if allowed at all by the State) under conditions no less stringent than allowed by sections 1415 and 1416; and (5) adopting and being able to implement an adequate plan for the provision of safe drinking water emergency situations.

40 CFR Part 142 sets out the specific program implementation requirements for States to obtain primacy for the public water system supervision (PWSS) program as authorized under section 1413 of the SDWA. EPA first promulgated these regulations on January 20, 1976. Since 1976, however, much has happened in the PWSS program, and portions of the implementation regulations at 40 CFR Part 142 have become outdated. In response, on August 2, 1988, the Agency proposed revisions to 40 CFR Part 142, Subpart B which take into account the program's evolution since 1976, as well as the new legislative mandates (53 FR 29194). The revised implementation regulations will be promulgated shortly. These implementation regulations will specify procedures, timing, and other general section 1413 requirements a State must meet to retain primary enforcement responsibility, including the requirement that primary States adopt drinking water regulations that are no less stringent than new or revised national primary drinking water regulations promulgated under SDWA section 1412. Since these general requirements will apply to States adopting this revised coliform rule, today's amendment of 40 CFR Part 142 only addresses primacy criteria that are unique to the total coliform rule.

For objective criteria in the NPDWRs, including the revised coliform rule, i.e., requirements that do not involve an exercise of discretion, States, as a condition of obtaining or maintaining (as appropriate) primacy, must promulgate regulations that incorporate requirements that are no less stringent than the national regulations. For the discretionary criteria, i.e., those which the State has discretion to choose how they will be implemented, the State, as part of its program revision, generally need only describe the practices or procedures it will use to implement those portions of its program. Both types of criteria are described below.

B. Special Primacy Requirements

As described above, an application for approval of a State program revision must describe the practices or procedures that the State will use to implement provisions of the total coliform regulations that provide State flexibility with respect to how the objectives of the regulation are to be achieved, e.g., sample invalidation procedures. These optional discretionary elements are listed in § 142.16(c)(12). With the exception of the requirements of 40 CFR 142.16(c)(1) (the sample siting plan approval procedure, which is a mandatory element of a program revision), however, a State need only submit the practices or procedures associated with implementing the elements it intends to use. Thus, for a particular element listed, if the State does not plan to exercise the discretion provided in the total coliform rule, the program revision need not address this element.

Where the State is only required to describe the practices or procedures it will use in exercising the discretion provided in the total coliform regulation, EPA review of that portion of the State program revision will generally be limited. It will consider whether the State practices or procedures are clear and unambiguous, and whether they can be reasonably expected to accomplish the objectives of the regulations.

C. State Recordkeeping and Reporting Requirements

Today's notice amends 40 CFR Part 142 to add requirements for States with primary enforcement responsibility to retain records and report information to EPA to ensure adequate oversight of the States' activities to implement the revised total coliform regulations. No previously required reporting requirements are deleted. States must:

(1) Retain records of determinations made on a system-by-system or case-by-case basis where the State has exercised its discretionary authority under the provisions of § 142.20(c). The list of records of determinations which must be kept is contained in § 142.14(a)(5). Some of these decisions are only required to be put in writing and placed in the affected system's file (e.g., waiving the 24-hour limit for collecting total coliform repeat samples under certain specified conditions). Other decisions require that the system be notified in writing (e.g., reduced routine total coliform monitoring for a public water system) in addition to a record of determination being placed in the system's file. The requirement to have a record of decision in writing is necessary to determine compliance. Without this record, a file review might show a system to be out of compliance when in fact the State had used its discretionary authority to modify the requirements that the system had to meet.

(2) Submit a report by January 1 of each year which consists of a list of public water systems which the State has determined are allowed to monitor less frequently than once per month for community water systems or less frequently than once per quarter for non-community water systems in accordance with § 141.21a(a). The list must include effective dates for systems which did not have such a determination in place for the entire preceding federal fiscal year.

D. State Wellhead Protection Program

Section 1428 of the SDWA contains requirements for the development and implementation of State Wellhead Protection (WHP) Programs to protect wells and wellfields which are used, or may be used, to provide source water to public water systems. Under section 1428, each State must adopt and submit to EPA for approval a WHP Program that, at a minimum:

(1) Specifies the duties of State agencies, local governments, and public water systems in the development and implementation of the WHP Program;

(2) For each wellhead, determines the wellhead protection area (WHPA), as defined in section 1428(e) of SDWA, based on all reasonably available hydrogeologic information on ground-water flow, recharge, and discharge and other information the State deems necessary to adequately determine the WHPA;

(3) Identifies within each WHPA all potential human sources of contaminants which may have any adverse health effect;

(4) Describes provisions for technical assistance, financial assistance, implementation of control measures, and education, training, and demonstration projects to protect the water supply within WHPAs from such contaminants;

(5) Includes contingency plans for the location and provision of alternate drinking water supplies for each public water system in the event of well or wellfield contamination by such contaminants;

(6) Requires that State and local governments and public water systems consider all potential sources of human contamination within the expected wellhead areas of a new water well which serves a public water system; and

(7) Requires public participation in developing the WHP Program.

SDWA required all States to submit a WHP program to EPA by June 19, 1989, for EPA review and approval. EPA has prepared the following technical guidance documents to assist States in developing WHP programs: "Guidance for Applicants for State Wellhead Protection Program Assistance Funds under the Safe Drinking Water Act" (Office of Ground-Water Protection, 1987) and "Guidelines for Delineation of Wellhead Protection Areas" (Office of Ground-Water Protection, 1987). States may wish to use the WHP Program to help assess the vulnerability of a ground-water system to microbial and chemical contamination; such information would be useful to the State in determining the frequency with which a system must sample and conduct sanitary surveys under this revised coliform rule.

X. Other Statutory and Executive Order Requirements

A. Executive Order 12291

Under Executive Order 12291, EPA must judge whether a regulation is "major" and therefore subject to the Regulatory Impact Analysis (RIA) requirement. This action does not constitute a "major" regulatory action because it will have a financial impact on the regulated community of under $100 million per year. Therefore, EPA prepared an Economic Impact Analysis (USEPA, 1989) (rather than an RIA) during regulation development and submitted it to the Office of Management and Budget for review. Results of the analysis are presented above in section VIII.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act requires EPA to explicitly consider the effect of proposed regulations on small entities. If there is a significant effect on a substantial number of small systems, means should be sought to minimize the effects.

The Small Business Administration defines a "small water utility" as one which serves fewer than 50,000 people. All systems in this size category will be subject to this final total coliform rule, but EPA expects the average incremental cost increase for such systems due to the new requirements of this rule, compared to the total cost of producing water, to be quite small, about 0.6–0.7 percent. Consequently, the rule is not expected to have a significant economic effect on a substantial number of small systems within the meaning of the Regulatory Flexibility Act. Although EPA anticipates that some small entities may have some financial difficulty in achieving compliance with the rule, the Agency has adopted a number of measures, many in response to public comments, to mitigate this burden. As a result, this final rule is less burdensome on small systems than the proposed rule would have been. These measures include retaining the current monitoring frequency for small systems (the proposal would have increased it) and reducing the frequency of sanitary surveys (compared to the proposal). EPA believes that further measures to reduce cost could significantly jeopardize public health.

C. Paperwork Reduction Act

The information collection requirements contained in this rule have been submitted to the Office of Management and Budget (OMB) under the provisions of the *Paperwork Reduction Act*, 44 U.S.C. 3501 *et seq.* The information collection requirements are not effective until OMB approves them and a technical amendment to that effect is published in the Federal Register.

The public reporting burden on public water systems for this collection of information, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and

completing and reviewing the collection of information, is estimated to average 0.4 hour more per response than the interim total coliform rule. The annual public reporting burden on each State program for this collection of information is estimated to average 10,077 hours per response more than the current total coliform rule.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA."

D. Science Advisory Board and National Drinking Water Advisory Council

In accordance with section 1412(d) of the Safe Drinking Water Act, the Agency consulted with the Secretary and the National Drinking Water Advisory Council before proposing and promulgating these regulations, and considered their comments. In addition, in accordance with section 1412(e) of the Safe Drinking Water Act, EPA requested comments from the Science Advisory Board before proposing this MCLG and NPDWR, and took its comments into consideration in developing the proposed and final rule.

List of Subjects in 40 CFR Parts 141 and 142

Microorganisms, Incorporation by reference, Intergovernmental relations, Reporting and recordkeeping requirements, Water supply, Administrative practice and procedure.

Dated: June 19, 1989.

William K. Reilly,

Administrator.

XI. References

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USEPA. 1984. U.S. Environmental Protection Agency, Office of Drinking Water. Drinking water criteria document for total coliforms. PB 86–118148, National Technical Information Service, 5285 Port Royal Rd., Springfield, VA 22161.

USEPA. 1988. U.S. Environmental Protection Agency. Office of Drinking Water. Technologies and costs for the treatment of microbial contaminants in potable water supplies.

USEPA. 1989. U.S. Environmental Protection Agency. Economic Impact Analysis: Benefits and costs of final total coliform rule.

USEPA. ——. U.S. Environmental Protection Agency. Office of Drinking Water. Guidance manual for compliance with the filtration and disinfection requirements for public water systems using surface water sources (draft).

For the reasons set forth in the preamble, Title 40, Chapter I of the Code of Federal Regulations is amended as follows:

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

1. The authority 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, and 300j–9.

§ 141.2 [Corrected]

2. FR Doc. 88–21695 published September 28, 1988, beginning at page 37396 is corrected at page 37410, second column, for Part 141 by removing the paragraph designations (d) and (h) in § 141.2, and changing the amendatory instruction to read as follows: "2. In § 141.2 the definitions for 'Person" and 'State' are revised to read as follows:".

2a. In § 141.2, the following new definitions are added and arranged alphabetically to read as follows:

§ 141.2 Definitions.

* * * * *

"Confluent growth" means a continuous bacterial growth covering the entire filtration area of a membrane filter, or a portion thereof, in which bacterial colonies are not discrete.

* * * * *

"Domestic or other non-distribution system plumbing problem" means a coliform contamination problem in a public water system with more than one service connection that is limited to the specific service connection from which the coliform-positive sample was taken.

* * * * *

"Near the first service connection" means at one of the 20 percent of all service connections in the entire system that are nearest the water supply treatment facility, as measured by water transport time within the distribution system.

* * * * *

"System with a single service connection" means a system which supplies drinking water to consumers via a single service line.

"Too numerous to count" means that the total number of bacterial colonies exceeds 200 on a 47-mm diameter membrane filter used for coliform detection.

* * * * *

3. Section 141.4 is revised to read as follows:

§ 141.4 Variances and exemptions

Variances or exemptions from certain provisions of these regulations may be granted pursuant to sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility, except that variances or exemptions from the MCL for total coliforms and variances from any of the treatment technique requirements of Subpart H of this part may not be granted.

§ 141.14 [Removed]

4. Section 141.14 is removed.

5. Section 141.21 is revised to read as follows:

§ 141.21 Coliform sampling.

(a) *Routine monitoring.* (1) Public water systems must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. These plans are subject to State review and revision.

(2) The monitoring frequency for total coliforms for community water systems is based of the population served by the system, as follows:

TOTAL COLIFORM MONITORING FREQUENCY FOR COMMUNITY WATER SYSTEMS

Population served	Minimum number of samples per month
25 to 1,000 [1]	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,900	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

[1] Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

If a community water system serving 25 to 1,000 persons has no history of total coliform contamination in its current configuration and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and is free of sanitary defects, the State may reduce the monitoring frequency specified above, except that in no case may the State reduce the monitoring frequency to less than one sample per quarter. The State must approve the reduced monitoring frequency in writing.

(3) The monitoring frequency for total coliforms for non-community water systems is as follows:

(i) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public, except that the State may reduce this monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. Beginning June 29, 1994 the State cannot reduce the monitoring frequency for a non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving 1,000 persons or fewer to less than once/year.

(ii) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, except the State may reduce this monitoring frequency, in writing, for any month the system serves 1,000 persons or fewer. The State cannot reduce the monitoring frequency to less than once/year. For systems using ground water under the direct influence of surface water, paragraph (a)(3)(iv) of this section applies.

(iii) A non-community water system using surface water, in total or in part, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, regardless of the number of persons it serves.

(iv) A non-community water system using ground water under the direct influence of surface water, as defined in 141.2, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section. The system must begin monitoring at this frequency beginning six months after the State determines that the ground water is under the direct influence of surface water.

(4) The public water system must collect samples at regular time intervals throughout the month, except that a system which uses ground water (except ground water under the direct influence of surface water, as defined in § 141.2), and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

(5) A public water system that uses surface water or ground water under the direct influence of surface water, as defined in § 141.2, and does not practice filtration in compliance with Subpart H must collect at least one sample near the first service connection each day the turbidity level of the source water, measured as specified in § 141.74(b)(2), exceeds 1 NTU. This sample must be analyzed for the presence of total coliforms. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection. Sample results from this coliform monitoring must be included in determining compliance with the MCL for total coliforms in § 141.63.

(6) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the MCL for total coliforms in § 141.63. Repeat samples taken pursuant to paragraph (b) of this section are not considered special purpose samples, and must be used to determine compliance with the MCL for total coliforms in § 141.63.

(b) *Repeat monitoring.* (1) If a routine sample is total coliform-positive, the public water system must collect a set of repeat samples within 24 hours of being notified of the positive result. A system which collects more than one routine sample/month must collect no fewer than three repeat samples for each total coliform-positive sample found. A system which collects one routine sample/month or fewer must collect no fewer than four repeat samples for each total coliform-positive sample found. The State may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. In the case of an extension, the State must specify how much time the system has to collect the repeat samples.

(2) The system must collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the State may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

(3) The system must collect all repeat samples on the same day, except that the State may allow a system with a single service connection to collect the required set of repeat samples over a four-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one routine sample/month).

(4) If one or more repeat samples in the set is total coliform-positive, the public water system must collect an additional set of repeat samples in the manner specified in paragraphs (b)(1)–(3) of this section. The additional samples must be collected within 24 hours of being notified of the positive result, unless the State extends the limit as provided in paragraph (b)(1) of this section. The system must repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in § 141.63 has been exceeded and notifies the State.

(5) If a system collecting fewer than five routine samples/month has one or more total coliform-positive samples and the State does not invalidate the sample(s) under paragraph (c) of this section, it must collect at least five routine samples during the next month the system provides water to the public, except that the State may waive this requirement if the conditions of paragraph (b)(5) (i) or (ii) of this section are met. The State cannot waive the requirement for a system to collect repeat samples in paragraphs (b)(1)–(4) of this section.

(i) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

(ii) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State has determined why the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem. The State cannot waive the requirement to collect five routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. Under this paragraph, a system must still take at least one routine sample before the end of the next month it serves water to the public and use it to determine compliance with the MCL for total coliforms in § 141.63, unless the State has determined that the system has corrected the contamination problem before the system took the set of repeat samples required in paragraphs (b)(1)–(4) of this section, and all repeat samples were total coliform-negative.

(6) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(7) Results of all routine and repeat samples not invalidated by the State must be included in determining compliance with the MCL for total coliforms in § 141.63.

(c) *Invalidation of total coliform samples.* A total coliform-positive sample invalidated under this paragraph (c) does not count towards meeting the minimum monitoring requirements of this section. (1) The State may invalidate a total coliform-positive sample only if the conditions of paragraph (c)(1)(i), (ii), or (iii) of this section are met.

(i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.

(ii) The State, on the basis of the results of repeat samples collected as required by paragraphs (b) (1) through (4) of this section, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The State cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., a State cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the public water system has only one service connection).

(iii) The State has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under paragraphs (b) (1) through (4) of this section, and use them to determine compliance with the MCL for total coliforms in § 141.63. To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision must be documented in writing, and approved and signed by the supervisor of the State official who recommended the decision. The State must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(2) A laboratory must invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the Multiple-Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence (P–A) Coliform Test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system must continue to re-sample within 24 hours and have the samples analyzed until it obtains a valid result. The State may waive the 24-hour time limit on a case-by-case basis.

(d) *Sanitary surveys.* (1)(i) Public water systems which do not collect five or more routine samples/month must undergo an initial sanitary survey by June 29, 1994 for community public water systems and June 29, 1999 for non-community water systems. Thereafter, systems must undergo another sanitary survey every five years, except that non-community water systems using only protected and disinfected ground water,

as defined by the State, must undergo subsequent sanitary surveys at least every ten years after the initial sanitary survey. The State must review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the system needs to undertake to improve drinking water quality.

(ii) In conducting a sanitary survey of a system using ground water in a State having an EPA-approved wellhead protection program under section 1428 of the Safe Drinking Water Act, information on sources of contamination within the delineated wellhead protection area that was collected in the course of developing and implementing the program should be considered instead of collecting new information, if the information was collected since the last time the system was subject to a sanitary survey.

(2) Sanitary surveys must be performed by the State or an agent approved by the State. The system is responsible for ensuring the survey takes place.

(e) *Fecal coliforms/Escherichia coli (E. coli) testing.* (1) If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for *E. coli* in lieu of fecal coliforms. If fecal coliforms or *E. coli* are present, the system must notify the State by the end of the day when the system is notified of the test result, unless the system is notified of the result after the State office is closed, in which case the system must notify the State before the end of the next business day.

(2) The State has the discretion to allow a public water system, on a case-by-case basis, to forgo fecal coliform or *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive of *E. coli*-positive. Accordingly, the system must notify the State as specified in paragraph (e)(1) of this section and the provisions of § 141.63(b) apply.

(f) *Analytical methodology.* (1) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

(2) Public water systems need only determine the presence or absence of total coliforms; a determination of total coliform density is not required.

(3) Public water systems must conduct total coliform analyses in accordance with one of the following analytical methods:

(i) Multiple-Tube Fermentation (MTF) Technique, as set forth in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th edition, Method 908, 908A, and 908B—pp. 870–878, except that 10 fermentation tubes must be used; or *Microbiological Methods for Monitoring the Environment, Water and Wastes*, U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA–600/8–78–017, December 1978, available from ORD Publications, CERI, U.S. EPA, Cincinnati, Ohio 45268), Part III, Section B.4.1–4.6.4, pp. 114–118 (Most Probable Number Method), except that 10 fermentation tubes must be used; or

(ii) Membrance Filter (MF) Technique, as set forth in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th edition, Method 909, 909A and 909B—pp. 886–896; or *Microbiological Methods for Monitoring the Environment, Water and Wastes*, U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA–600/8–78–017, December 1978, available from ORD Publications, CERI, U.S. EPA, Cincinnati, Ohio 45268), Part III, Section B.2.1–2.6, pp. 108–112; or

(iii) Presence-Absence (P–A) Coliform Test, as set forth in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th edition, Method 908E—pp. 882–886; or

(iv) Minimal Medium ONPG–MUG (MMO–MUG) Test, as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with Presence-Absence Techniques" (Edberg et al.), Applied and Environmental Microbiology, Volume 55, pp. 1003–1008, April 1989. (Note: The MMO–MUG Test is sometimes referred to as the Autoanalysis Colilert System.)

(4) In lieu of the 10-tube MTF Technique specified in paragraph (f)(3)(i) of this section, a public water system may use the MTF Technique using either five tubes (20-ml sample portions) or a single culture bottle containing the culture medium for the MTF Technique, i.e., lauryl tryptose broth (formulated as described in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association *et al.*, 16th Edition, Method 908A—pp. 872), as long as a 100-ml water sample is used in the analysis.

(5) Public water systems must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique or Presence-Absence (P–A) Coliform Test is used to test for total coliforms, shake the lactose-positive presumptive tube or P–A bottle vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator stick into brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliforms, respectively. For EPA-approved analytical methods which use a membrance filter, remove the membrane containing the total coliform colonies from the substrate with a sterile forceps and carefully curl and insert the membrane into a tube of EC medium. (The laboratory may first remove a small portion of selected colonies for verification.) Gently shake the inoculated EC tubes to insure adequate mixing and incubate in a waterbath at 44.5 ±0.2 °C for 24 ± 2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test. The preparation of EC medium is described in *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 16th Edition, Method 908C—pp. 879, paragraph 1a. Public water systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required.

(6) These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the analytical methods cited in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association *et al.*; 1015 Fifteenth Street, NW.; Washington, DC 20005. Copies of the methods set forth in *Microbiological Methods for Monitoring the Environment, Water and Wastes* may be obtained from ORD Publications, U.S. EPA, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268. Copies of the MMO–MUG Test as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method" (Edberg *et al.*) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. Copies may be inspected at EPA's Drinking Water Docket; 401 M Street, SW.; Washington,

DC 20460, or at the Office of the Federal Register; 1100 L Street, NW.; Room 8401; Washington, DC 20408.

(g) *Response to violation.* (1) A public water system which has exceeded the MCL for total coliforms in § 141.63 must report the violation to the State no later than the end of the next business day after it learns of the violation, and notify the public in accordance with § 141.32.

(2) A public water system which has failed to comply with a coliform monitoring requirement, including the sanitary survey requirement, must report the monitoring violation to the State within ten days after the system discovers the violation, and notify the public in accordance with § 141.32.

6. Section 141.31 is amended by revising paragraph (b) to read as follows:

§ 141.31 Reporting requirements.

* * * * *

(b) Except where a different reporting period is specified in this part, the supplier of water must report to the State within 48 hours the failure to comply with any national primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

* * * * *

7. Section 141.32 is amended to add paragraphs (a)(1)(iii)(C), (e)(11) and (12) to read as follows:

§ 141.32 General public notification requirements.

(a) * * *

(1) * * *

(iii) * * *

(C) Violation of the MCL for total coliforms, when fecal coliforms or *E. coli* are present in the water distribution system, as specified in § 141.63(b).

* * * * *

(e) * * *

(11) *Total coliforms* (To be used when there is a violation of § 141.63(a), and not a violation of § 141.63(b)) The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of total coliforms is a possible health concern. Total coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for total coliforms to reduce the risk of these adverse health effects. Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe.

(12) *Fecal Coliforms/E. coli* (To be used when there is a violation of § 141.63(b) or both § 141.63(a) and (b)) The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of fecal coliforms or *E. coli* is a serious health concern. Fecal coliforms and *E. coli* are generally not harmful themselves, but their presence in drinking water is serious because they usually are associated with sewage or animal wastes. The presence of these bacteria in drinking water is generally a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and *E. coli* to reduce the risk of these adverse health effects. Under this standard all drinking water samples must be free of these bacteria. Drinking water which meets this standard is associated with little or none of this risk and should be considered safe. State and local health authorities recommend that consumers take the following precautions: [To be inserted by the public water system, according to instructions from State or local authorities].

8. Section § 141.52 is amended by adding a new entry "(4)" to the table to read as follows:

§ 141.52 Maximum contaminant level goals for microbiological contaminants

* * * * *

Contaminant	MCLG
* * * * *	
(4) Total coliforms (including fecal coliforms and *Escherichia coli*).	Zero.

9. A new 141.63 is added to Subpart G to read as follows:

§ 141.63 Maximum contaminant levels (MCLs) for microbiological contaminants.

(a) The MCL is based on the presence or absence of total coliforms in a sample, rather than coliform density.

(1) For a system which collects at least 40 samples per month, if no more than 5.0 percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms.

(2) For a system which collects fewer than 40 samples/month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

(b) Any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or *E. coli*-positive routine sample constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in § 141.32, this is a violation that may pose an acute risk to health.

(c) A public water system must determine compliance with the MCL for total coliforms in paragraphs (a) and (b) of this section for each month in which it is required to monitor for total coliforms.

(d) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in paragraphs (a) and (b) of this section:

(1) Protection of wells from contamination by coliforms by appropriate placement and construction;

(2) Maintenance of a disinfectant residual throughout the distribution system;

(3) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, and continual maintenance of positive water pressure in all parts of the distribution system;

(4) Filtration and/or disinfection of surface water, as described in Subpart H, or disinfection of ground water using

strong oxidants such as chlorine, chlorine dioxide, or ozone; or

(5) The development and implementation of an EPA-approved State Wellhead Protection Program under section 1428 of the SDWA.

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

1. The authority citation for Part 142 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, and 300j–9.

2. Section 142.14 is amended by revising paragraph (a)(2) and adding a new paragraph (a)(5) to read as follows:

§ 142.14 Records kept by States.

(a) * * *

(2) Records of microbiological analyses of repeat or special samples shall be retained for not less than one year in the form of actual laboratory reports or in an appropriate summary form.

* * * * *

(5) Records of each of the following decisions made pursuant to the total coliform provisions of Part 141 shall be made in writing and retained by the State.

(i) Records of the following decisions must be retained for 5 years.

(A) Section 141.21(b)(1)—Any decision to waive the 24-hour time limit for collecting repeat samples after a total coliform-positive routine sample if the public water system has a logistical problem in collecting the repeat sample that is beyond the system's control, and what alternative time limit the system must meet.

(B) Section 141.21(b)(5)—Any decision to allow a system to waive the requirement for five routine samples the month following a total coliform-positive sample. If the waiver decision is made as provided in § 141.21(b)(5), the record of the decision must contain all the items listed in that paragraph.

(C) Section 141.21(c)—Any decision to invalidate a total coliform-positive sample. If the decision to invalidate a total coliform-positive sample as provided in § 141.21(c)(1)(iii) is made, the record of the decision must contain all the items listed in that paragraph.

(ii) Records of each of the following decisions must be retained in such a manner so that each system's current status may be determined.

(A) Section 141.21(a)(2)—Any decision to reduce the total coliform monitoring frequency for a community water system serving 1000 persons or fewer, that has no history of total coliform contamination in its current configuration and had a sanitary survey conducted within the past five years showing that the system is supplied solely by a protected groundwater source and is free of sanitary defects, to less than once per month, as provided in § 141.21(a)(2); and what the reduced monitoring frequency is. A copy of the reduced monitoring frequency must be provided to the system.

(B) Section 141.21(a)(3)(i)—Any decision to reduce the total coliform monitoring frequency for a non-community water system using only ground water and serving 1,000 persons or fewer to less than once per quarter, as provided in § 141.21(a)(3)(i), and what the reduced monitoring frequency is. A copy of the reduced monitoring frequency must be provided to the system.

(C) Section 141.21(a)(3)(ii)—Any decision to reduce the total coliform monitoring frequency for a non-community water system using only ground water and serving more than 1,000 persons during any month the system serves 1,000 persons or fewer, as provided in § 141.21(a)(3)(ii). A copy of the reduced monitoring frequency must be provided to the system.

(D) Section 141.21(a)(5)—Any decision to waive the 24-hour limit for taking a total coliform sample for a public water system which uses surface water, or ground water under the direct influence of surface water, and which does not practice filtration in accordance with Part 141, Subpart H, and which measures a source water turbidity level exceeding 1 NTU near the first service connection as provided in § 141.21(a)(5).

(E) Section 141.21(d)(1)—Any decision that a non-community water system is using only protected and disinfected ground water and therefore may reduce the frequency of its sanitary survey to less than once every five years, as provided in § 141.21(d), and what that frequency is. A copy of the reduced frequency must be provided to the system.

(F) Section 141.21(d)(2)—A list of agents other than the State, if any, approved by the State to conduct sanitary surveys.

(G) Section 141.21(e)(2)—Any decision to allow a public water system to forgo fecal coliform of *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. coli*-positive, as provided in § 141.21(e)(2).

* * * * *

3. Section 142.15 is amended by adding a new paragraph (b)(5) to read as follows:

§ 142.15 Reports by States.

* * * * *

(b) * * *

(5) A list of public water systems which the State is allowing to monitor less frequently than once per month for community water systems or less frequently than once per quarter for non-community water systems as provided in § 141.21a, including the effective date of the reduced monitoring requirement for each system.

4. Section 142.16 is amended by adding a new paragraph (c) to read as follows:

§ 142.16 Special primacy requirements.

* * * * *

(c) *Total coliform requirements.* In addition to meeting the general primacy requirements of this part, an application for approval of a State program revision that adopts the requirements of the national primary drinking water regulation for total coliforms must contain the following information.

(1) The application must describe the State's plan for determining whether sample-siting plans are acceptable (including periodic reviews), as required by § 141.21(a)(1).

(2) The national primary drinking water regulation for total coliforms in Part 141 gives States the option to impose lesser requirements in certain circumstances, which are listed below. If a State chooses to exercise any of these options, its application for approval of a program revision must include the information listed below (the State need only provide the information listed for those options it has chosen to use).

(i) Section 141.21(a)(2) (Reduced monitoring requirements for community water systems serving 1,000 or fewer persons)—a description of how the State will determine whether it is appropriate to reduce the total coliform monitoring frequency for such systems using the criteria in § 141.21(a)(2) and how it will determine the revised frequency.

(ii) Section 141.21(a)(3)(i) (Reduced monitoring requirements for non-community water systems using ground water and serving 1000 persons or fewer) A description of how the State will determine whether it is appropriate to reduce the total coliform monitoring frequency for such systems using the criteria in § 141.21(a)3)(i) and how it will determine the revised frequency.

(iii) Section 141.21(a)(3)(ii) (Reduced monitoring for non-community water systems using ground water and serving more than 1000 persons) A description of how the State will determine whether it is appropriate to reduce the total coliform monitoring frequency for non-

community water systems using only ground water and serving more than 1000 persons during any month the system serves 1000 persons or fewer and how it will determine the revised frequency.

(iv) Section 141.21(a)(5) (Waiver of time limit for sampling after a turbidity sampling result exceeds 1 NTU) A description of how the State will determine whether it is appropriate to waive the 24-hour time limit.

(v) Section 141.21(b)(1) (Waiver of time limit for repeat samples) A description of how the State will determine whether it is appropriate to waive the 24-hour time limit and how it will determine what the revised time limit will be.

(vi) Section 141.21(b)(3) (Alternative repeat monitoring requirements for systems with a single service connection) A description of how the State will determine whether it is appropriate to allow a system with a single service connection to use an alternative repeat monitoring scheme, as provided in § 141.21(b)(3), and what the alternative requirements will be.

(vii) Section 141.21(b)(5) (Waiver of requirement to take five routine samples the month after a system has a total coliform-positive sample) A description of how the State will determine whether it is appropriate to waive the requirement for certain systems to collect five routine samples during the next month it serves water to the public, using the criteria in § 141.21(b)(5).

(viii) Section 141.21(c) (Invalidation of total coliform-positive samples) A description of how the State will determine whether it is appropriate to invalidate a total coliform-positive sample, using the criteria in § 141.21(c).

(ix) Section 141.21(d) (Sanitary surveys) A description of the State's criteria and procedures for approving agents other than State personnel to conduct sanitary surveys.

(x) Section 141.21(e)(2) (Waiver of fecal coliform or *E. coli* testing on a total coliform-positive sample) A description of how the State will determine whether it is appropriate to waive fecal coliform or *E. coli* testing on a total coliform-positive sample.

5. A new § 142.63 is added to read as follows:

§ 142.63 Variances and exemptions from the maximum contaminant level for total coliforms.

No variances or exemptions from the maximum contaminant level in § 141.63 of this chapter are permitted.

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community water systems using only ground water and serving more than 1000 persons during any month the system serves 1000 persons or fewer and how it will determine the revised frequency.

(iv) Section 141.21(a)(5) (Waiver of time limit for sampling after a turbidity sampling result exceeds 1 NTU) A description of how the State will determine whether it is appropriate to waive the 24-hour time limit.

(v) Section 141.21(b)(1) (Waiver of time limit for repeat samples) A description of how the State will determine whether it is appropriate to waive the 24-hour time limit and how it will determine what the revised time limit will be.

(vi) Section 141.21(b)(3) (Alternative repeat monitoring requirements for systems with a single service connection) A description of how the State will determine whether it is appropriate to allow a system with a single service connection to use an alternative repeat monitoring scheme, as provided in § 141.21(b)(3), and what the alternative requirements will be.

(vii) Section 141.21(b)(5) (Waiver of requirement to take five routine samples the month after a system has a total coliform-positive sample) A description of how the State will determine whether it is appropriate to waive the requirement for certain systems to collect five routine samples during the next month it serves water to the public, using the criteria in § 141.21(b)(5).

(viii) Section 141.21(c) (Invalidation of total coliform-positive samples) A description of how the State will determine whether it is appropriate to invalidate a total coliform-positive sample, using the criteria in § 141.21(c).

(ix) Section 141.21(d) (Sanitary surveys) A description of the State's criteria and procedures for approving agents other than State personnel to conduct sanitary surveys.

(x) Section 141.21(e)(2) (Waiver of fecal coliform or *E. coli* testing on a total coliform-positive sample) A description of how the State will determine whether it is appropriate to waive fecal coliform or *E. coli* testing on a total coliform-positive sample.

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