**RULES**
**OF**
**TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

**DIVISION OF WATER RESOURCES**

**CHAPTER 0400-45-01**
**PUBLIC WATER SYSTEMS**

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**0400-45-01-.01 AUTHORITY.**

(1) These rules and regulations are issued under the authority of Public Acts of 1983, Chapter 324.

(2) The Division of Water Supply is responsible for the supervision of public water systems.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.02 PURPOSE.**

(1) The purpose of these rules and regulations is to provide guidelines for the interpretation of T.C.A. § 68-221-701 et seq. and to set out the procedures to be followed by the Department in carrying out the Department's primary enforcement responsibility under the Federal Safe Drinking Water Act. These rules and regulations set out the requirements which agents, employees or representatives of public water systems must meet in the following areas: in the preparation and submission of plan documents for public water systems; in the supervision of all phases of construction; in supplying safe drinking water meeting all applicable maximum contaminant levels or treatment technique requirements; in providing

(Rule 0400-45-01-.02, continued)

adequate operation and maintenance of the system; and in complying with procedural requirements for appealing orders issued by the Commissioner of the Tennessee Department of Environment and Conservation against a public water system.

(2) Where the terms “shall” and “must” are used, practice and usage is sufficiently standardized to indicate a mandatory requirement, insofar as any complaint action by the Department is concerned. Other items, such as should, recommend, preferred, and the like, indicate desirable procedures or methods.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.03 SCOPE.**

These rules will apply to all public water supply systems that provide water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen (15) service connections or regularly serves an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year. A public water supply system is either a community water system or a non-community water system. A community water system is a public water supply system which serves at least fifteen (15) service connections used by year-round residents or regularly serves at least twenty-five (25) year-round residents. A non-community water system is a public water supply system that is not a community water system and which generally serves a transient population such as hotels, motels, restaurants, camps, service stations churches, industry, etc. A Non-Transient Non-Community Water System is a non-community water system that regularly serves at least 25 of the same persons over six (6) months per year. These rules do not apply to public water systems which meet all of the following criteria:

(1) consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(2) obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

(3) does not sell water to any person; and

(4) is not a carrier which conveys passengers in interstate commerce.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.04 DEFINITIONS.**

(1) "Action level" is the concentration of lead or copper in water which may determine the treatment requirements that a water system is required to complete.

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

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

(Rule 0400-45-01-.04, continued)

(4) “Benchmark” A disinfection benchmark is the lowest monthly average value of the monthly logs of Garidia Lamblia inactivation.

(5) “Business Plan” means a document which identifies source(s) of income or revenue sufficient to meet expenses over a three (3) year period. The business plan will identify costs related to retaining a certified operator, estimated annual infrastructure repair costs, depreciation, facility maintenance fees, estimated annual monitoring costs, estimated costs of providing public notices, estimated administrative costs, and any and all other operational, treatment, and related costs (e.g. chemicals and other supplies used to treat water, etc.). The business plan must include the re-payment of borrowed and amortized funds.

(6) “Capacity Development Plan” means a document(s) identifying what actions a public water system is taking or shall take to become a “viable water system.” Such plan shall include information concerning retention of a Certified Operator in direct charge; system ownership and accountability; staffing and organizational structure; fiscal management and controls, source water assessment and protection plan; “business plan;” and any and all other information identifying any further action that shall be taken.

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

(8) "Clean compliance history” is, for the purposes of Rule 0400-45-01-.41, a record of no MCL violations under paragraph (4) of Rule 0400-45-01-.06; no monitoring violations under Rule 0400-45-01-.07 or Rule 0400-45-01-.41; and no coliform treatment technique trigger exceedances or treatment technique violations under Rule 0400-45-01-.41.

(9) “Coagulation” means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.

(10) "Combined distribution system” is the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

(11) "Community Water System" means a public water system which serves at least fifteen (15) service connections used by year round residents or regularly serves at least twenty five (25) year round residents.

(12) "Compliance cycle" means the nine year calendar year cycle during which public water systems must monitor for certain contaminants. Each compliance cycle consists of three three year compliance periods. The first calendar year cycle begins January 1, 1993 and ends December 31, 2001; the second begins January 1, 2002 and ends December 31, 2010; the third begins January 1, 2011 and ends December 31, 2019.

(13) “Compliance period" means a three year calendar year period within a compliance cycle. Each compliance cycle has three three year compliance periods. Within the first compliance cycle, the first compliance period runs from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; the third from January 1, 1999 to December 31, 2001.

(14) "Comprehensive performance evaluation (CPE)” is a thorough review and analysis of a treatment plant’s performance based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant’s capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. For purposes of compliance, the

(Rule 0400-45-01-.04, continued)

comprehensive performance evaluation must consist of at least the following components: assessment of plant performance; evaluation of major unit processes; identification and prioritization of performance limiting factors; assessment of the applicability of comprehensive technical assistance; and preparation of a CPE report.

(15) "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.

(16) “Connection” means the point at which there is a meter or service tap if no meter is present.

(17) "Consecutive system is a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

(18) "Contaminant” means any physical, chemical, biological, or radiological substance or matter in water.

(19) "Conventional filtration treatment" means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial particulate removal.

(20) "Corrosion inhibitor" means a substance capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.

(21) "CT" or "CTcalc" is the product of "residual disinfectant concentration" (C) in mg/1 determined before or at the first customer, and the corresponding "disinfectant contact time" (T) in minutes, i.e., "C" x "T". If a public water system applies disinfectants at more than one point prior to the first customer, it must determine the CT of each disinfectant sequence before or at the first customer to determine the total percent inactivation or "total inactivation ratio". In determining the total inactivation ratio, the public water system must determine the residual disinfectant concentration of each disinfection sequence and corresponding contact time before any subsequent disinfection application point(s). "CT99.9" is the CT value required for 99.9 percent (3 log) inactivation of Giardia lamblia cysts. CT99.9 for a variety of disinfectants and conditions appear in Tables 1.1 through 1.6, 2.1, and 3.1 of part (5)(b)3 of Rule 0400-45-01-.31.

$$\frac{CTcalc}{CT_{99.9}}$$

is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as

$$\sum \frac{(CTcalc)}{(CT_{99.9})}$$

is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3 log inactivation of Giardia lamblia cyst. Disinfectant concentrations must be determined by tracer studies or an equivalent demonstration approved by the Department.

(22) "Department” when used in these regulations shall mean the Division of Water Supply, Tennessee Department of Environment and Conservation, or one of the Division's Field Offices.

(23) "Diatomaceous earth filtration" means a process resulting in substantial particulate removal in which (1) a precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum), and (2) while the water is filtered by passing through the cake on the

(Rule 0400-45-01-.04, continued)

septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake.

(24) "Direct filtration" means a series of processes including coagulation and filtration but excluding sedimentation resulting in substantial particulate removal.

(25) "Disinfectant" means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

(26) "Disinfectant contact time" ("T" in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration ("C") is measured. Where only one "C" is measured, "T" is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or at where residual disinfectant concentration ("C") is measured. Where more than one "C" is measured, "T" is (a) for the first measurement of "C", the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first "C" is measured and (b) for subsequent measurements of "C", the time in minutes that it takes for water to move from the previous "C" measurement point to the "C" measurement point for which the particular "T" is being calculated. Disinfectant contact time in pipelines must be calculated based on "plug flow" by dividing the internal volume of the pipe by the maximum hourly flow rate through that pipe. Disinfectant contact time within mixing basins and storage reservoirs must be determined by tracer studies or an equivalent demonstration.

(27) "Disinfection" means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

(28) "Disinfection profile" is a summary of daily Giardia lamblia inactivation through the treatment plant. The procedure for developing a disinfection profile is contained in 40 CFR 141.172.

(29) "Distribution System" means all water lines up to the point of a meter. For unmetered systems distribution system includes all lines up to the customer's service tap.

(30) "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.

(31) "Dose Equivalent" means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

(32) "Dual sample set" is a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purposes of conducting an IDSE under the provisions of Rule 0400-45-01-.37 and determining compliance with the TTHM and HAA5 MCLs under the provisions of Rule 0400-45-01-.38.

(33) "Effective corrosion inhibitor residual" for the purpose of the lead and copper rules only, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

(34) "Engineer" means the person or firm who designed the public water system and conceived, developed, executed or supervised the preparation of the plan documents.

(Rule 0400-45-01-.04, continued)

(35) “Enhanced coagulation” means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

(36) “Enhanced softening” means the improved removal of disinfection byproduct precursors by precipitative softening.

(37) "Filter profile” is a graphical representation of individual filter performance, based on continuous turbidity measurements or total particle counts versus time for an entire filter run, from startup to backwash inclusively, that includes an assessment of filter performance while another filter is being backwashed.

(38) “Filtration” means a process for removing particulate matter from water by passage through porous media.

(39) "Finished water” is water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).

(40) “First draw sample" means a one liter sample of tap water, for the purposes of the lead and copper rules, that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.

(41) “Flooculation” means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

(42) “Flowing stream” is a course of running water flowing in a definite channel.

(43) “GAC10” means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as best available technology for compliance with disinfection byproducts shall be 120 days.

(44) "GAC20” means granular activated carbon filter beds with an empty-bed contact time of 20 minutes based on average daily flow and a carbon reactivation frequency of every 240 days.

(45) "Gross Alpha Particle Activity" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

(46) “Gross Beta Particle Activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

(47) “Ground water under the direct influence of surface water” means any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large diameter pathogens such as Giardia lamblia or Cryptosporidium, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the Department. The Department determination of direct influence may be based on site specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation.

(48) "Haloacetic acids (five) (HAA5)” mean the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic

(Rule 0400-45-01-.04, continued)

acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

(49) “Halogen” means one of the chemical elements chlorine, bromine or iodine.

(50) "Human Consumption” - means the use of water that involves any drinking or ingestion of the water by humans, any human skin contact or food preparation where the food is not brought to boiling temperatures after contact with the water.

(51) “Initial compliance period" means the first full three year compliance period which begins January 1, 1993. For public water systems having fewer than 150 service connections initial compliance period shall be January 2, 1996, for the following contaminants:

| | | | |
|---|---|---|---|
| (a) | Antimony | (m) | endrin |
| (b) | Beryllium | (n) | glyphosate |
| (c) | Cyanide | (o) | oxamyl |
| (d) | Nickel | (p) | picloram |
| (e) | Thallium | (q) | simazine |
| (f) | dichloromethane | (r) | benzo(a)pyrene |
| (g) | 1,2,4-trichlorobenzene | (s) | di(2ethylhexyl)adipate |
| (h) | 1,1,2-trichloroethane | (t) | di(2ethylhexyl)phthalate |
| (i) | dalapon | (u) | hexachlorobenzene |
| (j) | dinoseb | (v) | hexachlorocyclopentadiene |
| (k) | diquat | (w) | 2,3,7,8 TCDD |
| (l) | endothall | | |

(52) "Lake/reservoir” refers to a natural or man-made basin or hollow on the earth’s surface in which water collects or is stored that may or may not have a current or single direction of flow.

(53) "Large water system" for the purpose of lead and copper rule, means a water system that serves more than 50,000 persons.

(54) "Lead service line" means a service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line.

(55) “Legionella” means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

(56) "Level 1 assessment” is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. It is conducted by the system operator or owner. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any Department directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

(57) "Level 2 assessment” is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely

(Rule 0400-45-01-.04, continued)

reason that the system triggered the assessment. A Level 2 assessment provides a more detailed examination of the system (including the system's monitoring and operational practices) than does a Level 1 assessment through the use of more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. It is conducted by an individual approved by the Department, which may include the system operator. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any Department directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system. The system must comply with any expedited actions or additional actions required by the Department in the case of an E. coli MCL violation.

(58) "Locational running annual average (LRAA)" is the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

(59) "Man-Made Beta Particle and Photon Emitter" means all radionuclides emitting beta particles and/or photons listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69", except the daughter products of thorium 232, uranium 235 and uranium 238..

(60) "Maximum Contaminant Level" means the maximum permissible level of a contaminant in water which is delivered at the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

(61) "Maximum contaminant level goal" or "MCLG" means that the maximum level of the contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are non-enforceable health goals.

(62) "Maximum residual disinfectant level (MRDL)" means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a PWS is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels under Section 1412 of the Safe Drinking Water Act. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

(63) "Maximum Total Trihalomethane Potential (MTP)" means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25°C or above.

(Rule 0400-45-01-.04, continued)

(64) "Medium- size water system" for the purpose of the lead and copper rule means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

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

(66) "Near the first service connection" means at one of the twenty 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.

(67) "Non-Community Water System" means a public water system that is not a community water system. A non-community water system is either a "transient non-community water system" (TNCWS) or a "non-transient non-community water system" (NTNCWS).

(68) "Non-Transient Non-Community Water System" or NTNCWS" means a non-community water system that regularly serves at least twenty five (25) of the same persons over six (6) months per year.

(69) "Optimal corrosion control treatment" for the purpose of lead and copper rule only means the corrosion control treatment that minimizes the lead and copper concentrations at user's taps while insuring that the treatment does not cause the water system to violate any primary drinking water regulation.

(70) "Person" means any individual, corporation, company, association, partnership, State, municipality, utility district, water cooperative, or Federal agency.

(71) "Picocurie" (pCi) means that quantity of radioactive material producing 2.22 nuclear transformations per minute.

(72) "Plan Documents" mean reports, proposals, preliminary plans, survey and basis of design data, general and detailed construction plans, profiles, specifications and all other information pertaining to public water system planning.

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

(74) "Point of disinfectant application" is the point where the disinfectant is applied and water downstream of that point is not subject to recontamination by surface water runoff.

(75) "Point-of-Entry Treatment Device" (POE) means a device applied to the drinking water entering a house or building for the purpose of reducing contaminants in the drinking water distributed throughout the house or building.

(76) "Point-of-Use Treatment Device" (POU) means a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap.

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

(Rule 0400-45-01-.04, continued)

(78) "Primary Drinking Water Regulation" means a regulation promulgated by the Department which:

(a) applies to public water systems;

(b) specifies contaminants which, in the judgment of the Department, may have any adverse effect on the health of persons;

(c) specified for each such contaminant either;

1. a maximum contaminant level, if, in the judgment of the Department, it is economically and technologically feasible to ascertain the level of such contaminant in water in public water systems, or

2. if, in the judgment of the Department, it is not economically or technologically feasible to so ascertain the level of such contaminant, each treatment technique known to the Department which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of Rule 0400-45-01-.06; and

(d) contains criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; or treatment techniques including quality control and testing procedures to insure compliance with such levels and to insure proper operation and maintenance of the system, and requirements to (i) the minimum quality of water which may be taken into the system and (ii) siting for new facilities for public water systems.

(79) “Public Water System” means a system for the provision of piped water for human consumption if such serves 15 or more connections or which regularly serves 25 or more individuals daily at least 60 days out of the year and includes:

(a) any collection, treatment, storage or distribution facility under control of the operator of such system and used primarily in connection with such system; and

(b) any collection or pre-treatment storage facility not under such control which is used primarily in connection with such system,

The population of a water system shall be determined by actual count or by multiplying the household factor by the number of connections in the system. The household factor shall be taken from the latest federal census for that county or city. Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.

(80) "Rem" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millerem (mrem)" is 1/1000 of a rem.

(81) "Repeat compliance period" means any subsequent compliance period after the initial compliance period.

(82) "Residual disinfectant concentration" ("C" in CT calculations) means the concentration of disinfectant measured in mg/l in a representative sample of water.

(83) "Safe Drinking Water Act" means the Federal law codified in 42 United States Code 300f et seq., Public Law 93 523, dated December 16, 1974 and subsequent amendments.

(Rule 0400-45-01-.04, continued)

(84) "Sanitary defect" is a defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place.

(85) "Sanitary Survey" means an on-site review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such sources, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

(86) "Seasonal system" is a non-community water system that is not operated as a public water system on a year-round basis and starts up and shuts down at the beginning and end of each operating season.

(87) "Secondary Drinking Water Regulation" mean a regulation promulgated by the Department which applies to public water systems and which specifies the maximum contaminant levels which, in the judgment of the Department are requisite to protect the public welfare. Such regulations may apply to any contaminant in drinking water

(a) which may adversely affect the odor or appearance of such water and consequently may cause the persons served by the public water system providing such water to discontinue its use, or

(b) which may otherwise adversely affect the public welfare. Such regulations may vary according to geographic and other circumstances.

(88) "Sedimentation" means a process for removal of solids before filtration by gravity or separation.

(89) "Service line sample" means a one liter sample of water collected in accordance with part (7)(b)3 of Rule 0400-45-01-.33, that has been standing for at least 6 hours in a service line.

(90) "Single family structure" for the purpose of lead and copper rules means a building constructed as a single family residence that is currently used as either a residence or a place of business.

(91) "Slow sand filtration" means a process involving passage of a raw water through a bed of sand at low velocity (generally less than 0.4 m/h) resulting in substantial particulate removal by physical and biological mechanisms.

(92) "Small water system" for the purpose of the lead and copper rules only, means a water system that serves 3,300 or fewer persons.

(93) "Subpart H systems" means public water systems using surface water or ground water under the direct influence of surface water as a source that are subject to the requirements of Rules 0400-45-01-.17, 0400-45-01-.31 and 0400-45-01-.39.

(94) "Supplier of Water" means any person who owns or operates a public water system.

(95) "Surface water" means all water which is open to the atmosphere and subject to surface runoff.

(96) "SUVA" means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV 254/ (in m) by its concentration of dissolved organic carbon (DOC) (in mg/L).

(Rule 0400-45-01-.04, continued)

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

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

(99) “Total Organic Carbon” (TOC) means total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

(100) "Total trihalomethane" (TTHM) means the sum of concentration in milligrams per liter of the trihalomethane compounds trihalomethane (chloroform), dibromochloromethane, bromodichloro-methane and tribomomethane (bromoform), rounded to two significant figures.

(101) “Transient Non-Community Water System” or “TNCWS” means a non-community water system that regularly serves at least twenty-five (25) individuals daily at least sixty (60) days out of the year. A transient non community water system is a public water supply system that generally serves a transient population such as hotels, motels, restaurants, camps, service stations churches, industry, and rest stops.

(102) "Trihalomethane" (THM) means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

(103) “Two-stage lime softening” is a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes.

(104) “Uncovered finished water storage facility” is a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection and is open to the atmosphere.

(105) “Viable Water System” means a public water system which has the commitment and the financial, managerial and technical capacity to consistently comply with the Tennessee Safe Drinking Water Act and these regulations.

(106) "Virus" means a virus of fecal origin which is infectious to humans by waterborne transmission.

(107) “Waterborne disease outbreak" means a significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the appropriate local or State agency.

(108) “Wholesale system” is a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.05 SUPERVISION OF DESIGN AND CONSTRUCTION.**

(1) Engineering - Plan documents for public water systems shall be submitted to the Department at least thirty (30) days prior to the date on which action by the Department is desired.

(Rule 0400-45-01-.05, continued)

(2) Expiration of Approval - Approval of engineering reports, proposals, preliminary plans, survey and basis of design data shall be null and void after a period of one year from the date stamped on the documents, unless the general and detailed plan documents have been submitted to the Department. Approval of all other plan documents by the Department shall be null and void after a period of one year from the date stamped on the plan documents, unless the construction is either underway or completed.

(3) General Practice - All plan documents for public water system design and construction shall present all information in conformance with accepted engineering practices and the "Design Criteria for community Public Water Systems" as published by the Department.

(4) Revisions to Plan Documents - Any deviations from plan documents approved by the Department, which affect location, sanitary and/or mineral quality, capacity, hydraulic conditions, operating units, or the function of unit processes or distribution and storage, must be approved in writing before such changes are made. Any revisions must be made on the master work, i.e., the original tracings. Revised plan documents must be submitted in time to permit the review and approval of such revisions before any construction which will be affected by such revisions is begun.

(5) Copies of Plan Documents - Generally, only two copies of the engineering report and two sets of the preliminary plans shall be required by the Department for review and/or approval. At least four complete sets of the detailed plan documents shall be required for final review. Upon the granting by the Department of its approval for construction the documents shall be so stamped and two sets returned to the engineer's office, one set forwarded to the appropriate Field Office for filing or use in field inspection of construction, and one set retained for the Department files. Upon completion of the project, one set of "As Built" plans and one copy of the executed contract documents shall be submitted to the Department and one set each to the owner. In addition, shop drawings, instruction manuals, etc., on all equipment furnished by the project shall be compiled into one or more documents and given to the owner.

(6) Supervision of Construction - One set of the plan document stamped "APPROVED FOR CONSTRUCTION" shall be available at the job sites at all times during construction. The engineer or a person qualified other than the contractor or his representative, and approved by the public water system shall provide continuous adequate inspection during construction to assure that all work is done in accordance with approved plan documents. The Department's representative shall have access to the project at any time during construction. If the Department's representative observes work being done in a manner that does not conform to the approved plan documents, he shall have the authority, through the engineer's representative, the water system's agent or directly to the contractor, to order the cessation of all work affected by the nonconformity until such discrepancies are rectified.

(7) Engineer's Seal - Plan documents for non-transient non-community and community public water systems shall be prepared by a person qualified under T.C.A. §§ 62-2-101 et seq. and shall have the necessary professional seal affixed as required by T.C.A. § 62-2-306.

(8) (a) Ownership and Operational Organization – No person shall operate a public water system without notifying the Division of Water Supply prior to placing the new system in operation. Any person operating a public water system other than an individual, a municipality, any agency or instrumentality of the United States, any facility owned and operated by the State of Tennessee, or any organization otherwise exempt by law must have a charter or appropriate authorization lawfully issued as set forth in one or more of the following:

Utility District – T.C.A. §§ 7-82-101 et seq.
General Corporation Act – T.C.A. §§ 48 -1-101 et seq.

(Rule 0400-45-01-.05, continued)

Tennessee Regulatory Authority – T.C.A. §§ 65-4-101 et seq.
Urban Type Public Facilities – T.C.A. §§ 5-16-101 et seq.

(b) All public water systems shall comply with all laws, rules and regulations, and policies of the Department. Construction modification and treatment processes must be approved in accordance with all federally designated best available technologies and Tennessee Laws. Every public water system shall, within thirty (30) days following any change in ownership or operation of the system, file a written report of such change in ownership or operation with the Department. Such report shall, at a minimum, contain the name, home address, business address, and home and business phone numbers of the person assuming ownership or operation of the system, and the date such change of ownership or operation became effective.

(c) All persons owning or operating a public water system shall keep the Department advised of their current address and must readily accept all mail sent to them by the Department. For purposes of this rule, registered or certified mail sent with proper postage to the registered owner or operator's last known address shall be considered adequate notification regardless of whether is accepted or returned unclaimed.

(d) Because of the Department's statutory duty to supervise the construction, operation, and maintenance of public water systems, and because written communication is a necessary aspect of such supervision, an owner or operator's refusal to accept mail or failure to claim registered or certified mail is a violation of this Chapter and may result in enforcement action.

(9) Interconnection of Systems - Insofar as feasible, public water systems shall be connected with a municipal, county, regional or other existing approved water system capable of supplying the demand. Where such connection is not feasible, other approved sources may be considered. Each public water system shall be designed in such a manner as will facilitate the connection of the system at an appropriate time to an expanding municipal, county or regional system. Each public water system shall be designed to provide service to all service areas anticipated or projected by the owner.

(10) System Capacity - Whenever a public water system reaches eighty (80) per cent of the design capacity based on average day usage, the supplier of water shall immediately obtain the services of a competent engineer to prepare plan documents for expansion of said system.

(11) Turbidimeters – All community water systems using ground water formations under the direct influence of surface water, and serving more than 50 connections or 150 individuals, shall be required to install turbidity monitoring equipment with power cutoff ability and recording unit. Those systems not included in the above may be required to install turbidity monitoring devices if the Department finds that the system cannot meet the microbiological standard, the turbidity can be seen without an instrument, or there is an outbreak of illness that may be water related. All filter plants serving community water systems shall be required to have continuous recording turbidimeters on the filter effluent line(s). Such instrumentation may be pen and ink, digital, computerized or other record keeping or recording devices approved by the Department. If pen and ink recorders are used they shall be limited to two pens and two filters and shall use a scale of 0 to 2.0 NTU unless specific alternatives are approved in writing by the Department.

(12) Monitoring of new sources - All new surface or ground water sources added to an existing water system or proposed for use by a new water system shall have the required biological and chemical water quality monitoring completed prior to being placed in service. The parameters to be monitored shall be those required for drinking water for the specific type of system involved.

(Rule 0400-45-01-.05, continued)

(13) Delegation of Plans Review Authority – Under T.C.A § 68-221-706, any unit of local government may petition the Commissioner for certification to review and approve plans for water distribution facilities within its jurisdiction. The unit of local government must have adequate experience and expertise in water distribution and must adopt standards and impose requirements which are at least as stringent as the Department's. The request for certification must be in writing and contain at least the following:

(a) The names of the individual(s) responsible for the review and approval together with his/her experience and education. This person(s) must be employed by the unit of local government and be a registered professional engineer in Tennessee.

(b) A copy of the standards, requirements and design criteria legally adopted and enforceable by the unit of local government.

(c) The type of projects the unit of local government wishes to receive certification to review. This may include but is not limited to water lines, distribution pumping stations and distribution storage tanks.

(d) Procedures for maintaining records of all projects reviewed and approved by the unit of local government.

(e) The wording to be used on the approval stamp.

(f) Plans review authority fee.

The Division of Water Supply will be responsible for reviewing the application for certification and shall have up to 60 days from the receipt of the complete application to make a written response. Units of local government will not be certified to review projects involving state or federal funds, raw water pump stations, new water sources, treatment facilities, sludge handling facilities, or any project designed by the staff of the local government. Any unit of local government which receives certification for plans review shall submit one copy of any plan documents it has approved to the Division of Water Supply. This shall be done within 10 days of the local government's approval. The commissioner may periodically review the unit of local government's plans review program and prescribe changes as deemed appropriate. The Division of Water Supply may execute a written agreement with a unit of local government which has received plans review certification. Failure to comply with the terms of the agreement may result in revocation of the plans review certification.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.06 MAXIMUM CONTAMINANT LEVELS.**

(1) Inorganic Chemicals

(a) The maximum contaminant level for fluoride applies to community water systems. The maximum contaminant levels for nitrate, nitrite and total nitrate and nitrite are applicable to both community water systems and non-community water systems. The maximum contaminant levels for the remaining inorganic chemicals apply only to community water systems and non-transient non-community systems.

(b) The following are the maximum contaminant levels for inorganic chemicals:

| CONTAMINANT | LEVEL, MILLIGRAMS PER LITER |
|---|---|

(Rule 0400-45-01-.06, continued)

| | | |
|---|---|---|
| 1. | Antimony | 0.006 |
| 2. | Arsenic | 0.010 |
| 3. | Asbestos | 7 million fibers/liter (longer than 10 microns) |
| 4. | Beryllium | 0.004 |
| 5. | Barium | 2.0 |
| 6. | Cadmium | 0.005 |
| 7. | Chromium | 0.1 |
| 8. | Cyanide (as free cyanide) | 0.2 |
| 9. | Fluoride | 4.0 |
| 10. | Mercury | 0.002 |
| 11. | Nickel | 0.1 |
| 12. | Nitrate | 10.0 (as Nitrogen) |
| 13. | Nitrite | 1.0 (as Nitrogen) |
| 14. | Total nitrate and nitrate | 10.0 (as Nitrogen) |
| 15. | Selenium | 0.05 |
| 16. | Thallium | 0.002 |

(2) Organic Chemicals - The following are the maximum contaminant levels for organic chemicals.

(a) The following maximum contaminant levels for organic contaminants apply to community water systems and non-transient non-community water systems. The maximum contaminant levels for volatile organic chemicals are given in paragraph (2) of Rule 0400-45-01-.25.

| | CONTAMINANT | LEVEL, MILLIGRAMS PER LITER |
|---|---|---|
| 1. | Alachlor | 0.002 |
| 2. | Atrazine | 0.003 |
| 3. | Carbofuran | 0.04 |
| 4. | Chlordane | 0.002 |
| 5. | Dibromo chloropropane (DBCP) | 0.0002 |
| 6. | 2,4 Dichlorophenoxyacetic acid | 0.07 |
| 7. | Ethylene dibromide | 0.00005 |
| 8. | Heptachlor | 0.0004 |
| 9. | Heptachlor epoxide | 0.0002 |
| 10. | Lindane | 0.0002 |
| 11. | Methoxychlor | 0.04 |
| 12. | Polychlorinated biphenyls | 0.0005 |
| 13. | Toxaphene | 0.003 |
| 14. | 2,4,5 Trichlorophenoxyproprionic acid | 0.05 |
| 15. | Pentachlorophenol | 0.001 |
| 16. | Benzo(a)pyrene | 0.0002 |
| 17. | Dalapon | 0.2 |
| 18. | Di(2-ethylhexyl) adipate | 0.4 |
| 19. | Di(2-ethylhexyl)phthalate | 0.006 |
| 20. | Dinoseb | 0.007 |
| 21. | Diquat | 0.02 |
| 22. | Endothall | 0.1 |
| 23. | Glyphosate | 0.7 |
| 24. | Hexachlorobenzene | 0.001 |
| 25. | Hexachlorocyclopentadiene | 0.05 |
| 26. | Oxamyl (Vydate) | 0.2 |
| 27. | Picloram | 0.5 |
| 28. | Simazine | 0.004 |

(Rule 0400-45-01-.06, continued)

| | | |
|---|---|---|
| 29. | 2,3,7,8-TCDD (Dioxin) | 0.00000003 |
| 30. | Endrin | 0.002 |

(3) Turbidity - The requirements of paragraph (3) of Rule 0400-45-01-.06 apply to filtered surface systems until June 29, 1993. The requirements in this paragraph apply to unfiltered systems that the Department has determined, in writing, must install filtration until June 29, 1993, or until filtration is installed, whichever is later.

The maximum contaminant level for turbidity is applicable to public water systems using surface water source(s) in whole or in part. Furthermore, the maximum contaminant level for turbidity is applicable to those systems using ground water which are required to install turbidimeters pursuant to paragraph (11) of Rule 0400-45-01-.05. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system are:

(a) One (1.0) turbidity unit, as determined by monthly average pursuant to Rule 0400-45-01-.08.

(b) Two (2.0) turbidity units based on an average for two consecutive days pursuant to Rule 0400-45-01-.08.

To meet the maximum contaminant level for turbidity, a public water system must meet both subparagraphs (a) and (b) of this paragraph.

(4) Microbiological - The maximum contaminant levels for microbiologicals are applicable to both community water systems and non-community water systems.

(a) Until March 31, 2016, the total coliform maximum contaminant level (MCL) is based on the presence or absence of total coliforms in a sample, rather than coliform density. Beginning April 1, 2016, the MCL for total coliform shall no longer be in effect.

The number of total coliform positive samples shall not exceed any of the following:

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.

3. A public water system which has exceeded the MCL for total coliforms must report the violation to the Department no later than the end of the next business day after it learns of the violation and notify the public in accordance with the schedule of Rule 0400-45-01-.19 using the language specified in Rule 0400-45-01-.19.

4. A public water system which has failed to comply with the coliform monitoring requirements, including a sanitary survey requirement must report the monitoring violation to the Department within ten (10) days after the system discovers the violation and notify the public in accordance with Rule 0400-45-01-.19.

(b) Until March 31, 2016, 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

(Rule 0400-45-01-.06, continued)

coliforms. For purposes of the public notification requirements in Rule 0400-45-01-.19, this is a violation that may pose an acute risk to health.

(c) 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 Department 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 Department office is closed, in which case the system must notify the Department before the end of the next business day.

2. The Department 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 or E. coli-positive. Accordingly, the system must notify the Department as specified in part 1 of this subparagraph and the provisions of subparagraph (b) of this paragraph apply.

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

(e) No variance or exemptions from the maximum contaminant level for total coliforms are permitted.

(f) Maximum contaminant level goals for microbiological contaminants.

1. MCLGs for the following contaminants are as indicated:

| Contaminant | | MCLG |
|---|---|---|
| (i) | *Giardia lamblia* | zero |
| (ii) | Viruses | zero |
| (iii) | *Legionella* | zero |
| (iv) | Total coliforms (including fecal coliforms and *Escherichia coli*) | zero |
| (v) | *Cryptosporidium* | zero |
| (vi) | *Escherichia coli (E. coli)* | zero |

2. The MCLG identified in subpart 1(iv) of this subparagraph is no longer applicable beginning April 1, 2016.

(g) Beginning April 1, 2016, a system is in compliance with the MCL for E. coli for samples taken under the provisions of Rule 0400-45-01-.41 unless any of the conditions identified in parts 1 through 4 of this subparagraph occur. For purposes of the public notification requirements in Rule 0400-45-01-.19, violation of the MCL may pose an acute risk to health.

1. The system has an E. coli-positive repeat sample following a total coliform positive routine sample.

2. The system has a total coliform positive repeat sample following an E. coli-positive routine sample.

(Rule 0400-45-01-.06, continued)

3. The system fails to take all required repeat samples following an E. coli-positive routine sample.

4. The system fails to test for E. coli when any repeat sample tests positive for total coliform.

(h) Until March 31, 2016, a public water system must determine compliance with the MCL for total coliforms in subparagraphs (a) and (b) of this paragraph for each month in which it is required to monitor for total coliforms. Beginning April 1, 2016, a public water system must determine compliance with the MCL for E. coli in subparagraph (g) of this paragraph for each month in which it is required to monitor for total coliforms.

(i) The EPA Administrator, pursuant to section 1412 of the Federal Safe Drinking Water 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 subparagraphs (a) and (b) of this paragraph and for achieving compliance with the maximum contaminant level for E. coli in subparagraph (g) of this paragraph:

1. Protection of wells from fecal contamination 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, cross connection control, 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 Rules 0400-45-01-.17, 0400-45-01-.31 and 0400-45-01-.39, or disinfection of ground water, as described in Rule 0400-45-01-.40, using strong oxidants such as chlorine, chlorine dioxide, or ozone; and

5. For systems using ground water, compliance with the requirements of an EPA-approved State Wellhead Protection Program developed and implemented under section 1428 of the Federal Safe Drinking Water Act.

(j) The EPA Administrator, pursuant to section 1412 of the Federal Safe Drinking Water Act, hereby identifies the technology, treatment techniques, or other means available identified in subparagraph (i) of this paragraph as affordable technology, treatment techniques, or other means available to systems serving 10,000 or fewer people for achieving compliance with the maximum contaminant level for total coliforms in subparagraphs (a) and (b) of this paragraph and for achieving compliance with the maximum contaminant level for E. coli in subparagraph (g) of this paragraph.

(5) Radionuclides-

(a) The following maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity are applicable to all community water systems:

1. Combined radium-226 and radium-228: The maximum contaminant level for combined radium-226 and radium-228 is 5 pCi/L. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

(Rule 0400-45-01-.06, continued)

2. Gross alpha particle activity (including radium-226 but excluding radon and uranium): The maximum contaminant level for gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/L.

(b) Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems shall be as follows:

1. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than four (4) millirem/year.

2. Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing four (4) mrem total body or organ dose equivalents shall be calculated on the basis of a two (2) liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69 as amended August, 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed four (4) millirem/year.

Table A
Average Annual Concentrations Assumed
to Produce a Total Body or Organ Dose of a 4 mrem/yr.

| Radionuclide | Critical Organ | pCi per Liter |
|---|---|---|
| Tritium | Total Body | 20,000 |
| Strontium-90 | Bone Marrow | 8 |

(c) MCL for uranium. The maximum contaminant level for uranium is 30 micrograms per liter.

(d) Compliance dates.

1. Compliance dates for combined radium-226 and -228, gross alpha particle activity, gross beta particle and photon radioactivity, and uranium: Community water systems must comply with the MCLs listed in subparagraphs (a), (b), and (c) of this paragraph, beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of Rule 0400-45-01-.11. Compliance with reporting requirements for the radionuclides under Appendix A to Consumer Confidence Reports (Rule 0400-45-01-.35) and Appendices A and B to Public Notification (Rule 0400-45-01-.19) is required on December 8, 2003.

(e) Best Available Technologies

The Department hereby identifies as indicated in the following table the best technology available for achieving compliance with the maximum contaminant levels for combined radium-226 and -228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.

Table B
BAT for Combined Radium-226 and Radium-228, Uranium, Gross Alpha Particle Activity, and Beta Particle and Photon Radioactivity

(Rule 0400-45-01-.06, continued)

| Contaminant | BAT |
|---|---|
| 1. Combined radium-226 and radium-228 | Ion exchange, reverse osmosis, lime softening. |
| 2. Uranium | Ion exchange, reverse osmosis, lime softening, coagulation/filtration |
| 3. Gross alpha particle activity (excluding Radon and Uranium) | Reverse osmosis |
| 4. Beta particle and photon radioactivity | Ion exchange and reverse osmosis |

(f) No variance or exemption for compliance with the MCLs listed in paragraph (5) of this rule are allowed.

(g) Small systems compliance technologies list for radionuclides.

Table C
List of Small Systems Compliance Technologies for Radionuclides
and Limitations to Use

| Unit Technologies | Limitations (see foot-notes) | Operator skill level required [1] | Raw water quality range and considerations.[1] |
|---|---|---|---|
| 1. Ion Exchange (IE) | (a) | Intermediate | All ground waters. |
| 2. Point of use (POU[2]) IE | (b) | Basic | All ground waters. |
| 3. Reverse osmosis (RO) | (c) | Advanced | Surface waters usually require pre-filtration. |
| 4. POU[2] RO | (b) | Basic | Surface waters usually require pre-filtration. |
| 5. Lime softening | (d) | Advanced | All waters. |
| 6. Green sand filtration | (e) | Basic | |
| 7. Co-precipitation with Barium Sulfate | (f) | Intermediate to Advanced | Ground waters with suitable water quality. |
| 8. Electrodialysis/ electrodialysis reversal | | Basic to imtermediate | All ground waters. |
| 9. Pre-formed hydrous Manganese oxide filtration | (g) | Intermediate | All ground waters. |
| 10. Activated alumia | (a)(h) | Advanced | All ground waters; competing anion concentrations may affect regeneration frequency. |
| 11. Enhanced coagulation/filtration | (i) | Advanced | Can treat a wide range of water qualities |

[1] National Research Council (NRC). Safe Water from Every Tap: Improving Water Service to Small Communities. National Academy Press. Washington, D.C. 1997.

[2] A POU, or “point-of-use” technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes: Technologies for Radionuclides:

(a) The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

(Rule 0400-45-01-.06, continued)

(b) When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

(c) Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.

(d) The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

(e) Removal efficiencies can vary depending on water quality.

(f) This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

(g) This technology is most applicable to small systems that already have filtration in place.

(h) Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

(i) Assumes modification to a coagulation/filtration process already in place.

Table D
Compliance Technologies by System Size Category for Radionuclide NPDWR's

| Contaminant | Compliance Technologies [1] for system size categories (population served) | | |
|---|---|---|---|
| | 25-500 | 501-3,300 | 3301-10,000 |
| 1. Combined radium-226 and radium-228 | 1,2,3,4,5,6,7,8,9 | 1,2,3,4,5,6,7,8,9 | 1,2,3,4,5,6,7,8,9 |
| 2. Gross alpha particle activity | 3.4 | 3.4 | 3,4 |
| 3. Beta particle activity and photon activity | 1,2,3,4 | 1,2,3,4 | 1,2,3,4 |
| 4. Uranium | 1,2,4,10,11 | 1,2,3,4,5,10,11 | 1,2,3,4,5,10,11 |

Note:[1] Numbers correspond to those technologies found listed in Table C.

(6) Disinfectant Residuals and Disinfectant Byproducts

(a) Bromate and chlorite. The maximum contaminant levels (MCLs) for bromate and chlorite are as follows:

| Disinfection by-product | MCL (mg/L) |
|---|---|
| Bromate | 0 .010 |
| Chlorite | 1 .0 |

1. Compliance dates for CWSs and NTNCWSs. Subpart H systems serving 10,000 or more persons must comply with this subparagraph beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subparagraph beginning January 1, 2004.

2. The Administrator, pursuant to section 1412 of the Federal Safe Drinking Water Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for bromate and chlorite identified in this subparagraph:

| Disinfection by-product | Best available technology |
|---|---|

(Rule 0400-45-01-.06, continued)

| | |
|---|---|
| Bromate | Control of ozone treatment process to reduce production of bromate |
| Chlorite | Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels |

(b) TTHM and HAA5.

1. Running Annual Average compliance (Rule 0400-45-01-.36)

(i) Compliance dates. Subpart H systems serving 10,000 or more persons must comply with this part beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this this part beginning January 1, 2004. All systems must comply with these MCLs until the date specified for Locational Running Annual Average (Stage 2 Disinfection Byproducts Requirements (LRAA)) compliance in Rule 0400-45-01-.38.

| Disinfection by-product | MCL (mg/L) |
|---|---|
| Total trihalomethanes (TTHM) | 0.080 |
| Haloacetic acids (five) (HAA5) | 0.060 |

(ii) The Administrator, pursuant to section 1412 of the Federal Safe Drinking Water Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this part.

| Disinfection by-product | Best available technology |
|---|---|
| Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5) | Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant |

2. LRAA compliance (Rule 0400-45-01-.38)

(i) Compliance dates. The Stage 2 Disinfection Byproducts Requirements (LRAA) MCLs for TTHM and HAA5 must be complied with as a locational running annual average (LRAA) at each monitoring location beginning the date specified for Stage 2 Disinfection Byproducts Requirements (LRAA) compliance in subparagraph (1)(c) of Rule 0400-45-01-.38.

| Disinfection by-product | MCL (mg/L) |
|---|---|
| Total trihalomethanes (TTHM) | 0.080 |
| Haloacetic acids (five) (HAA5) | 0.060 |

(ii) The Administrator, pursuant to section 1412 of the Federal Safe Drinking Water Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this part for all systems that disinfect their source water:

| Disinfection by-product | Best available technology |
|---|---|
| Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5) | Enhanced coagulation or enhanced softening or GAC10; nanofiltration and with a molecular weight cutoff of equal to or less than 1000 Daltons; |

(Rule 0400-45-01-.06, continued)

| | |
|---|---|
| | or GAC20 |

(iii) The Administrator, pursuant to section 1412 of the Federal Safe Drinking Water Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this part for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

| Disinfection by-product | Best available technology |
|---|---|
| Total trihalomethanes (TTHM) and Haloacetic acids (five) - (HAA5). | Systems serving 10,000 or more: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance.<br><br>Systems serving <10,000: Improved distribution system and storage tank management to reduce residence time. |

(c) Maximum residual disinfectant levels.

1. Maximum residual disinfectant levels (MRDLs) are as follows:

| Disinfectant residual | MRDL (mg/L) |
|---|---|
| Chlorine | 4.0 (as $Cl_2$). |
| Chloramines | 4.0 (as $Cl_2$). |
| Chlorine dioxide | 0.8 (as $ClO_2$). |

(d) Compliance dates.

1. CWSs and NTNCWSs. Subpart H systems serving 10,000 or more persons must comply with MRDLs beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with MRDLs beginning January 1, 2004.

2. Transient NCWSs. Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

(e) Best Available Control Technology

1. The following are identified as the best technology, treatment technology or other means available for achieving compliance with the maximum residual disinfectant level:

(i) Control of the treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

(Rule 0400-45-01-.06, continued)
***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016. Amendments filed March 7, 2016; effective June 5, 2016.*

**0400-45-01-.07 MONITORING AND ANALYTICAL REQUIREMENTS.**

(1) Microbiological Contaminant Sampling

(a) Effective April 1, 2016, violations for total coliform and fecal coliform shall no longer be considered MCL violations and violations regarding total coliform shall be treatment technique triggers as described in Rule 0400-45-01-.41. Paragraph (5) of this rule further delineates the transition to Rule 0400-45-01-.41.

(b) Reserved

(c) The supplier of water for a community water system shall take coliform samples at regular time intervals and in number proportional to the population served by the system during the reporting period as set forth below:

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 |

| Population Served | Minimum Number of Samples Per Month |
|---|---|
| 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 |

(Rule 0400-45-01-.07, continued)

| | |
|---|---|
| 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.

1. Coliform samples shall be collected at sites which are representative of water throughout the distribution system according to a written sample siting plan.

2. Sample siting plans shall be made available to the Department on request. Plans determined to be deficient by the Department shall be revised by the system on the basis of the Department's findings.

3. Microbiological sampling shall be conducted in accordance with the approved sampling plan.

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

1. 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 must monitor each calendar quarter that the system provides water to the public.

2. A non-community water system using only ground water (except ground water 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, as specified in subparagraph (c) of this paragraph. For systems using ground water under the direct influence of surface water, part 4 of this subparagraph applies.

3. 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 subparagraph (c) of this paragraph, regardless of the number of persons it serves.

4. A non-community water system using ground water under the direct influence of surface water must monitor at the same frequency as a like-sized community water system, as specified in subparagraph (c) of this paragraph. The system must begin monitoring at this frequency beginning six months after the determination that the ground water is under the direct influence of surface water.

5. A non-community water system must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample site plan. These plans are subject to Department review and revision.

(e) Public water systems must collect samples at regular time intervals throughout the monitoring period. Those public water systems that use only ground water (except ground water under the direct influence of surface water) and serve 4,900 or fewer

(Rule 0400-45-01-.07, continued)

persons may collect all required samples on a single day if they are taken from different sites.

(f) A public water system that uses surface water or ground water under the direct influence of surface water, and does not practice filtration in compliance with Rule 0400-45-01-.31 must collect at least one sample near the first service connection each day the turbidity level of the source water 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 Department determines that the system, for 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 paragraph (4) of Rule 0400-45-01-.06.

(g) 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 whether the coliform treatment technique trigger has been exceeded compliance with the MCL for total coliforms in paragraph (4) of Rule 0400-45-01-.06 provided the water is not served to customers before negative analytical results are obtained. Samples representing water served to customers prior to obtaining analytical results shall not be special purpose samples and shall not count toward compliance with the MCL for total coliforms in paragraph (4) of Rule 0400-45-01-.06 with the MCL for total coliforms in paragraph (4) of Rule 0400-45-01-.06. After March 31, 2016, this subparagraph is no longer applicable.

(2) Repeat Monitoring

(a) 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 per month must collect no fewer than three repeat samples for each total coliform-positive sample found. A system which collects one routine sample per month or fewer must collect no fewer than four repeat samples for each total coliform-positive sample found. The Department may extend the 24-hour limit on a case-by-case basis if the system has a problem in collecting the repeat samples within 24 hours that is beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the repeat samples.

(b) 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 Department may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

(c) The system must collect all repeat samples on the same day and within 24 hours of being notified of a positive result, except that the Department may allow a system with a single service connection to collect the required set of repeat samples over a four consecutive 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 per month.)

(Rule 0400-45-01-.07, continued)

(d) 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 subparagraphs (a), (b), and (c) of this paragraph. The additional samples must be collected within 24 hours of being notified of the positive result, unless the Department extends the limit as provided in subparagraph (a) of this paragraph. 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 paragraph (4) of Rule 0400-45-01-.06 has been exceeded and notifies the Department.

(e) If a system normally collecting fewer than five routine samples per monitoring period has one or more total coliform-positive samples and the Department does not invalidate the sample(s) under paragraph (3) of this rule, it must collect at least five routine samples during the next month the system serves water to the public.

(f) 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.

(g) Results of all routine and repeat samples not invalidated by the Department must be included in determining compliance with the MCL for total coliforms in paragraph (4) of Rule 0400-45-01-.06.

(3) Invalidation of Total Coliform Samples. A total coliform-positive sample invalidated under this paragraph does not count towards meeting the minimum monitoring requirement for microbiological contaminants.

(a) The Department may invalidate a total coliform-positive sample only if the conditions of part 1, 2, or 3 of this subparagraph are met.

1. The laboratory establishes that improper sample analysis caused the total coliform-positive result;

2. The Department, on the basis of the results of repeat samples collected as required by subparagraphs (2)(a), (b), (c), and (d) of this rule, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The Department 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 are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., the Department 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).

3. The Department 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 subparagraphs (2)(a), (b), (c), and (d) of this rule and use them to determine compliance with the MCL for total coliforms in paragraph (4) of Rule 0400-45-01-.06. 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 Departmental official who recommended the decision. The Department 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

(Rule 0400-45-01-.07, continued)

action the system has taken, or will take, to correct this problem. The Department may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(b) 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 Department may waive the 24-hour time limit on a case-by-case basis.

(4) Sanitary Surveys

(a) Public water systems which do not collect five or more routine samples per 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 Department, must undergo subsequent sanitary surveys at least every ten years after the initial sanitary survey. The Department 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.

(b) In conducting a sanitary survey of a system using ground water having an EPA-approved wellhead protection program under section 1428 of the Federal 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.

(c) Public water systems which do not collect five or more routine samples per month must undergo a sanitary survey performed by the Department at least once every five years. The system is responsible for ensuring the survey takes place by informing the Department within 30 days of the expiration of the 5-year period.

(d) Sanitary surveys conducted by the Department pursuant to Rule 1200-05-01-.40 may be used to meet the sanitary survey requirements of this paragraph.

(e) A public water system may request a sanitary survey re-inspection of its water system provided the public water system requests the re-inspection within sixty (60) days of the receipt of the results of the initial sanitary survey. The public water system requesting the sanitary survey re-inspection shall pay the costs of the re-inspection incurred by the Department.

(5) Subparagraphs (1)(c) and (4)(c) of this rule are applicable until March 31, 2016. The provisions of paragraphs (2) and (3) of this rule and Rules 0400-45-01-.06(4)(c), 0400-45-01-.14(10)(a), and 0400-45-01-.06(4)(a)3 are applicable until all required repeat monitoring under paragraph (2) of this rule and fecal coliform or E. coli testing under Rule 0400-45-01-

(Rule 0400-45-01-.07, continued)

.06(4)(c) that was initiated by a total coliform-positive sample taken before April 1, 2016, is completed, as well as analytical method, reporting, recordkeeping, public notification, and consumer confidence report requirements associated with that monitoring and testing. Beginning April 1, 2016, the provisions of Rule 0400-45-01-.41 are applicable, with systems required to begin regular monitoring at the same frequency as the system specific frequency required on March 31, 2016.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016. Amendments filed March 7, 2016; effective June 5, 2016.*

**0400-45-01-.08 TURBIDITY SAMPLING AND ANALYTICAL REQUIREMENTS.**

(1) Ground water sampling – Samples shall be taken by suppliers of water that serve more than 50 connections or that have been directed to conduct monitoring under paragraph (11) of Rule 0400-45-01-.05 for both community water systems and non–community water system at a representative entry point(s) to the water distribution system at least once per day for the purpose of making turbidity measurements to determine compliance with paragraph (3) of Rule 0400-45-01-.06. Public water systems using water from a source not under the direct influence of surface water are not required to monitor turbidity unless directed to do so under the provisions of paragraph (11) of Rule 0400-45-01-.05.

(2) Turbidity measurements of surface water and ground water under the direct influence that employs filtration - The minimum sampling requirements for systems using filtration treatment shall be as follows:

(a) Turbidity measurements must be performed on representative samples of the system's filtered water every four hours, (or more frequently, as authorized by the rules) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab samples if approved in writing by the Department. For systems serving 500 or fewer persons per day, the Department may allow the sampling frequency to be reduced to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. Systems filtering surface water and ground water under the direct influence of surface water shall comply with the treatment technique standards found in paragraph (4) of Rule 0400-45-01-.31.

(3) Ground water systems under the direct influence of surface water and do not filter and have qualified to avoid filtration - The minimum sampling requirements for ground water systems under the direct influence of surface water and not employing filtration shall be as follows:

(a) Turbidity measurements must be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours (or more frequently, as authorized by the rules) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the Department. Turbidity must comply with the limits specified in part (2)(a)2 of Rule 0400-45-01-.31.

(4) Reporting

(a) Ground water systems - All community water systems using a ground water source with turbidity removal facilities and not designated as ground water under the direct influence of surface water shall be required, if the results of a turbidity analysis indicate that the maximum allowable limit has been exceeded, to confirm by resampling as soon as practicable and preferably within one (1) hour. If the repeat sample confirms

(Rule 0400-45-01-.08, continued)

that the maximum allowable limit has been exceeded, the supplier of water shall report to the Department within forty-eight (48) hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds two (2) NTU, the supplier of water shall report to the Department and notify the public as directed in Rules 0400-45-01-.18 and 0400-45-01-.19. All non-community water systems using ground water formations, other than approved sand and gravel formations, may be required to monitor turbidity if the Department finds a system cannot meet the microbiological standard, the turbidity limit is exceeded, or if other health related problems exist.

(b) Surface water systems and ground water systems under the direct influence of surface water -Turbidity measurements must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes but is not limited to:

1. The total number of filtered water turbidity measurements taken during the month.

2. The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the applicable limits specified in paragraph (4) of Rule 0400-45-01-.31.

3. The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

(c) Ground water systems under the direct influence of surface water that have qualified to avoid filtration - Information that must be reported includes but is not limited to:

1. The maximum turbidity level measured during the month, the date(s) of occurrence for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the Department.

2. For the first 12 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after one year of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 12 months the system served water to the public.

3. For the first 120 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 120 months the system served water to the public.

(d) Ground water systems under the direct influence of surface water that has been directed to install filtration but has not yet done so shall monitor as specified in subparagraph (a) of this paragraph.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.09 INORGANIC CHEMICAL SAMPLING AND ANALYTICAL REQUIREMENTS.**

(1) Monitoring and analysis for the purpose of determining compliance with the maximum contaminant level for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium,

(Rule 0400-45-01-.09, continued)

cyanide, fluoride, mercury, nickel, nitrate, nitrite, total nitrate and nitrite, thallium, and selenium shall be conducted as follows:

(a) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point) beginning in the compliance period starting January 1, 1993. The system shall take such sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(b) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment, or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point), beginning in the compliance period starting January 1, 1993. The systems shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. Surface water systems include systems with a combination of surface and ground sources.

(c) If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods when water representative of all sources is being used.

(d) The Department may reduce the total number of analyses by allowing the use of composite sampling. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of sample must be done in the laboratory.

1. If the concentration in the composite sample is greater than or equal to one-fifth of the MCL of an inorganic chemical, then a follow-up sample must be taken within 14 days at each sampling point included in the composite. These samples must be analyzed for the contaminants which were detected in the composite sample.

2. If duplicates of the original samples taken from each sampling point used in the composite are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the Department within 14 days of collection.

3. If the population served by the system is greater than 3,300 persons, then compositing may only be permitted by the Department at sampling points within a single system. In systems serving 3,300 or less persons, the Department may permit compositing among different systems provided the 5-sample limit is maintained.

(e) All new systems or systems that use a new source of water that begin operation after the effective date of this rule must demonstrate compliance with the MCL within a period of time specified by the Department. The system must also comply with the initial sampling frequencies specified by the Department to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements of this rule.

(2) Compliance with the maximum contaminant level for inorganics shall be determined as specified in paragraph (7) of this rule. The frequency of monitoring for asbestos shall be in accordance with paragraph (3) of this rule. The frequency of monitoring antimony, arsenic, barium, beryllium, cadmium, cyanide, chromium, fluoride, mercury, nickel, selenium and thallium shall be in accordance with paragraph (4) of this rule. The frequency of monitoring

(Rule 0400-45-01-.09, continued)

for nitrate shall be in accordance with paragraph (5) of this rule. The frequency of monitoring for nitrite shall be in accordance with paragraph (6) of this rule.

(3) The frequency of monitoring required to determine compliance with the maximum contaminant level for asbestos shall be as follows:

(a) Each community and non-transient, non-community water system is required to monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period starting January 1, 1993.

1. All community water systems and non-transient non-community water systems serving more than 10,000 people shall complete initial sampling by December 31, 1993. All community water systems and non-transient non-community water systems serving from 3,300 to 10,000 people shall complete initial sampling by December 31, 1994. All other community water systems and non-transient non-community water systems shall complete monitoring by December 31, 1995. Repeat samples shall be collected thereafter on a nine year cycle.

(b) If the system believes it is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply to the Department to be excluded from the monitoring requirement in subparagraph (a) of this paragraph. If the Department agrees to exclude the system, the system is not required to monitor.

(c) The Department may exclude a system from asbestos monitoring provided the public water system provides the Department with a sworn statement by the superintendent, manager or chief operator of the system that no asbestos materials have been used in its treatment plant and distribution system and that no asbestos containing materials will be used in the system after the date of the system requests to be excluded.

(d) An asbestos monitoring waiver if issued by the Department remains in effect for three years or until the system installs asbestos containing materials in the system. Systems shall notify the Department within 48 hours of using any asbestos containing materials. Systems not receiving a waiver shall monitor in accordance with subparagraph (a) of this paragraph.

(e) A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

(f) A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of paragraph (2) of this rule.

(g) A system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos–cement pipe and one sample at the entry point to the distribution system under conditions where asbestos contamination is most likely to occur.

(h) A system which exceeds the maximum contaminant level at any sampling point shall monitor quarterly beginning in the next quarter after the violation occurred.

(i) The Department may decrease the quarterly monitoring requirement to the frequency specified in subparagraph (a) of this paragraph provided the Department has determined a ground water system has collected two consecutive quarterly samples

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and a surface (or combined surface/ground water system) has four consecutive samples below the MCL.

(j) If monitoring data collected after January 1, 1990 comply with the requirements of this paragraph, then the Department may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(4) The frequency of monitoring conducted to determine compliance with the maximum contaminant levels for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be as follows:

(a) Groundwater systems shall take one sample at each sampling point during each three year compliance period starting January 1, 1993. Surface water systems and combined surface/ground systems shall take one sample annually at each sampling point beginning January 1, 1993.

(b) Systems which exceed the maximum contaminant levels shall monitor quarterly beginning in the next quarter after the violation occurred.

(c) The Department may decrease the quarterly monitoring requirement to the frequencies specified in subparagraph (a) of this paragraph provided a ground water system has collected two consecutive quarterly samples and a surface water system has a minimum of four consecutive quarterly samples below the MCL.

(d) The system may apply to the Department for a waiver from the monitoring frequencies specified in subparagraph (a) of this paragraph. The Department may grant a public water system a waiver for monitoring cyanide, provided that the Department determines that the system is not vulnerable due to the lack of any industrial source of cyanide.

(e) A condition of the waiver shall require that a system shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (i.e., nine years).

(f) The Department may grant a waiver provided surface water systems have monitored annually for at least three years and groundwater systems have conducted a minimum of three rounds of monitoring. (At least one sample shall have been taken since January 1, 1990). Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the maximum contaminant level. Systems that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.

(g) In determining the appropriate reduced monitoring frequency, the Department shall consider:

1. Reported concentrations from all previous monitoring;

2. The degree of variation in reported concentrations; and

3. Other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.

(h) A decision by the Department to grant a waiver shall be made in writing and shall set forth the basis for the determination. The determination may be initiated by the Department or upon an application by the public water system. The public water

(Rule 0400-45-01-.09, continued)

system shall specify the basis for its request. The Department shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.

(5) All public water systems (community, non-transient non-community, and transient non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrate.

(a) Community and non–transient non–community water systems served by ground water system shall monitor annually beginning January 1, 1993. Community and non–transient systems served by surface water shall monitor quarterly beginning January 1, 1993.

(b) For community and non–transient non–community water systems, the repeat monitoring frequency for ground water systems shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL. The Department may allow a groundwater system to reduce the sampling frequency to annually after the results of four consecutive quarterly samples are below the MCL.

(c) For community and non-transient non-community water systems, the Department may allow a surface water system to reduce the sampling frequency to annually if all analytical results from four consecutive quarters are less than 50 percent of the MCL. A surface water system shall return to quarterly monitoring if any one sample is greater than or equal to 50 percent of the MCL.

(d) Each transient non-community water system shall monitor annually beginning January 1, 1993.

(e) After the initial round of quarterly sampling is completed, each community and non-transient non-community system which has been allowed to reduce its monitoring to annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.

(6) All public water systems (community, non-transient non-community, and transient non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrite.

(a) All public water systems shall take one sample at each sampling point during the compliance period beginning January 1, 1993, and ending December 31, 1995.

(b) After the initial sample, systems where an analytical result for nitrite is less than 50 percent of the MCL shall monitor at the frequency determined by the Department in accordance with the criteria in subparagraph (4)(g) of this rule.

(c) For community, non-transient non-community, and transient non-community water systems, the repeat monitoring frequency for any water system shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL. The Department may allow a system to reduce the sampling frequency to annually after determining the system has four consecutive quarters of data less than the MCL.

(d) Systems which are monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.

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(7) Confirmation samples:

(a) Where the results of sampling for asbestos, antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride mercury, nickel, selenium or thallium indicate an exceedance of the maximum contaminant level, the Department may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks after the date of the initial sample analysis) at the same sampling point.

(b) Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within 24 hours of the system's receipt of notification of the analytical results of the first sample. Systems unable to comply with the 24-hour sampling requirement must immediately notify the consumers served by the public water system in accordance with Rule 0400-45-01-.19. Systems that give public notice rather than collect a confirmation sample within 24-hours must take and analyze a confirmation sample within two weeks of notification of the analytical results of the first sample.

(c) If confirmation samples are taken for any contaminant, then the results of the initial and confirmation sample shall be averaged. The resulting average shall be used to determine the system's compliance in accordance with paragraph (10) of this rule. Results of documented sampling errors may be deleted if approved by the Department.

(8) The Department may require more frequent monitoring than specified in paragraphs (3), (4), (5), and (6) of this rule or may require confirmation samples for positive and negative results.

(9) Systems may conduct more frequent monitoring than the minimum monitoring frequencies specified in this rule.

(10) Compliance with the MCLs for inorganic chemicals listed in Rule 0400-45-01-.06 shall be determined based on the analytical result(s) obtained at each sampling point.

(a) For systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium is determined by a running annual average at each sampling point. If the average at any sampling point is greater than the MCL, then the system is out of compliance. If any one sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any sample below the detection limit shall be calculated at zero for the purpose of determining the annual average. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(b) For systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury nickel, selenium and thallium if the level of a contaminant at any sampling point is greater than the MCL. If confirmation samples are required by the Department, the determination of compliance will be based on the annual average of the initial MCL exceedance and any Department required confirmation samples. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(c) Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate and/or nitrite exceed the MCLs in the initial sample, a confirmation

(Rule 0400-45-01-.09, continued)

sample is required in accordance with paragraph (7)(b) of this rule, and compliance shall be determined based on the average of the initial and confirmation samples.

(d) If a public water system has a distribution system separate and distinct from other parts of the distribution system with no interconnections, the Department may allow the system to give public notice to only the area served by that portion of the system which is out of compliance.

(e) Arsenic sampling results will be reported to the nearest 0.001 mg/L.

(11) The Department may establish specific times during each compliance periods for public water systems to complete its monitoring.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.10 ORGANIC CHEMICAL SAMPLING AND ANALYTICAL REQUIREMENTS.**

(1) Beginning January 1, 1993, or the effective date of these regulations whichever is later, analysis of the contaminants listed in subparagraph (2)(a) of Rule 0400-45-01-.06 for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows:

(a) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

(b) Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant or within the distribution system. Surface water systems include systems with a combination of surface and ground sources.

(c) If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods when water representative of all sources is being used.

(d) Monitoring frequency:

1. Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in paragraph (2) of Rule 0400-45-01-.06 during each compliance period beginning with the initial compliance period.

2. Systems serving more than 3,300 persons which do not detect a contaminant in the initial compliance period, may reduce the sampling frequency to a minimum of two quarterly samples in one year during each repeat compliance period.

3. Systems serving 3,300 or less persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of one sample during each repeat compliance period.

(Rule 0400-45-01-.10, continued)

4. All new systems or systems that use a new source of water that begin operation after the effective date of this rule must demonstrate compliance with the MCL within a period of time specified by the Department. The system must also comply with the initial sampling frequencies specified by the Department to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements of this rule.

(e) Each community and non-transient water system may apply to the Department for a waiver from the requirement of subparagraph (d) of this paragraph. A system must reapply for a waiver for each compliance period.

(f) The Department may grant a waiver after evaluating the following: Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the Department reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.

1. Previous analytical results.

2. The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Non-point sources include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.

3. The environmental persistence and transport of the pesticide or PCBs.

4. How well the water source is protected against contamination due to such factors as depth of the well and the type of soil and the integrity of the well casing.

5. Elevated nitrate levels at the water supply source.

6. Use of PCBs in equipment used in the production, storage, or distribution of water (i.e., PCBs used in pumps transformers, etc.).

7. Any other information required by the Department.

(g) If an organic contaminant listed in paragraph (2) of Rule 0400-45-01-.06 is detected (as defined by subparagraph (r) of this paragraph) in any sample, then:

1. Each system must monitor quarterly at each sampling point which resulted in a detection.

2. The Department may decrease the quarterly monitoring requirement specified in part 1 of this subparagraph provided it has determined that the system is below the maximum contaminant level. In no case shall the Department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

3. After the Department determines the system is below the maximum contaminant level the Department may allow the system to monitor annually. Systems which

(Rule 0400-45-01-.10, continued)

monitor annually must monitor during the quarter that previously yielded the highest analytical result.

4. If monitoring results in detection of one or more of certain related contaminants (aldicarb, aldicarb sulfone, aldicarb sulfoxide and heptachlor, heptachlor epoxide), then subsequent monitoring shall analyze for all related contaminants.

(h) Systems which violate the maximum contaminant levels for organics must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the Department determines the system is below the MCL, the system shall monitor at the frequency specified in part (g)3 of this paragraph.

(i) The Department may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Department, the result must be averaged with the first sampling result and the average used for the compliance determination. The Department has discretion to delete results of documented sampling errors from this calculation.

(j) The Department may reduce the total number of analyses a system must conduct by allowing the use of composite sampling. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.

(k) Compliance with paragraph (2) of Rule 0400-45-01-.06 shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of the MCL, the system is in violation of the MCL.

1. For systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. If the annual average of any sampling point is greater than the MCL, then the system is out of compliance. If the initial sample or a subsequent sample would cause the annual average to be exceeded, then the system is out of compliance immediately.

2. Systems monitoring annually or less frequently whose sample result exceeds the regulatory detection level must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

3. If any sample result will cause the running annual average to exceed the MCL, at any sampling point, the system is out of compliance with the MCL immediately.

4. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.

5. If a sample result is less than the detection limit, zero will be used to calculate the annual average.

(l) Reserved

(m) Reserved

(n) If monitoring data collected after January 1, 1990, are generally consistent with the requirements of this paragraph, then the Department will allow systems to use that data

(Rule 0400-45-01-.10, continued)

to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(o) The Department may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctuations in concentration due to seasonal use, changes in water source), as determined by the criteria described in subparagraph (3)(a) of Rule 0400-45-01-.09.

(p) The Department has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their representatives and agencies.

(q) The Department may pursuant to these rules establish specific times during each compliance period for public water systems to complete its monitoring.

(r) Detection as used in this paragraph shall be defined as greater than or equal to the following concentrations for each contaminant.

TABLE 0400-45-01-.10(1)(r)

| CONTAMINANT | DETECTION LIMIT (mg/L) |
|---|---|
| Alachlor | 0.0002 |
| Aldicarb | 0.0005 |
| Aldicarb sulfoxide | 0.0005 |
| Aldicarb sulfone | 0.0008 |
| Atrazine | 0.0001 |
| Benzo(a)pyrene | 0.00002 |
| Carbofuran | 0.0009 |
| Chlordane | 0.0002 |
| Dalapon | 0.001 |
| Dibromochloropropane (DBCP) | 0.00002 |
| Di(2-ethyl hexyl) adipate | 0.0006 |
| Di(2-ethyl hexyl) phthalate | 0.0006 |
| Dinoseb | 0.0002 |
| Diquat | 0.0004 |
| 2,4-D | 0.0001 |
| Endothall | 0.009 |
| Endrin | 0.00001 |

| CONTAMINANT | DETECTION LIMIT (mg/L) |
|---|---|
| Ethylene dibromide (EDB) | 0.00001 |
| Glyphosate | 0.006 |
| Heptachlor | 0.00004 |
| Heptachlor epoxide | 0.00002 |
| Hexachlorobenzene | 0.0001 |
| Hexachlorocyclopentadiene | 0.0001 |
| Lindane | 0.00002 |
| Methoxychlor | 0.0001 |
| Oxamyl | 0.002 |
| Picloram | 0.0001 |
| Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl) | 0.0001 |
| Pentachlorophenol | 0.00004 |
| Simazine | 0.00007 |

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| | |
|---|---|
| Toxaphene | 0.001 |
| 2,3,7,8 TCDD (Dioxin) | 0.000000005 |
| 2,4,5-TP (Silvex) | 0.0002 |

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.11 RADIONUCLIDE SAMPLING.**

(1) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample.)

(a) To determine compliance with gross alpha particle activity, radium-226, radium-228 and uranium the detection limit shall not exceed the concentration in the Table to this subparagraph.

Detection Limits for Gross Alpha Particle
Activity, Radium-226, Radium-228, and Uranium

| Contaminant | Detection Limit |
|---|---|
| Gross alpha particle activity | 3pCi/L |
| Radium-226 | 1pCi/L |
| Radium-228 | 1pCi/L |
| Uranium | 1/10 the MCL |

(b) To determine compliance with beta particle and photon activity the detection limit shall not exceed the concentrations listed in the following table.

Detection Limits for Man-made Beta Particle
and Photon Emitters

| Radionuclide | Detection Limit |
|---|---|
| Tritium | 1000pCi/L |
| Strontium-89 | 10pCi/L |
| Strontium-90 | 2pCi/L |
| Iodine-131 | 1pCi/L |
| Cesium-134 | 10pCi/L |
| Gross beta | 4pCi/L |
| Other radionuclides | 1/10 of the applicable limit |

(2) To judge compliance with the maximum contaminant levels listed in paragraph (5) of Rule 0400-45-01-.06 averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(3) The Department has the authority to determine compliance or initiate enforcement action based upon analytical results or other information compiled by their sanctioned representatives and agencies.

(4) Monitoring and compliance requirements for gross alpha particle activity, radium -226, radium 228, and uranium.

(Rule 0400-45-01-.11, continued)

(a) Community water systems (CWSs) must conduct initial monitoring to determine compliance with radium-226 and 228, gross alpha particle activity and uranium activity by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, and uranium and beta particle activity and photon activity in drinking water "detection limit" is defined as in paragraph (3) of this rule.

1. Applicability and sampling location for existing community water systems or sources. All existing CWSs using ground water, surface water or systems using both ground and surface water (hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the Department has designated a distribution system location, in accordance with item 2(ii)(III) of this subparagraph.

(i) Applicability and sampling location for new community water systems or sources. All new CWSs or CWSs that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after initiating use of the source. CWSs must conduct more frequent monitoring when ordered by the Department in the event of possible contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.

2. Initial monitoring: Systems must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

(i) Systems without acceptable historical data, as defined below, must collect four consecutive quarterly samples at all sampling points before December 31, 2007.

(ii) Grandfathering of data: The Department may allow historical monitoring data collected at a sampling point to satisfy the initial monitoring requirements for that sampling point, for the following situations.

(I) To satisfy initial monitoring requirements, a community water system having only one entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

(II) To satisfy initial monitoring requirements, a community water system with multiple entry points and having appropriate historical monitoring data for each entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

(III) To satisfy initial monitoring requirements, a community water system with appropriate historical data for a representative point in the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003, provided that the Department finds that the historical data satisfactorily demonstrates that each entry point to the distribution system is expected to be in compliance based upon the historical data and reasonable assumptions about the variability of contaminant levels between entry points. The Department must

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make a written finding indicating how the data conforms to these requirements.

(iii) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the Department may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.

(iv) If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the Department.

3. Reduced monitoring: The Department may allow community water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria:

(i) If the average of the initial monitoring results for each contaminant (i.e., gross alpha particle activity, uranium, radium-226, or radium-228) is below the detection limit specified in this rule, the system must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

(ii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below 1/2 the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below 1/2 the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years.

(iii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above 1/2 the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above 1/2 the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years.

(iv) Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above 1/2 MCL, then the next monitoring period for that sampling point is three years).

(v) If a system has a monitoring result that exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the Department.

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4. Compositing: To fulfill quarterly monitoring requirements for gross alpha particle activity, radium-226, radium-228, or uranium, a system may composite up to four consecutive quarterly samples from a single entry point if analysis is done within a year of the first sample. The Department will treat analytical results from the composite as the average analytical result to determine compliance with the MCLs and the future monitoring frequency. If the analytical result from the composited sample is greater than 1/2 MCL, the Department may direct the system to take additional quarterly samples before allowing the system to sample under a reduced monitoring schedule.

5. A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed 5 pCi/L. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/L. The gross alpha measurement shall have a confidence interval of 95% (1.65 sigma, where sigma is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium- 226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, 1/2 the detection limit will be used to determine compliance and the future monitoring frequency.

(b) Monitoring and compliance requirements for beta particle and photon radioactivity. To determine compliance with the maximum contaminant levels for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

1. Community water systems (both surface and ground water) designated by the Department as vulnerable must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the Department. Systems already designated by the Department must continue to sample until the Department reviews and either reaffirms or removes the designation.

(i) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the Department may reduce the frequency of monitoring at that sampling point to once every 3 years. Systems must collect all samples required in part 1 of this subparagraph during the reduced monitoring period.

(ii) For systems in the vicinity of a nuclear facility, the Department may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the Department determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with part 1 of this subparagraph.

2. Community water systems (both surface and ground water) designated by the Department as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. Systems must collect

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quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the Department. Systems already designated by the Department as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the Department reviews and either reaffirms or removes the designation.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the Department, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

(iv) If the gross beta particle activity beta minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L, the Department may reduce the frequency of monitoring at that sampling point to every 3 years. Systems must collect all samples required in part 2 of this subparagraph during the reduced monitoring period.

(v) For systems in the vicinity of a nuclear facility, the Department may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the Department determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with part 2 of this subparagraph.

3. Community water systems designated by the Department to monitor for beta particle and photon radioactivity can not apply to the Department for a waiver from the monitoring frequencies specified in part 1 or 2 of this subparagraph.

4. Community water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for the gross beta particle activity analysis. Systems are allowed to subtract the potassium-40 beta particle activity value from the total gross beta particle activity value to determine if the screening level is exceeded. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82.

5. For community water systems, if the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and summed to determine compliance with part (5)(b)1 of Rule 0400-45-01-.06, using the formula in part (5)(b)2 of Rule 0400-45-01-.06. Doses

(Rule 0400-45-01-.11, continued)

must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

6. Community water systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in subparagraph (5)(c) of Rule 0400-45-01-.06 beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of 3 monthly samples, that the MCL is being met. Community water systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in subparagraph 1(ii) or 2(i) of this subparagraph.

(c) General monitoring and compliance requirements for radionuclides.

1. The Department may require more frequent monitoring than specified in subparagraphs (a) and (b) of this paragraph, or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

2. Each public water systems shall monitor at the time designated by the Department during each compliance period.

3. Compliance: Compliance the radionuclide MCLs will be determined based on the analytical result(s) obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

(i) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point. If the average of any sampling point is greater than the MCL, then the system is out of compliance with the MCL.

(ii) For systems monitoring more than once per year, if any sample result will cause the running average to exceed the MCL at any sample point, the system is out of compliance with the MCL immediately.

(iii) Systems must include all samples taken and analyzed under the provisions of this Rule in determining compliance, even if that number is greater than the minimum required.

(iv) If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running average of the samples collected.

(v) If a sample result is less than the detection limit, zero will be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, 1/2 the detection limit will be used to calculate the annual average.

4. The Department has the discretion to delete results of obvious sampling or analytic errors.

5. If the MCL for radioactivity set forth in paragraph (5) of Rule 0400-45-01-.06 is exceeded, the operator of a community water system must give notice to the Department pursuant to Rule 0400-45-01-.20 and to the public as required by Rule 0400-45-01-.19.

(Rule 0400-45-01-.11, continued)
***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.12 SECONDARY DRINKING WATER REGULATIONS.**

(1) The following maximum contaminant levels are established to provide a water that is aesthetically pleasing to the consumer. These standards will apply to all community water systems and to those non-community water systems as may be deemed necessary by the Department. Monitoring for these contaminants will be set in the Monitoring Program for each system, but in no event less than once every year for a surface and surface/ground supply and once every three years for a ground water supply.

Maximum Contaminant Level

| Contaminant | | Milligrams per Liter (unless otherwise indicated) |
|---|---|---|
| (a) | Chloride | 250 |
| (b) | Color | 15 (Color Units) |
| (c) | Copper | 1 |
| (d) | MBAS (Methyl Blue Active Substance) | 0.5 |
| (e) | Iron | 0.3 |
| (f) | Manganese | 0.05 |
| (g) | Odor | 3 (Threshold Odor Number) |
| (h) | pH | 6.5-8.5 |
| (i) | Sulfate | 250 |
| (j) | TDS (Total Dissolved Solids) | 500 |
| (k) | Zinc | 5 |
| (l) | Fluoride | 2 |
| (m) | Aluminum | 0.2 |
| (n) | Silver | 0.1 |

(2) The system may apply for monitoring waivers from the monitoring frequency specified in paragraph (1) of this rule. The Department may issue monitoring waivers after considering: historical data, whether or not there have been customer complaints concerning the contaminant to be waived, any corrective action taken by the water supplier to correct the secondary contaminant problem, and whether or not the system routinely monitors for the contaminant as part of its treatment process monitoring program. The Department shall determine the frequency, if any, a system must monitor after considering the historical data available, the number and nature of customer complaints and other factors that may affect the contaminant concentration, and specify the decision in writing to the system.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.13 ALTERNATIVE ANALYTICAL TECHNIQUES.**

If an alternative analytical technique is acceptable to the Administrator of the U.S. Environmental Protection Agency as being substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level, they shall become a part of these rules and regulations by inference.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.14 LABORATORY CERTIFICATION.**

(1) General

(a) For the purpose of determining compliance with physical, chemical, biological and radiological constituents and maximum contaminant levels set forth in this rule chapter, analyses of samples may be considered only if they have been analyzed by a laboratory certified by the Department. Laboratories which are certified by the Department are designated "state-certified laboratories." Analysis for turbidity, free chlorine residual, temperature, pH, alkalinity, calcium, conductivity, orthophosphate, daily chlorite, and silica may be performed by persons approved by the Department. Approved methodology must be used.

(b) The Tennessee Laboratory Certification Program is established for the purpose of evaluating laboratories to determine technical capability to analyze for one or more groups of the contaminants, disinfectant residuals, disinfection byproducts and disinfectant precursors listed in Rules 0400-45-01-.06 through 0400-45-01-.10, 0400-45-01-.12, 0400-45-01-.21, 0400-45-01-.24 through 0400-45-01-.26, and 0400-45-01-.36 through 0400-45-01-.40. Designation of Department laboratory certification officer(s) shall be from those experienced professional staff members assigned to the Department of Environment and Conservation, Division of Water Supply and certified by the U.S. Environmental Protection Agency. Certification Officer(s) shall supervise the certification program.

(c) A laboratory desiring certification in microbiological and/or chemical analysis shall make written application to the Department of Environment and Conservation, Division of Water Supply. The applicant shall indicate those group(s) of contaminants for which it seeks certification:

Chemistry

1. General (wet)
2. Inorganic
3. Organic Chemicals
4. Disinfection Byproducts
5. Polychlorinated Biphenyls (PCBs)
6. Radiochemistry
7. Microbiology
   (i) Enzyme Substrate Coliforms
   (ii) Membrane Filter Coliforms
   (iii) Heterotrophic Plate Count
   (iv) Enterococci

(d) The laboratory shall upon request supply to the Department all information requested concerning its equipment, facilities, data, and the qualifications of its laboratory staff. Certified laboratories must have an on-site audit conducted every three years by the certification officer or his/her designee.

(e) A laboratory desiring certification will arrange for an American Association for Laboratory Accreditation (A2LA) approved vendor to send performance evaluation samples to the laboratory for testing pursuant to its proficiency testing program. A2LA approved Performance Evaluation venders can be viewed at: http://www.a2la.org/dirsearchnew/nelacptproviders.cfm. The laboratory's performance in correctly evaluating such sample(s) will be sent to both the laboratory and to the certification officer. All direct costs for the performance evaluation samples will be borne by the laboratory requesting certification.

(Rule 0400-45-01-.14, continued)

(f) The certification officer shall review the written report of the laboratory performance evaluation and together with his review of requirements set forth in this rule shall determine the certification ranking.

(g) Certified laboratories must maintain all records and correspondence used to determine compliance with the requirements of these Rules for a period of not less than six (6) years. Adequate information must be available to reconstruct results for compliance and performance evaluation (PE) samples. This includes all raw data, calculations, and quality control data. Electronic data must be backed up by protected tape, hard disk, or other method approved by the Department. Water system clients should be notified before disposing of any records so that they may request copies if needed. Performance evaluation samples shall be analyzed annually.

(h) Certified Laboratories shall comply with all requirements set forth in the latest edition of EPA Manual for the Certification of Laboratories Analyzing Drinking Water except where those requirements differ from the requirements set forth in this chapter.

(2) In order for a laboratory to be certified by the Department:

(a) It must have a written quality assurance (QA) plan which addresses the following parts:

1. Laboratory organization and responsibility.

2. Process used to identify clients' Data Quality Objectives.

3. Standard Operating Procedures with dates of last revision.

4. Field sampling procedures.

5. Laboratory sample receipt and handling procedures.

6. Instrument calibration procedures

7. Analytical procedures.

8. Data reduction, validation, reporting and verification.

9. Type of quality control (QC) checks and the frequency of their use.

10. List schedules of internal and external system and data quality audits and inter - laboratory comparisons.

11. Preventive maintenance procedures and schedules.

12. Corrective action contingencies.

13. Record keeping procedures.

(i) If a particular part is not relevant, the QA plan should state this and provide a brief explanation.

(ii) All laboratories analyzing drinking water compliance samples must adhere to any required QC procedures specified in the approved method. Documentation for many of the listed QA plan parts may be made by reference to appropriate sections of the latest edition of EPA Manual for

(Rule 0400-45-01-.14, continued)

the Certification of Laboratories Analyzing Drinking Water, the laboratory's standard operating procedures (SOPs), or other literature (e.g., promulgated methods, Standard Methods for the Examination of Water and Wastewater, etc.). The QA Plan should be updated at least annually.

(b) It must complete the performance evaluation samples as described in paragraph (9) of this rule.

(c) On an annual basis and with each application for certification or recertification, all laboratories except Tennessee Public Water Systems shall convey to the Department, Division of Water Supply, payment for the activities necessary for each group of contaminants it desires certification or recertification. All laboratories except Tennessee Public Water Systems shall pay annually an administrative certification fee as listed in the fee schedule. The fee schedule is as follows:

| Fee Type | | Fee in Dollars |
|---|---|---|
| 1. | Administrative In-State | $1000 |
| 2. | Administrative Out of State | $750 |
| 3. | General Chemistry-Turbidity, Corrosivity, pH | $500 |
| 4. | Inorganics- Trace Metals, Sodium, Nitrite, Nitrate, Fluoride, Sulfate, Cyanide, Asbestos, Chlorite, and Bromate | $500 |
| 5. | Organics $500 | |
| 6. | Disinfection Byproducts-Trihalomethanes and Haloacetic acids | $500 |
| 7. | Polychlorinated Biphenyls (PCB) | $500 |
| 8. | Radiochemistry | $500 |
| 9. | Enzyme Substrate-Total Coliform and E.-Coli | $500 |
| 10. | Membrane Filter- Total Coliform, Fecal Coliform, E.-Coli | $500 |
| 11. | Heterotrophic Plate Count | $500 |
| 12. | Enterococci | $500 |

(i) Certification fees shall be retained by the Department even if the laboratory applying for certification does not qualify for certification.

(ii) If the certification fee is not paid within 30 days after the receipt of the invoice, certification of the laboratory is automatically revoked.

(iii) The reinstatement fee for a laboratory that fails to pay its certification fee by the invoice due date shall be $500 in addition to the fees specified in this subparagraph.

(3) Ranking Scheme of Laboratories - Based upon a review of the written application, the facts determined from any inspection, and the results of a laboratory performance evaluation, a certification officer may classify a laboratory as follows for the particular group(s) of contaminants for which it seeks certification:

(a) Certified - A laboratory that meets the minimum requirements as set forth in these rules.

(b) Provisionally Certified - A laboratory which has deficiencies but can still produce valid analytical data.

(Rule 0400-45-01-.14, continued)

(c) Not Certified - A laboratory which possesses major deficiencies such that it cannot consistently produce valid analytical data in order to determine compliance with the maximum contaminant level. Analytical data will not be accepted from a laboratory with this ranking.

(d) Interim Certification - Interim certification may be granted in certain circumstances when it is impossible or unnecessary to perform an on-site audit. Interim certification status may be granted if, for example, the Certification Officer determines that the laboratory has the appropriate instrumentation, is using the approved methods, has adequately trained personnel to perform the analyses, and has satisfactorily analyzed PE samples, if available, for the contaminants in question. The Certification Officer should perform an on-site audit as soon as possible but no later than three years. An example of a situation where this type of certification is warranted would be a laboratory that has requested certification for the analysis of additional analytes that involve a method for which it already has certification.

(4) Downgrading Certification Status - A laboratory certified to perform analyses may be downgraded to a Provisionally Certified status for a particular parameter, or for one or more groups of contaminants for which it has been certified for any one of the following reasons:

(a) Failure to analyze a set of performance evaluation samples within established acceptance limits described in paragraph (9) of this rule. If more than one concentration of a particular contaminant was provided for analysis, the laboratory must analyze all concentrations provided except where otherwise stated.

(b) Failure to notify the Department within 30 days of any changes either in personnel, equipment, or laboratory location which may impair analytical capability.

(c) Failure to maintain the minimum required standard of quality as contained in the most recent version of the EPA Manual for the Certification of Laboratory Analyzing Drinking Water as determined by an on-site evaluation by a Department representative.

(d) During a provisional status period, which may last for up to one year plus any extension period pending proceedings for revocation of its certification, the laboratory may continue to analyze samples for compliance purposes, but it must notify its clients of its downgraded status in writing on all reports.

(e) Failure to report compliance data to the public water system or the Department in a timely manner. Data that may cause the system to exceed a MCL shall be reported as soon as possible to the system and to the Department.

(5) Revoking Certification Status - A laboratory certified to perform analyses may be downgraded from a Certified or a Provisionally Certified status to a Not Certified status for a particular parameter, or for one or more groups of contaminants for which it has been certified, including but not limited to any of the reasons listed in subparagraphs below. Commercial laboratories must notify their public water system customers of the change in certification status by mail within 45 days of a downgrade in status by the Department and retain copies of such notice for six years.

(a) Failure to analyze an initial and a follow-up or cross check performance evaluation sample within established acceptance limits.

(b) Failure to correct identified deviations (including continued use of unapproved methods and equipment) within the time specified by the Department.

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(c) Reporting as data derived from its own laboratory analysis, that data obtained from analyses of the sample(s) performed by another laboratory.

(d) Falsification or inaccurate reporting of analytical data.

(e) Failure to report to the Department on Departmental forms analytical results as specified by Rule 0400-45-01-.18. Forms may be obtained from the Division of Water Supply. A certified laboratory shall submit results of its analyses to both the appropriate Department's field office and the Department's central office on forms furnished by the Department.

(f) Failure to perform the analysis within the time period prescribed by the analytical procedure. However, the time period shall not be more than thirty (30) days from the sample collection date, except for lead and copper tap samples collected pursuant to Rule 0400-45-01-.33.

(g) Failure to notify its drinking water customers of any downgrade or revocation of its certification status and to keep records of the notice to customers.

(h) Failure of the laboratory to reject any sample taken for compliance purposes that does not meet acceptable criteria for the type container and preservative, maximum holding time, chain of custody, proper sample collection and transport, and sample report form that contains the location, date, time of collection, collector's name, preservative added, and other special remarks concerning the sample. Indelible ink shall be used for completing the sample report form.

(i) Failure of the Laboratory Director to give timely notice to the party responsible for collecting the sample that improper sampling technique, container, transport, holding time, method preservative or documentation was used.

(j) Failure to provide written sampling procedures with sample containers sent to customers for collecting drinking water samples.

(k) Failure to meet the method detection limits.

(l) Failure to maintain all data necessary to reconstruct analytical results reported for compliance samples.

(m) Failure to pay certification fees as listed in subparagraph (2)(c) of this rule.

(6) Procedure for Revocation

(a) The Department or the certification officer shall notify the laboratory by certified mail of its intent to revoke certification.

(b) If the local laboratory objects to the determination to revoke certification, the laboratory shall submit a written notice of appeal to the Department within thirty (30) days after issuance of the notice of intent to revoke certification. The notice of appeal will be referred to the Tennessee Water Quality Control Board. The Board will set a hearing date and conduct proceedings in accordance with the Uniform Administrative Procedures Act, Chapter 5 of Title 4. If no notice of appeal is so filed, certification will be revoked.

(c) The notice of appeal shall set forth the grounds and reasons for objection and shall ask for a hearing before the Tennessee Water Quality Control Board. It shall be signed by a duly authorized representative of the laboratory such as the president/owner of a

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commercial laboratory, or the mayor, utility manager, president, or laboratory supervisor in the case of a municipal or utility district laboratory.

(d) If the Water Quality Control Board modifies or sets aside the determination of the Department, the Department will reevaluate the local laboratory within sixty (60) days of issuance of the decision by the Board.

(7) Reinstatement of Certification - Certification of a laboratory will be reinstated when it demonstrates to the Department that the deficiencies which resulted in provisional certification or revocation have been corrected. Such demonstration may result from an on-site evaluation and/or a successful analysis of samples on the next regularly scheduled performance evaluation.

(8) Reciprocity of Certified Laboratories - The Department may authorize acceptance of analyses from laboratories certified by other states or by the U. S. Environmental Protection Agency. Authorization will be granted on a reciprocal basis for laboratories from those states which accept Tennessee laboratory certification. Laboratories desiring Department approval of their certification from the U.S. E.P.A. or from another state must submit to the Department copies of all correspondence pertaining to the grant of certification, including the results of any performance evaluation sample analyses.

(9) Proficiency Evaluation (PE) Samples or Performance Test (PT) Samples

(a) In order to receive and maintain full certification for an analyte, the following are required for each analyte for which a laboratory is certified:

1. The laboratory must analyze PE samples (if available) acceptable to the Department at least once a year for each analyte and by each method used to analyze compliance samples. PE samples are also referred to as Performance Test (PT) samples.

2. Results from analysis of the PE samples must be within the acceptable limits set forth in this chapter.

3. The laboratory must document the corrective actions taken when a PE sample is analyzed unsuccessfully. A copy of this documentation must be available for review by the certification officer.

4. A make up PE sample must be successfully analyzed within three months of being notified that a PE sample was not acceptable.

(b) Excluding vinyl chloride, the laboratory may be certified for all VOCs if they successfully analyze at least 80% of the regulated VOCs. The 80% Rule does not apply to the regulated trihalomethanes (THM) or haloacetic acids (HAAs). Laboratories are certified for total THMs and HAA5 but each regulated THM and HAA concentration must be reported, evaluated and passed individually to pass the PE sample. If a laboratory fails one of the regulated THMs or HAAs, it cannot be certified for total THMs or HAA5, but must analyze another PE sample and pass all of the regulated THMs or HAAs in a PE sample to be certified to analyze compliance monitoring samples for total trihalomethanes or total haloacetic acids.

The following table summarizes the 80% Rule.

| Analyte(s) | PE Success Requirement |
|---|---|
| Vinyl Chloride | 100% |
| 20 VOCs | 80% * |
| 4 Regulated THMs | 100% |

(Rule 0400-45-01-.14, continued)

| | |
|---|---|
| 5 Regulated HAA5s | 100% |

*A lab will not maintain certification for analyte(s) which it repeatedly fails.

(c) Acceptable PE studies for the determination of total coliforms and E. coli shall be part of a drinking water study. Each study shall contain a set of ten samples in various combinations of total coliforms, E. coli, non-coliforms, and at least one blank. To be certified, laboratories must successfully analyze nine of the ten samples with no false negatives.

(10) Analytical Requirements

(a) Microbiology

1. Suppliers of water for community water systems and non-community water systems shall analyze for coliform bacteria for the purpose of determining compliance with paragraph (4) of Rule 0400-45-01-.06. The standard sample volume required for total coliform analysis, regardless of the analytical method used is 100 milliliters. Analyses shall be conducted in accordance with one of the analytical methods in following table:

Table 0400-45-01-.14(10)(a)1

| Organism | Methodology | Citation [1] |
|---|---|---|
| Total Coliforms [2] | Total Coliform Fermentation Technique [3,4,5] | 9221A, B |
| | Total Coliform Membrane Filter Technique [6] | 9222 A, B, C |
| | Presence-Absence (P-A) Coliform Test [5,7] | 9221 |
| | ONPG-MUG Test [8]<br>Colisure Test [9]<br>E*Colite® Test [10]<br>m-ColiBlue24® Test [11]<br>Readycult® Coliforms 100 Presence/Absence Test [12]<br>Membrane Filter Technique using Chromocult® Coliform Agar[13]<br>Colitag® Test[14] | 9223 |

Footnotes

1 Methods 9221 A, B; 9222 A, B, C; 9221 D and 9223 are contained in Standard Methods for the Examination of Water and Wastewater, 18th edition (1992) and 19th edition (1995) American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 20005; either edition may be used. In addition, the following online versions may also be used: 9221 A, B, D-99, 9222 A, B, C-97 and 9223 B-97. Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

2 The time from sample collection to initiation of analysis may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 °C during transit.

3 Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform, using lactose broth, is less than 10 percent.

4 If inverted tubes are used to detect gas production, the media should cover these tubes at least one-half to two-thirds after the sample is added.

5 No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.

6 MI agar also may be used. Preparation and use of MI agar is set forth in the article, ''New medium for the simultaneous detection of total coliform and Escherichia coli in water'' by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534–3544. Also available from the Office of Water Resource Center (RC–4100), 401 M. Street SW, Washington, DC 20460, EPA/600/J–99/225.

7 Six-times formulation strength may be used if the medium is filter-sterilized rather than autoclaved.

8 The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

9 A description of the Colisure Test, Feb 28, 1994, may be obtained from IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. The Colisure Test may be read after an incubation time of 24 hours.

10 A description of the E*Colite® Test, ''Presence/Absence for Coliforms and E. Coli in Water,'' Dec 21, 1997, is available from Charm Sciences, Inc., 36 Franklin Street, Malden, MA 02148–4120.

(Rule 0400-45-01-.14, continued)

11 A description of the m-ColiBlue24® Test, Aug 17, 1999, is available from the Hach Company, 100 Dayton Avenue, Ames, IA 50010.

12 The Readycult® Coliforms 100 Presence/Absence Test is described in the document, "Readycult® Coliforms 100 Presence/Absence Test for the Detection and Identification of Coliform Bacteria and Escherichla coli in finished water", November 2000, Version 1.0, available from EM Science (an affiliate of Merck KggA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone number is (800) 222-0342, e-mail address is: adellenbusch@emscience.com.

13 Membrane Filter Technique using Chromocult® Coliform Agar is described in the document, "Chromocult® Coliform Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and Escherichla coli in finished water", November 2000, Version 1.0, available from EM Science (an affiliate of Merck KggA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone number is (800) 222-0342, e-mail address is: adellenbusch@emscience.com.

14 Colitag® product for the determination of the presence/absence of total coliforms and E. coli is described in "Colitag® Product as a Test for Detection and Identification of Coliforms and E. coli Bacteria in Drinking Water and Source Water as required in National Primary Drinking Water Regulations," August 2001, available from CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA, 95403 telephone (800) 878-7654, Fax (707) 545-7901, Internet address http://www.cpiinternational.com.

(i) The following table gives the alternative testing methods for total coliforms to those in table 0400-45-01-.14(10)(a)1:

Table 0400-45-01-.14(10)(a)1(i)

| Organism | Methodology | SM 21st Edition[1] | Other |
|---|---|---|---|
| Total Coliforms | Total Coliform Fermentation Technique | 9221 A, B | |
| | Total Coliform Membrane Filter Technique | 9222 A, B, C | |
| | Presence-Absence (P-A) Coliform Test | 9221 D | |
| | ONPG-MUG Test | 9223 | |
| | Colitag™ | | Modified Colitag™ [2] |

Footnotes

1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710

2 Modified Colitag™ Method. "Modified Colitag™ Test Method for the Simultaneous Detection of E. Coli and other Total Coliforms in Water (ATP D05-0035)," August 28, 2009. Available at http://www.nemi.gov or from CPI International, 5580 Skylane Boulevard, Santa Rosa, CA 95403.

2. Where a determination of fecal coliform density is not required, public water systems must conduct fecal coliform analysis in accordance with the following procedure:

(i) 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.

(ii) For EPA-approved analytical methods which use a membrane 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), swab the entire surface with a sterile cotton swab and transfer the inoculum to EC medium (do not leave the cotton swab in the EC medium), or inoculate individual total coliform-positive colonies into EC Medium. Gently shake the inoculated EC tubes

(Rule 0400-45-01-.14, continued)

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 Method 9221E in Standard Methods for the Examination of Water and Wastewater, 18th Edition (1992), 19th Edition (1995), and 20th Edition (1998); the cited method in any one of these three editions may be used.

3. Public Water Systems choosing to test for E. coli in lieu of fecal coliform must use the following methods:

(i) EC medium supplemented with 50 ug/ml of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222 G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 ml of EC medium, as described in part 2 of this subparagraph, is supplemented with 50 ug/ml of MUG before autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in part 2 of this subparagraph for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at 44.5 + 0.2 $^{o}$C for 24 + 2 hours, and then observe fluorescence with an ultraviolet light (366nm) in the dark. If fluorescence is visible, E. coli are present.

(ii) Nutrient agar supplemented with 100 µg/ml of 4methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used for determining if a total coliform-positive sample, as determined by a membrane filter technique, contains E. coli Alternatively, the 18th edition (1992) may be used if the membrane filter containing a total coliform-positive colony(ies) is transferred to nutrient agar, as described in Method 9221B (paragraph 3) of Standard Methods (18th edition), supplemented with 100 ug/ml of MUG. If the 18th edition is used, incubate the agar plate at 35 °C for 4 hours and then observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, E. coli are present.

(iii) Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article "National Field Evaluation of 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 Autoanalysis Colilert System is an MMO-MUG test). If the MMO-MUG test is total coliform-positive after a 24-hour incubation, test the medium for fluorescence with a 366-nm ultraviolet light (preferably with a 6-watt lamp) in the dark. If fluorescence is observed, the sample is E. coli-positive. If fluorescence is questionable (cannot be definitively read) after 24 hours incubation, incubate the culture for an additional four hours (but not to exceed 28 hours total) and again test the medium for fluorescence. The MMO-MUG Test with hepes buffer in lieu of phosphate buffer is the only approved formulation for the detection of E. coli.

(Rule 0400-45-01-.14, continued)

(iv) The Colisure Test. A description of the Colisure Test may be obtained from the Millipore Corporation, Technical Services Department, 80 Ashby Road, Bedford, MA 01730.

(v) The membrane filter method with MI agar, a description of which is cited in footnote 6 to Table 0400-45-01-.14(10)(a)1.

(vi) E*Colite® Test, a description of which is cited in footnote 10 to Table 0400-45-01-.14(10)(a)1.

(vii) m-ColiBlue24® Test, a description of which is cited in footnote 11 to Table 0400-45-01-.14(10)(a)1.

(viii) Readycult® Coliforms 100 Presence/Absence Test, a description of which is cited in footnote 12 to the Table 0400-45-01-.14(10)(a)1.

(ix) Membrane Filter Technique using Chromocult® Coliform Agar, a description of which is cited in footnote 13 to Table 0400-45-01-.14(10)(a)1.

(x) Colitag®, a description of which is cited in footnote 14 to Table 0400-45-01-.14(10)(a)1.

(xi) As an option to subpart (iii) of this part, a system with a total coliform-positive, MUG-negative, MMO-MUG test may further analyze the culture for the presence of E. coli by transferring a 0.1 ml. 28-hour MMO-MUG culture to EC Medium + MUG with a pipet. The formulation and incubation conditions of EC Medium + MUG, and observation of the results are described in subpart (i) of this part. Alternative methods are given in the following table:

Table 0400-45-01-.14(10)(a)3(xi)

| Alternative Testing Methods for E. coli | | | | | |
|---|---|---|---|---|---|
| Organism | Methodology | SM 20th Edition[1] | SM 21st Edition[2] | SM Online[3] | Other |
| E. coli | ONPG-MUG Test | 9223 B | | | |
| | | | | | Modified Colitag™[4] |

Footnotes

1 Standard Methods for the Examination of Water and Wastewater, 20th Edition (1998). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.

2 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710

3 Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

4 Modified Colitag™ Method. "Modified Colitag™ Test Method for the Simultaneous Detection of E. Coli and other Total Coliforms in Water (ATP D05-0035)," August 28, 2009. Available at http://www.nemi.gov or from CPI International, 5580 Skylane Boulevard, Santa Rosa, CA 95403.

4. Public Water systems required to monitor under parts (2)(a)1 and (5)(b)2 of Rule 0400-45-01-.31 for total coliforms, fecal coliforms, or heterotrophic bacteria must use one of the methods listed in the following table.

Table 0400-45-01-.14(10)(a)4

(Rule 0400-45-01-.14, continued)

| Organism | Methodology | Citation [1] |
|---|---|---|
| Total Coliform [2] | Total Coliform Fermentation Technique [3,4,5] | 9221 A, B, C |
| | Total Coliform Membrane Filter Technique [6] | 9222 A, B, C |
| | ONPG-MUG Test [7] | 9223 |
| Fecal Coliforms [2] | Fecal Coliform Procedure [8] | 9221 E |
| | Fecal Coliform Filter Procedure | 9222 D |
| Heterotrophic bacteria [2] | Pour Plate Method | 9215 B |
| | SimPlate [9] | |

Footnotes

1. Except where noted, all methods refer to Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association, 1015 Fifteenth Street NW., Washington, DC 20005. The cited methods published in any of these three editions may be used. In addition, the following online versions may also be used: 2130 B–01, 9215 B–00, 9221 A, B, C, E–99, 9222 A, B, C, D–97, and 9223 B–97. Standard Methods Online are available http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that may be used.
2. The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10 deg. C during transit. {8 hour holding time only applies to parts (2)(a)1 and (5)(b)2 of Rule 0400-45-01-.31}
3. Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform, using lactose broth, is less than 10 percent.
4. Media should cover inverted tubes at least one-half to two-thirds after the sample is added.
5. No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.
6. MI agar also may be used. Preparation and use of MI agar is set forth in the article, ''New medium for the simultaneous detection of total coliform and Escherichia coli in water'' by Brenner, K.P., et. al., 1993, Appl. Environ. Microbiol. 59:3534-3544. Also available from the Office of Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460, EPA/600/J-99/225. Verification of colonies is not required.
7. The ONPG-MUG Test is also known as the Autoanalysis Colilert System.
8. A-1 Broth may be held up to seven days in a tightly closed screw cap tube at 4 deg. C.
9. A description of the SimPlate method, ''IDEXX SimPlate TM HPC Test Method for Heterotrophs in Water'', November 2000, can be obtained from IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092, telephone (800) 321-0207.

(i) Alternative testing methods for those contaminants found in Table 0400-45-01-.14(10)(a)4 are given in the following table:

| Organism | Methodology | SM 21st Edition[1] |
|---|---|---|
| Total Coliform | Total Coliform Fermentation Technique | 9221 A, B, C |
| | Total Coliform Membrane Filter Technique | 9222 A, B, C |
| | ONPG-MUG Test | 9223 |
| Fecal Coliforms | Fecal Coliform Procedure | 9221 E |
| | Fecal Coliform Filter Procedure | 9222 D |
| Heterotrophic Bacteria | Pour Plate Method | 9215 B |

Footnotes

1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.

(Rule 0400-45-01-.14, continued)

5. Public water systems required to enumerate E. coli in source water as required by Rule 0400-45-01-.39 must use one of the approved methods in the following table:

Table 0400-45-01-.14(10)(a)5

| Parameter and units | Method [1] | EPA | Standard methods 18th,19th, 20th Ed. | Standard methods online | AOAC, ASTM, USGS | Other |
|---|---|---|---|---|---|---|
| E. coli, number per 100 ml [16] | MPN[2,3,4] multiple tube, | | 9221B / 9221F[6,8] | 9221B-99 / 9221F[6,8] | | |
| | multiple tube/multiple well | | 9223B[7] | 9223B–97[7] | 991.155 | Colilert®[7,10] Colilert-18®[7,9,10] |
| | MF two step | 1103.1[13] | 9222B/9222G[12], 9213D | 9222B–97 / 9222G[12] | D5392–93[4] | |
| | MF single step | 1603[14], 1604[15] | | | | mColiBlue-24®[11] |

Footnotes

1. The method must be specified when results are reported.
2. Tests must be conducted to provide organism enumeration (density). Select the appropriate configuration of tubes/filtrations and dilutions/volumes to account for the quality, character, consistency, and anticipated organism density of the water sample.
3. To assess the comparability of results obtained with individual methods, it is suggested that side-by-side tests be conducted across seasons of the year with the water samples routinely tested in accordance with the most current Standard Methods for the Examination of Water and Wastewater or EPA alternate test procedure (ATP) guidelines.
4. ASTM. 2000, 1999, 1996. Annual Book of ASTM Standards—Water and Environmental Technology. Section 11.02. ASTM International. 100 Barr Harbor Drive, West Conshohocken, PA 19428.
5. AOAC. 1995. Official Methods of Analysis of AOAC International, 16th Edition, Volume I, Chapter 17. Association of Official Analytical Chemists International. 481 North Frederick Avenue, Suite 500, Gaithersburg, MD 20877–2417.
6. The multiple-tube fermentation test is used in 9221B.1. Lactose broth may be used in lieu of lauryl tryptose broth (LTB), if at least 25 parallel tests are conducted between this broth and LTB using the water samples normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliform using lactose broth is less than 10 percent. No requirement exists to run the completed phase on 10 percent of all total coliform-positive tubes on a seasonal basis.
7. These tests are collectively known as defined enzyme substrate tests, where, for example, a substrate is used to detect the enzyme b-glucuronidase produced by E. coli.
8. After prior enrichment in a presumptive medium for total coliform using 9221B.1, all presumptive tubes or bottles showing any amount of gas, growth or acidity within 48 h ± 3 h of incubation shall be submitted to 9221F. Commercially available EC–MUG media or EC media supplemented in the laboratory with 50 µg/mL of MUG may be used.
9. Descriptions of the Colilert®, Colilert-18®, Quanti-Tray®, and Quanti-Tray®/2000 may be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092.
10. Descriptions of the Colilert□, Colilert-18®, Quanti-Tray®, and Quanti-Tray®/2000 may be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092.
11. A description of the mColiBlue24® test, Total Coliforms and E. coli, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010.
12. Subject total coliform positive samples determined by 9222B or other membrane filter procedure to 9222G using NA MUG media.
13. USEPA. 2002. Method 1103.1: Escherichia coli (E. coli) In Water By Membrane Filtration Using membrane-Thermotolerant Escherichia coli Agar (mTEC). U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA–821–R–02–020.
14. USEPA. 2002. Method 1603: Escherichia coli (E. coli) In Water By Membrane Filtration Using Modified membrane-Thermotolerant Escherichia coli Agar ( modified mTEC). U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA–821–R–02–023.
15. Preparation and use of MI agar with a standard membrane filter procedure is set forth in the article, Brenner et al. 1993. ‘‘New Medium for the Simultaneous Detection of Total Coliform and Escherichia coli in Water.’’ Appl. Environ. Microbiol. 59:3534–3544 and in USEPA. 2002. Method 1604: Total Coliforms and Escherichia coli (E. coli) in Water by Membrane

(Rule 0400-45-01-.14, continued)

Filtration by Using a Simultaneous Detection Technique (MI Medium).U.S. Environmental Protection Agency, Office of Water, Washington, DC, EPA 821–R–02–024.

16. Recommended for enumeration of target organism in ambient water only.

(i) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of subpart (ii) of this part.

(ii) The Department may approve on a case-by-case basis the holding of an E. coli sample for up to 48 hours between sample collection and initiation of analysis if the Department determines that analyzing an E. coli sample within 30 hours is not feasible. E. coli samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in Table 0400-45-01-.14(10)(a)5.

(iii) Systems must maintain samples between 0°C and 10°C during storage and transit to the laboratory.

6. Ground water systems must analyze all ground water source samples collected under paragraph (3) of Rule 0400-45-01-.40 using one of the analytical methods listed in the following table for the presence of E. coli or enterococci.

| Analytical Methods for Source Water Monitoring | | |
|---|---|---|
| Fecal Indicator[1] | Methodology | Method citation |
| E. coli | Colilert[3]<br>Colisure[3]<br>Membrane Filter Method with MI Agar<br>m-ColiBlue24 Test[5]<br>E*Colite Test[6]<br>EC-MUG[7]<br>NA-MUG[7] | 9223 B.[2]<br>9223 B.[2]<br>EPA Method 1604.[4]<br><br><br><br>9221 F.[2]<br>9222 G.[2] |
| Enterococci | Multiple-Tube Technique<br>Membrane Filter Technique<br>Membrane Filter Technique<br>Enterolert[9] | 9230B.[2]<br>9230C.[2]<br>EPA Method 1600.[8] |

Analyses must be conducted in accordance with the documents listed below. The Director of the Federal Register approves the incorporation by reference of the documents listed in footnotes 2-11 in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Copies may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

Footnotes

1 The time from sample collection to initiation of analysis may not exceed 30 hours. The ground water system is encouraged but not required to hold samples below $10^{o}$ C during transit.

2 Methods are described in Standard Methods for the Examination of Water and Wastewater $20^{th}$ edition (1998) and copies may be obtained from the American Public Health Association, 1015 Fifteenth Street NW., Washington DC 20005-2605.

3 Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, West Brook, Maine 04092.

4 EPA Method 1604: Total Coliforms and Escherichia coli in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium); September 2002, EPA 821-R-02-024. Method is available at http://www.epa.gov/nerlccwww/1604sp02.pdf or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460.

5 A description of the m-ColiBlue24 Test, "Total Coliforms and E. coli Membrane Filtration Method with m-ColiBlue24 Broth," Method No. 10029 Revision 2, August 17, 1999, is available from Hach Company, 100 Dayton Ave., Ames IA 50010 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460.

6 A description of the E*Colite Test, "Charm E*Colite Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Drinking Water, January 9, 1998, is available from Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843-1032 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460.

7 EC-MUG (Method 9221F) or NA-MUG (Method 9222G) can be used for E. coli testing step as described in 141.21(f)(6)(i) or (ii) after use of Standard Methods 9221 B, 9221 D, 9222 B, or 9222 C.

(Rule 0400-45-01-.14, continued)

8 EPA Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-b-D-Glucoside Agar (mEI) EPA 821-R-02-022 (September 2002) is an approved variation of Standard Method 9230C. The method is available at http://www.epa.gov/nerlcwww/1600sp02.pdf or EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460. The holding time and temperature for ground water samples are specified in footnote 1 above, rather than as specified in Section 8 of EPA Method 1600.

9 Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. Preparation and use of the medium is set forth in the article "Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters," by Budnick, G.E., Howard, R.T, and Mayo, D.R., 1996, Applied and Environmental Microbiology, 62:3881-3884.

(i) Alternative testing methods for the fecal indicators listed in the table in Rule 0400-45-01-.14(10)(a)6 are given in the following table:

| Alternative Methods | for Analytical Testing | for Source Water | Monitoring | |
|---|---|---|---|---|
| Organism | Methodology | SM 21st Edition[1] | SM Online[2] | Other |
| E. coli | Colilert | 9223 B | 9223 B-97 | |
| | Colisure | 9223 B | 9223 B-97 | |
| | Colilert-18 | 9223 B | 9223 B-97 | |
| | Readycult® | | | Readycult®[3] |
| | Colitag | | | Modified Colitag™ [4] |
| | Chromocult® | | | Chromocult® [5] |
| Enterococci | Multiple-Tube Technique | | 9230 B-04 | |

Footnotes

1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710.

2 Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

3 Readycult® Method, "Readycult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Finished Waters," January, 2007. Version 1.1. Available from EMD Chemicals (affiliate of Merck KGaA,, Darmstadt, Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297.

4 Modified Colitag™ Method. "Modified Colitag™ Test Method for the Simultaneous Detection of E. Coli and other Total Coliforms in Water (ATP D05-0035)," August 28, 2009. Available at http://www.nemi.gov or from CPI International, 5580 Skylane Boulevard, Santa Rosa, CA 95403.

5 Chromocult® Method, "Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and Escherichia coli in Finished Waters," November, 2000. Version 1.0. EMD Chemicals (affiliate of Merck KGaA,, Darmstadt, Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297.

(b) Public Water system required to monitor for turbidity by this Chapter must use one of the methods listed in the following table:

Table 0400-45-01-.14(10)(b)

| | | |
|---|---|---|
| Turbidity[4] | Nephelometric Method | 2130 B |
| | NephelometricMethod | 180.1[1] |
| | Great Lakes Instruments | Method 2[2] |
| | Hach FilterTrak | 10133[3] |

Footnotes

1. "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA/600/R-93/100, August 1993. Available at NTIS, PB94-121811.
2. GLI Method 2, "Turbidity", November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, Wisconsin 53223.
3. A description of the Hach FilterTrak Method 10133, "Determination of Turbidity by Laser Nephelometry," January 2000, Revision 2.0, can be obtained from; Hach Co., P.O. Box 389, Loveland, CO 80539–0389, telephone: 800–227–4224.
4. Styrene divinyl benzene beads (e.g. AMCO-AEPA–1 or equivalent) and stabilized formazin (e.g. Hach StablCal TM or equivalent) are acceptable substitutes for formazin.

(Rule 0400-45-01-.14, continued)

1. Alternative testing methods for turbidity given in Table 0400-45-01-.14(10)(b) are given in the following table:

Table 0400-45-01-.14(10)(b)1

| Contaminant | Methodology | SM 21st Edition[1] | Other |
|---|---|---|---|
| Turbidity | Nephelometric Method | 2130 B | |
| | Laser Nephelometry (on-line) | | Mitchell M5271[2] |
| | LED Nephelometry (on-line) | | Mitchell M5331[3] |
| | LED Nephelometry (on-line) | | AMI Turbiwell[4] |
| | LED Nephelometry (on-line) | | Orion AQ4500[5] |

Footnotes

1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710

2 Mitchell Method M5271, Revision 1.1. "Determination of Turbidity by Laser Nephelometry," March 5, 2009. Available at http:/www.nemi.gov or from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

3 Mitchell Method M5331, Revision 1.1. "Determination of Turbidity by LED Nephelometry," March 5, 2009. Available at http:/www.nemi.gov or from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

4 AMI Turbiwell, "Continuous Measurement of Turbidity Using a SWAN AMI Turbiwell Turbidimeter," August 2009. Available at http://www.nemi.gov or from Markus Bernasconi, SWAN Analytische Instrumente AG, Studbachstrasse 13, CH-8340 Hinwil, Switzerland.

5 Orion Method AQ4500, Revision 1.0. "Determination of Turbidity by LED Nephelometry," May 8, 2009. Available at http://www.nemi.gov or from Thermo Scientific, 166 Cummings Center, Beverly, MA 01915, http://www.thermo.com.

(c) Public water systems required to monitor by this Chapter for any inorganic contaminants listed in the following table must utilize one of the approved methods for that contaminant listed in the following table:

(Rule 0400-45-01-.14, continued)

Inorganic Contaminants Analytical Methods
Table 0400-45-01-.14(10)(c)

| Contaminant | Methodology [13] | EPA | ASTM [3] | SM [4] (18th, 19th ed.) | SM [4] (20th ed.) | SM Online [22] | Other |
|---|---|---|---|---|---|---|---|
| 1. Alkalinity | Titrimetric<br>Electrometric titration | | D1067-92, 02 B | 2320 B | 2320 B | 2320 B-97<br>I-1030-85 [5] | |
| 2. Antimony | Inductively Coupled Plasma (ICP)—Mass Spectrometry | 200.8[2] | | | | | |
| | Hydride-Atomic Absorption | | D3697-92, 02 | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Furnace | | | 3113 B | | 3113 B-99 | |
| 3. Arsenic | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Furnace | | D2972-97, 03 C | 3113 B | | 3113 B-99 | |
| | Hydride Atomic Absorption | | D2972-97, 03 B | 3114 B | | 3114 B-97 | |
| 4. Asbestos | Transmission Electron Microscopy | 100.1[9] | | | | | |
| | Transmission Electron | 100.2[10] | | | | | |
| | Microscopy | | | | | | |
| 5. Barium | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption; Direct | | | 3111D | | 3111 D-99 | |
| | Atomic Absorption; Furnace | | | 3113 B | | 3113 B-99 | |
| 6. Beryllium | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Furnace | | D3645-97, 03 B | 3113 B | | 3113 B-99 | |
| 7. Cadmium | Inductively Coupled Plasma | 200.7[2] | | | | | |
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Furnace | | | 3113 B | | 3113 B-99 | |
| 8. Calcium | EDTA titrimetric | | D511-93, 03 A | 3500-Ca D | 3500-Ca B | 3500-Ca B-97 | |
| | Atomic Absorption; Direct Aspiration. | | D511-93, 03 B | 3111 B | | 3111 B-99 | |
| | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| | Ion Chromatography | | D6919-03 | | | | |
| 9. Chromium | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |

(Rule 0400-45-01-.14, continued)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Furnace | | | 3113 B | | 3113 B-99 | |
| 10. Copper | Atomic Absorption; Furnace | | D1688-95, 02 C | 3113 B | | 3113 B-99 | |
| | Atomic Absorption; Direct | | D1688-95, 02 A | 3111 B | | 3111 B-99 | |
| | Aspiration. | | | | | | |
| | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| | ICP-Mass spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| 11.Conductivity | Conductance | | D1125-95 (Reapproved 1999) A | 2510 B | 2510 B | 2510 B-97 | |
| 12. Cyanide | Manual Distillation followed by | | D2036-98 A | 4500-CN⁻ C | 4500-CN⁻ C | | |
| | Spectrophotometric, Amenable. | | D2036-98 B | 4500-CN⁻ G | 4500-CN⁻G | 4500-CN⁻ G-99 | |
| | Spectro-photometric Manual. | | D2036-98 A | 4500-CN⁻E | 4500-CN⁻ E | 4500-CN⁻ E-99 | I-3300-85 [5] |
| | Spectro-photometric Semi-automated. | 335.4[6] | | | | | |
| | Selective Electrode | | | 4500-CN⁻ F | 4500-CN⁻ F | 4500-CN⁻ F-99 | |
| | UV, Distillation, Spectrophotometric. | | | | | | Kelada-01 [16] |
| | Micro Distillation, Flow Injection, Spectrophotometric. | | | | | | QuikChem 10-204-00-1-X [17] |
| | Ligand Exchange and Amperometry [19] | | D6888-04 | | | | OIA-1677, DW [19] |
| 13. Fluoride | Ion Chromatography | 300.0[6], 300.1[18] | D4327-97, 03 | 4110 B | 4110 B | 4110 B-00 | |
| | Manual Distill; Color. SPADNS. | | | 4500-F⁻ B, D | 4500-F⁻ B, D | 4500-F⁻ B, D-97 | |
| | Manual Electrode | | D1179-93, 99 B | 4500-F⁻ C | 4500-F⁻ C | 4500-F⁻ C-97 | |
| | Automated Electrode | | | | | | 380-75WE [11] |
| | Automated Alizarin | | | 4500-F⁻ E | 4500-F⁻ E | 4500-F⁻ E-97 | 129-71W [11] |
| | Capillary Ion Electrophoresis | | | | | | D6508, Rev. 2[22] |
| 14. Lead | Atomic Absorption; Furnace | | D3559-96, 03 D | 3113 B | | 3113 B-99 | |
| | ICP-Mass spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |

(Rule 0400-45-01-.14, continued)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Differential Pulse Anodic Stripping Voltametry | | | | | | Method 1001[15] |
| 15. Magnesium | Atomic Absorption | | D511-93, 03 B | 3111 B | | 3111 B-99 | |
| | ICP | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| | Complexation Titrimetric Methods | | D511-93, 03 A | 3500-Mg E | 3500-Mg B | 3500-Mg B-97 | |
| | Ion Chromatography | | D6919-03 | | | | |
| 16. Mercury | Manual, Cold Vapor | 245.1[2] | D3223-97, 02 | 3112 B | | 3112 B-99 | |
| | Automated, Cold Vapor | 245.2[1] | | | | | |
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| 17. Nickel | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Direct | | | 3111 B | | 3111 B-99 | |
| | Atomic Absorption; Furnace | | | 3113 B | | 3113 B-99 | |
| 18. Nitrate | Ion Chromatography | 300.0[6] 300.1[2] | D4327-97, 03 | 4110 B | 4110 B | 4110 B-00 | B-1011 [8] |
| | Automated Cadmium Reduction | 353.2[6] | D3867-90 A | 4500-$NO_3^-$ F | 4500-$NO_3^-$F | 4500-$NO_3^-$ F-00 | |
| | Ion Selective Electrode | | | 4500-$NO_3^-$ D | 4500-$NO_3^-$D | 4500-$NO_3^-$ D-00 | 601[7] |
| | Manual Cadmium Reduction | | D3867-90 B | 4500-$NO_3^-$ E | 4500-$NO_3^-$E | 4500-$NO_3^-$ E-00 | |
| | Capillary Ion Electrophoresis | | | | | | D6508, Rev 2[22] |
| 19. Nitrite | Ion Chromatography | 300.0[6] 300.1[2] | D4327-97, 03 | 4110 B | 4110 B | 4110 B-00 | B-1011 [8] |
| | Automated Cadmium Reduction | 353.2[6] | D3867-90 A | 4500-$NO_3^-$ F | 4500-$NO_3^-$F | 4500-$NO_3^-$ F-00 | |
| | Manual Cadmium Reduction | | D3867-90 B | 4500-$NO_3^-$E | 4500-$NO_3^-$E | 4500-N $O_3^-$ E-00 | |
| | Spectrophotometric | | | 4500-$NO_2^-$B | 4500-$NO_2^-$B | 4500-$NO_2^-$B-00 | |
| | Capillary Ion Electrophoresis | | | | | | D6508, Rev. 2[22] |
| 20. Ortho-phosphate [12] | Colorimetric, Automated, Ascorbic Acid. | 365.1[6] | | 4500-P F | 4500-P F | | |
| | Colorimetric, ascorbic acid, single reagent. | | D515-88 A | 4500-P E | 4500-P E | | |
| | Colorimetric Phosphomolybdate; | | | | | | I-1601-85 [5] |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Automated-segmented flow; Automated Discrete | | | | | | I-2601-90 [5] I-2598-85 [5] |
| | Ion Chromatography | 300.0[6] 300.1[18] | D4327-97, 03 | 4110 B | 4110 B | 4110 B-00 | |
| | Capillary Ion Electrophoresis. | | | | | | D6508, Rev. 2[22] |
| 21. pH | Electrometric | 150.1, 150.2[1] | D1293-95, 99 | 4500-$H^+$ B | 4500-$H^+$ B | 4500-$H^+$ B - 00 | |
| 22. Selenium | Hydride-Atomic Absorption | | D3859-98, 03 A | 3114 B | | 3114 B-97 | |
| | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |
| | Atomic Absorption; Furnace | | D3859-98, 03 B | 3113 B | | 3113 B-99 | |
| 23. Silica | Colorimetric, Molybdate Blue Automated-segmentedFlow | | | | | | I-1700-85 [5] I-2700-85 [5] |
| | Colorimetric | | D859-94, 00. | | | | |
| | Molybdosilicate . | | | 4500-Si D | 4500-SiO2 C | 4500-SiO2 C-97 | |
| | Heteropoly blue | | | 4500-Si E | 4500-SiO2 D | 4500-SiO2 D-97 | |
| | Automated for Molybdate-reactive Silica. | | | 4500-Si F | 4500-SiO2 E | 4500-SiO2 E-97 | |
| | Inductively Coupled Plasma | 200.7[2] | | 3120 B | 3120 B | 3120 B-99 | |
| 24. Sodium | Inductively Coupled Plasma | 200.7[2] | | | | | |
| | Atomic Absorption; Direct Aspiration. | | | 3111 B | | 3111 B-99 | |
| | Ion Chromatography | | D6919-03 | | | | |
| 25. Temperature | Thermometric | | | 2550 | 2550 | 2550-00 | |
| 26. Thallium | ICP-Mass Spectrometry | 200.8[2] | | | | | |
| | Atomic Absorption;Platform | 200.9[2] | | | | | |

Footnotes

1. ''Methods for Chemical Analysis of Water and Wastes,'' EPA/600/4-79/020, March 1983. Available at NTIS, PB84-128677.
2. ''Methods for the Determination of Metals in Environmental Samples—Supplement I,'' EPA/600/R-94/111, May 1994. Available at NTIS, PB95-125472.
3. Annual Book of ASTM Standards, 1994, 1996, 1999, or 2003, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. The previous versions of D1688-95A, D1688-95C (copper), D3559-95D (lead), D1293-95 (pH), D1125-91A (conductivity) and D859-94 (silica) are also approved. These previous versions D1688-90A, C; D3559-90D, D1293-84, D1125-91A and D859-88, respectively are located in the Annual Book of ASTM Standards, 1994, Vol. 11.01. Copies may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
4. Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used, except that the versions of 3111 B, 3111 D, 3113 B and 3114 B in the 20th edition may not be used.
5. Method I-2601-90, Methods for Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of

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Inorganic and Organic Constituents in Water and Fluvial Sediment, Open File Report 93-125, 1993; For Methods I-1030-85; I-1601-85; I-1700-85; I-2598-85; I-2700-85; and I-3300-85 See Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd edition., 1989; Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425.

6. ''Methods for the Determination of Inorganic Substances in Environmental Samples,'' EPA/600/R-93/100, August 1993. Available at NTIS, PB94-120821.
7. The procedure shall be done in accordance with the Technical Bulletin 601 '' Standard Method of Test for Nitrate in Drinking Water,'' July 1994, PN 221890-001, Analytical Technology, Inc. Copies may be obtained from ATI Orion, 529 Main Street, Boston, MA 02129.
8. Method B-1011, ''Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography,'' August 1987. Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Milford, MA 01757, Telephone: 508/482-2131, Fax: 508/482-3625.
9. Method 100.1, ''Analytical Method For Determination of Asbestos Fibers in Water,'' EPA/600/4-83/043, EPA, September 1983. Available at NTIS, PB83-260471.
10. Method 100.2, ''Determination of Asbestos Structure Over 10-µm In Length In Drinking Water,'' EPA/600/R-94/134, June 1994. Available at NTIS, PB94-201902.
11. Industrial Method No. 129-71W, ''Fluoride in Water and Wastewater,'' December 1972, and Method No. 380-75WE, ''Fluoride in Water and Wastewater,'' February 1976, Technicon Industrial Systems. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.
12. Unfiltered, no digestion or hydrolysis.
13. Because MDLs reported in EPA Methods 200.7 and 200.9 were determined using a 2x preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (i.e., no sample digestion) will be higher. For direct analysis of cadmium and arsenic by Method 200.7, and arsenic by Method 3120 B, sample preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis of antimony, lead, and thallium by Method 200.9; antimony and lead by Method 3113 B; and lead by Method D3559-90D, unless multiple in-furnace depositions are made.
14. If ultrasonic nebulization is used in the determination of arsenic by Methods 200.7, 200.8, or SM 3120 B, the arsenic must be in the pentavalent state to provide uniform signal response. For Methods 200.7 and 3120 B, both samples and standards must be diluted in the same mixed acid matrix concentration of nitric and hydrochloric acid with the addition of 100 µL of 30% hydrogen peroxide per 100 mL of solution. For direct analysis of arsenic with Method 200.8 using ultrasonic nebulization, samples and standards must contain 1 mg/L of sodium hypochlorite.
15. The description for Method Number 1001 for lead is available from Palintest, LTD, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018. Or from the Hach Company, P.O. Box 389, Loveland, CO 80539.
16. The description for the Kelada-01 Method, ''Kelada Automated Test Methods for Total Cyanide, Acid Dissociable Cyanide, And Thiocyanate,'' Revision 1.2, August 2001, EPA # 821-B01-009 for cyanide is available from the National Technical Information Service (NTIS), PB 2001-108275, 5285 Port Royal Road, Springfield, VA 22161. The toll free telephone number is 800-553-6847. Note: A 450-W UV lamp may be used in this method instead of the 550-W lamp specified if it provides performance within the quality control (QC) acceptance criteria of the method in a given instrument. Similarly, modified flow cell configurations and flow conditions may be used in the method, provided that the QC acceptance criteria are met.
17. The description for the QuikChem Method 10-204-00-1-X, ''Digestion and distillation of total cyanide in drinking and wastewaters using MICRO DIST and determination of cyanide by flow injection analysis,'' Revision 2.1, November 30, 2000, for cyanide is available from Lachat Instruments, 6645 W. Mill Rd., Milwaukee, WI 53218. Telephone: 414-358-4200.
18. ''Methods for the Determination of Organic and Inorganic Compounds in Drinking Water,'' Vol. 1, EPA 815-R-00-014, August 2000. Available at NTIS, PB2000-106981.
19. Method OIA-1677, DW ''Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry,'' January 2004. EPA-821-R-04-001, Available from ALPKEM, A Division of OI Analytical, P.O. Box 9010, College Station, TX 77842-9010.
20. Sulfide levels below those detected using lead acetate paper may produce positive method interferences. Test samples using a more sensitive sulfide method to determine if a sulfide in-terference is present, and treat samples accordingly.
21. Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.
22. Method D6508, Rev. 2, ''Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte,'' available from Waters Corp, 34 Maple St, Milford, MA, 01757, Telephone: 508/482-2131, Fax: 508/482-3625.

1. The inorganic contaminants from Table 0400-45-01-.14(10)(c) that have alternative testing methods are given in the following table:

Table 0400-45-01-.14(10)(c)1

| Contaminant | Methodology | EPA Method | SM 21st Edition[1] | SM Online[2] | ASTM[3] | Other |
|---|---|---|---|---|---|---|
| Alkalinity | Titrimetric | | 2320 B | | | |
| Antimony | Hydride – Atomic Absorption | | | | D 3697-07 | |
| | Atomic Absorption; | | 3113 B | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | Furnace | | | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2[4] | | | | |
| Arsenic | Atomic Absorption; Furnace | | 3113 B | | D 2972-08 C | |
| | Hydride Atomic Absorption | | 3114 B | | D 2972-08 B | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Barium | Inductively Coupled Plasma | | 3120 B | | | |
| | Atomic Absorption; Direct | | 3111 D | | | |
| | Atomic Absorption; Furnace | | 3113 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Beryllium | Inductively Coupled Plasma | | 3120 B | | | |
| | Atomic Absorption; Furnace | | 3113 B | | D 3645-08 B | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Cadmium | Atomic Absorption; Furnace | | 3113 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Calcium | EDTA titrimetric | | 3500-Ca B | | D 511-09 A | |
| | Atomic Absorption; Direct Aspiration | | 3111 B | | D 511-09 B | |
| | Inductively Coupled Plasma | | 3120 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Chromiuim | Inductively Coupled Plasma | | 3120 B | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | Atomic Absorption; Furnace | | 3113 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Copper | Atomic Absorption; Furnace | | 3113 B | | D 1688-07 C | |
| | Atomic Absorption; Direct Aspiration | | 3111 B | | D 1688-07 A | |
| | Inductively Coupled Plasma | | 3120 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Conductivity | Conductance | | 2510 B | | | |
| Cyanide | Manual Distillation followed by: | | | D2036-06 A | | |
| | Spectro-photometric, Amenable | 4500-$CN^-$ G | | D2036-06 B | | |
| | Spectro-photometric Manual | 4500-$CN^-$ E | | D2036-06 A | | |
| | Selective Electrode | 4500-$CN^-$ F | | | | |
| | Gas Chromatography/Mass Spectrometry Headspace | | | | | ME355.01[5] |
| Fluoride | Ion Chromatography | | 4110 B | | | |
| | Manual Distillation; Colorimetric SPADNS | | 4500-$F^-$ B, D | | | |
| | Manual Electrode | | 4500-$F^-$ C | | D1179-04 B | |
| | Automated Alizarin | | 4500-$F^-$ E | | | |
| Lead | Atomic Absorption; Furnace | | 3113 B | | D 3559-08 D | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Magnesium | Atomic Absorption | | 3111 B | | D 511-09 B | |
| | Inductively Coupled Plasma | | 3120 B | | | |
| | Complexation Titrimetric Methods | | 3500-Mg B | | D 511-09 A | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry | 200.5, Revision 4.2 | | | | |

(Rule 0400-45-01-.14, continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| | (AVICP-AES) | | | | | |
| Mercury | Manual, Cold Vapor | | 3112 B | | | |
| Nickel | Inductively Coupled Plasma | | 3120 B | | | |
| | Atomic Absorption; Direct | | 3111 B | | | |
| | Atomic Absorption; Furnace | | 3113 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Nitrate | Ion Chromatography | | 4110 B | | | |
| | Automated Cadmium Reduction | | 4500-$NO_3^-$ F | | | |
| | Manual Cadmium Reduction | | 4500-$NO_3^-$ E | | | |
| | Ion Selective Electrode | | 4500-$NO_2^-$ B | | | |
| | Reduction/Colorimetric | | | | | Systea Easy (1 – Reagent)[6] |
| Nitrite | Ion Chromatography | | 4110 B | | | |
| | Automated Cadmium Reduction | | 4500-$NO_3^-$ F | | | |
| | Manual Cadmium Reduction | | 4500-$NO_3^-$ E | | | |
| | Spectrophotometric | | 4500-$NO_2^-$ B | | | |
| | Reduction/Colorimetric | | | | | Systea Easy (1 – Reagent)[6] |
| Orthophosphate | Ion Chromatography | | 4110 B | | | |
| | Colorimetric, ascorbic acid, single reagent | | 4500-P E | 4500-P E-99 | | |
| | Colorimetric, Automated, Ascorbic Acid | | 4500-P F | 4500-P F-99 | | |
| pH | Electrometric | | 4500-$H^+$ B | | | |
| Selenium | Hydride-Atomic Absorption | | 3114 B | | D 3859-08 A | |
| | Atomic Absorption; Furnace | | 3113 B | | D 3859-08 B | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Silica | Colorimetric | | | | D859-05 | |
| | Molybdosilicate | | 4500-$SiO_2$ C | | | |
| | Heteropoly blue | | 4500-$SiO_2$ D | | | |

(Rule 0400-45-01-.14, continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| | Automated for Molybdate-reactive Silica | | 4500-$SiO_2$ E | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| | Inductively Coupled Plasma | | 3120 B | | | |
| Sodium | Atomic Absorption; Direct Aspiration | | 3111 B | | | |
| | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | | |
| Temperature | Thermometric | | 2550 | | | |

Footnotes
1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710
2 Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.
3 Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://astm.org. The methods listed are the only alternative versions that may be used.
4 EPA Method 200.5, Revision 4.2. "Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry." 2003. EPA/600/R-06/115. (Available at http://www.epa.gov/nerlcwww.ordmeth.htm.)
5 Method D99-003, Revision 3.0. "Free Chlorine Species ($HOCl^-$ and $OCl^-$) by Test Strip," November 21, 2003. Available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730.
6 Systea Easy (1 – Reagent). "Systea Easy (1 – Reagent) Nitrate Method," February 4, 2009. Available at http://www.nemi.gov or from Systea Scientific, LLC., 900 Jorie Blvd., Suite 35, Oak Brook, IL 60523.

(d) Detection Limits for Inorganic Contaminants methodology specified below must be equal to or less than the requirements in the following:

Table 0400-45-01-.14(10)(d)
Detection Limits for Inorganic Contaminants

| Contaminant | MCL (mg/l) | Methodology | Detection limit (mg/1) |
|---|---|---|---|
| Antimony | 0.006 | Atomic Absorption Furnace | 0.003 |
| | | Atomic Absorption: Platform | 0.0008[5] |
| | | ICP-Mass Spectrometry | 0.0004 |
| | | Hydride-Atomic Absorption | 0.001 |
| Arsenic | 0.01[6] | Atomic Absorption Furnace | 0.001 |
| | | Atomic Absorption: Platform Stabilized Temperature | [7]0.0005 |
| | | Atomic Absorption: Gaseous Hydride | 0.001 |
| | | ICP-Mass Spectrometry | [8]0.0014 |
| Asbestos | 7 MFL[1] | Transmission Electron Microscopy | 0.01 MFL |
| Barium | 2 | Atomic Absorption; furnace technique | 0.002 |
| | | Atomic Absorption; Direct Aspiration | 0.1 |
| | | Inductively Coupled Plasma | 0.002(0.001) |
| Beryllium | 0.004 | Atomic Absorption; Furnace | 0.0002 |
| | | Atomic Absorption; Platform | 0.00002[5] |

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| | | | |
|---|---|---|---|
| | | Inductively Coupled Plasma[2] | 0.0003 |
| | | ICP-Mass Spectrometry | 0.0003 |
| Cadmium | 0.005 | Atomic Absorption; furnace technique | 0.0001 |
| | | Inductively Coupled Plasma | 0.001 |
| Chromium | 0.1 | Atomic Absorption; furnace technique | 0.001 |
| | | Inductively Coupled Plasma | 0.007(0.001) |
| Cyanide | 0.2 | Distillation, Spectrophotometric[3] | 0.02 |
| | | Distillation, Automated Spectrophotometric[3] | 0.005 |
| | | Distillation, Selective Electrode[3] | 0.05 |
| | | Distillation, Amenable, Spectrophotometric[4] | 0.02 |
| Mercury | 0.002 | Manual Cold Vapor Technique | 0.0002 |
| | | Automated Cold Vapor Technique | 0.0002 |
| Nickel | 0.1 | Atomic Absorption; Furnace | 0.001 |
| | | Atomic Absorption; Platform | 0.0006[5] |
| | | Inductively Coupled Plasma[2] | 0.005 |
| | | ICP-Mass Spectrometry | 0.0005 |
| Nitrate | 10 (as N) | Manual Cadmium Reduction | 0.01 |
| | | Automated Hydrazine Reduction | 0.01 |
| | | Automated Cadmium Reduction | 0.05 |
| | | Ion Selective Electrode | 1 |
| | | Ion Chromatography | 0.01 |
| Nitrite | 1 (as N) | Spectrophotometric | 0.01 |
| | | Automated Cadmium Reduction | 0.05 |
| | | Manual Cadmium Reduction | 0.01 |
| | | Ion Chromatography | 0.004 |
| Selenium | 0.05 | Atomic Absorption; furnace | 0.002 |
| | | Atomic Absorption; gaseous hydride | 0.002 |
| Thallium | 0.002 | Atomic Absorption; Furnace | 0.001 |
| | | Atomic Absorption; Platform | 0.0007[5] |
| | | ICP-Mass Spectrometry | 0.0003 |

Footnotes

1 MFL = million fibers per liter > 10 microns.

2 Using a 2X preconcentration step as noted in Method 200.7 Lower method detection limits (MDLs) may be achieved using a 4X preconcentration.

3 Screening method for total cyanides.

4 Measures "free" cyanides.

5 Lower MDLs are reported using stabilized temperature graphite furnace atomic absorption.

6 The value for arsenic is effective January 23, 2006. Until then the MCL is 0.05 mg/L.

7. The MDL reported for EPA method 200.9 (Atomic Absorption; Platform-Stabilized Temperature) was determined using a 2X concentration step during sample digestion. The MCL determined for samples analyzed using direct analyses (i.e, no sample digestion) will be higher. Using multiple depositions, EPA 200.9 is capable of obtaining MDL of 0.0001 mg/L.

8 Using selective ion monitoring, EPA Method 200.8 (ICP-MS) is capable of obtaining a MDL of 0.0001 mg/L.

1. Laboratories must achieve a method detection limit for lead of 0.001 mg/l according to the procedures in appendix B of part 136 of 40 CFR. This need only be accomplished if the laboratory will be processing source water composite samples under subpart (9)(a)1(iv) of Rule 0400-45-01-.33.

   (i) Lead: 0.001 mg/l (only if source water compositing is done under Rule 0400-45-01-.09); and

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(ii) Copper: 0.001 mg/l or 0.020 mg/l when atomic absorption direct aspiration is used (only if source water compositing is done under Rule 0400-45-01-.09).

2. The Department has the authority to allow the use of previously collected monitoring data, provided that the laboratory is currently certified by EPA or the Department to perform analyses to the specifications required in this subparagraph and if the data were collected and analyzed in accordance with the requirements of this rule and Rule 0400-45-01-.33.

3. All lead levels measured between the PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL (0.0025 mg/l). All levels below the lead MDL must be reported as zero; and

4. All copper levels measured between PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL (0.025 mg/l). All levels below the copper MDL must be reported as zero.

(e) Laboratories must analyze PE samples within the following acceptance criteria:

| Contaminant | Acceptance limit |
|---|---|
| Antimony | ±30 at ≥0.006 mg/l |
| Arsenic | ±30 at ≥0.003 mg/l |
| Asbestos | 2 standard deviations based on study statistics |
| Barium | ±15% at ≥0.15 mg/l |
| Beryllium | ±15% at ≥0.001 mg/1 |
| Cadmium | ±20% at ≥0.002 mg/l |
| Chromium | ±15% at ≥0.01 mg/l |
| Copper | ±10% at ≥ 0.050 mg/l[1] |
| Cyanide | ±25% at ≥0.1 mg/l |
| Fluoride | ±10% at ≥1 to 10 mg/l |
| Lead | ± 30% ≥0.005 mg/l[2] |
| Mercury | ±30% at ≥0.0005 mg/l |
| Nickel | ±15% at ≥0.01 mg/l |
| Nitrate | ±10% at ≥0.4 mg/l |
| Nitrite | ±15% at ≥0.4 mg/l |
| Selenium | ±20% at ≥0.01 mg/l |
| Thallium | ±30% at ≥0.002 mg/l |

1. The practical quantitation level (PQL) for copper is 0.050 mg/l.
2. The PQL for lead is 0.005 mg/l.

(f) Sample collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this Rule shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the table below:

(Rule 0400-45-01-.14, continued)

Table 0400-45-01-.14(10)(f)

| Contaminant | Preservative [1] | Container[2] | Time [3] |
|---|---|---|---|
| Antimony | $HNO_3$ | P or G | 6 months |
| Arsenic | Conc $HNO_3$ to pH <2 | P or G | 6 months |
| Asbestos | 4°C | P or G | 48 hours [4] |
| Barium | $HNO_3$ | P or G | 6 months |
| Beryllium | $HNO_3$ | P or G | 6 months |
| Cadmium | $HNO_3$ | P or G | 6 months |
| Chromium | $HNO_3$ | P or G | 6 months |
| Cyanide | 4°C, NaOH | P or G | 14 days |
| Fluoride | None | P or G | 1 month |
| Mercury | $HNO_3$ | P or G | 28 days |
| Nickel | $HNO_3$ | P or G | 6 months |
| Nitrate | 4°C | P or G | 48 hours [5] |
| Nitrate-Nitrite 6 | $H_2SO_4$ | P or G | 28 days |
| Nitrite | 4°C | P or G | 48 hours |
| Selenium | $HNO_3$ | P or G | 6 months |
| Thallium | $HNO_3$ | P or G | 6 months |

Footnotes

1. For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time off collection. When chilling is indicated the sample must be shipped and stored at 4 °C or less. Acidification of nitrate or metals samples may be with a concentrated acid or a dilute (50% by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EPA Methods 200.7 or 200.8 or 200.9 are followed.
2. P=plastic, hard or soft; G=glass, hard or soft.
3. In all cases samples should be analyzed as soon after collection as possible. Follow additional (if any) information on preservation, containers or holding times that is specified in method.
4. Instructions for containers, preservation procedures and holding times as specified in Method 100.2 must be adhered to for all compliance analyses including those conducted with Method 100.1.
5. If the sample is chlorinated, the holding time for an unacidified sample kept at 4 °C is extended to 14 days.
6. Nitrate-Nitrite refers to a measurement of total nitrate.

(g) Certified Laboratories performing analyses for Public Water Systems as required by this Chapter must utilize an approved method for Organic Contaminants listed in Table 0400-45-01-.14(10)(g) or the altenative testing methods in Table A in this subparagraph:

Table 0400-45-01-.14(10)(g)

| Contaminant | EPA method[1] | Standard Methods | ASTM | Other |
|---|---|---|---|---|
| 1. Benzene | 502.2, 524.2 | | | |
| 2. Carbon tetrachloride | 502.2, 524.2, 551.1 | | | |
| 3. Chlorobenzene | 502.2, 524.2 | | | |
| 4. 1,2-Dichlorobenzene | 502.2, 524.2 | | | |
| 5. 1,4-Dichlorobenzene | 502.2, 524.2 | | | |
| 6. 1,2-Dichloroethane | 502.2, 524.2 | | | |
| 7. cis-Dichloroethylene | 502.2, 524.2 | | | |
| 8. trans-Dichloroethylene | 502.2, 524.2 | | | |

(Rule 0400-45-01-.14, continued)

| | | | | |
|---|---|---|---|---|
| 9. Dichloromethane | 502.2, 524.2 | | | |
| 10. 1,2-Dichloropropane | 502.2, 524.2 | | | |
| 11. Ethylbenzene | 502.2, 524.2 | | | |
| 12. Styrene | 502.2, 524.2 | | | |
| 13. Tetrachloroethylene | 502.2, 524.2, 551.1 | | | |
| 14. 1,1,1-Trichloroethane | 502.2, 524.2, 551.1 | | | |
| 15. Trichloroethylene | 502.2, 524.2, 551.1 | | | |
| 16. Toluene | 502.2, 524.2 | | | |
| 17. 1,2,4-Trichlorobenzene | 502.2, 524.2 | | | |
| 18. 1,1-Dichloroethylene | 502.2, 524.2 | | | |
| 19. 1,1,2-Trichloroethane | 502.2, 524.2, 551.1 | | | |
| 20. Xylenes (total) | 502.2, 524.2 | | | |
| 21. Vinyl chloride | 502.2, 524.2 | | | |
| 22. 2,3,7,8-TCDD (dioxin) | 1613 | | | |
| 23. 2,4-D [4] (as acid, salts and esters) | 515.2, 555, 515.1, 515.3, 515.4 | | D5317–93,98 (Reapproved 2003) | |
| 24. 2,4,5-TP [4] (Silvex) | 515.2, 555, 515.1, 515.3, 515.4 | | D5317–93,98 (Reapproved 2003) | |
| 25. Alachlor [2] | 507, 525.2, 508.1, 505, 551.1 | | | |
| 26. Atrazine [2] | 507, 525.2, 508.1, 505, 551.1 | | | Syngenta[5] AG–625 |
| 27. Benzo(a)pyrene | 525.2, 550, 550.1 | | | |
| 28. Carbofuran | 531.1, 531.2 | 6610 | | |
| 29. Chlordane | 508, 525.2, 508.1, 505 | | | |
| 30. Dalapon | 552.1, 515.1, 552.2, 515.3, 515.4, 552.3 | | | |
| 31. Di(2-ethylhexyl)adipate | 506, 525.2 | | | |
| 32. Di(2-ethylhexyl)phthalate | 506, 525.2 | | | |
| 33. Dibromochloropropane (DBCP) | 504.1, 551.1 | | | |
| 34. Dinoseb [4] | 515.2, 555, 515.1, 515.3, 515.4 | | | |
| 35. Diquat | 549.2 | | | |
| 36. Endothall | 548.1 | | | |
| 37. Endrin | 508, 525.2, 508.1, 505, 551.1 | | | |
| 38. Ethylene dibromide (EDB) | 504.1, 551.1 | | | |
| 39. Glyphosate | 547 | 6651 | | |
| 40. Heptachlor | 508, 525.2, 508.1, 505, 551.1 | | | |
| 41. Heptachlor Epoxide | 508, 525.2, 508.1, 505, 551.1 | | | |
| 42. Hexachlorobenzene | 508, 525.2, 508.1, 505, 551.1 | | | |
| 43. Hexachlorocyclopentadiene | 508, 525.2, 508.1, 505, 551.1 | | | |
| 44. Lindane | 508, 525.2, 508.1, 505, 551.1 | | | |
| 45. Methoxychlor | 508, 525.2, 508.1, 505, 551.1 | | | |
| 46. Oxamyl | 531.1, 531.2 | 6610 | | |

(Rule 0400-45-01-.14, continued)

| | | | | |
|---|---|---|---|---|
| 47. PCBs [3] (as decachlorobiphenyl) | 508A | | | |
| 48. PCBs [3] (as Aroclors) | 508.1, 508, 525.2, 505 | | | |
| 49. Pentachlorophenol | 515.2, 525.2, 555, 515.1, 515.3, 515.4 | | D5317–93,98 (Reapproved 2003) | |
| 50. Picloram [4] | 515.2, 555, 515.1, 515.3, 515.4 | | D5317–93,98 (Reapproved 2003) | |
| 51. Simazine [2] | 507, 525.2, 508.1, 505, 551.1 | | | |
| 52. Toxaphene | 508, 508.1, 525.2, 505 | | | |

Footnotes

1. Previously approved EPA methods remain available for compliance monitoring until June 1, 2001. EPA methods 502.2 Rev. 2.0, 505 Rev. 2.0, 507 Rev. 2.0, 508 Rev. 3.0, 531.1 Rev. 3.0 are in ``Methods for the Determination of Organic Compounds in Drinking Water'', December 1988, revised July 1991; methods 506 and 551 are in ``Methods for the Determination of Organic Compounds in Drinking Water--Supplement I'', July 1990; methods 515.2 Rev. 1.0 and 524.2 Rev. 4.0 are in ``Methods for the Determination of Organic Compounds in Drinking Water--Supplement II,'' August 1992; and methods 504.1 Rev. 1.0, 508.1 Rev. 1.0, 525.2 Rev.1.0 are available from US EPA NERL, Cincinnati, OH 45268
2. Substitution of the detector specified in Method 505, 507, 508, or 508.1 for the purpose of achieving lower detection limits is allowed as follows: Either an electron capture or nitrogen phosphorus detector may be used provided all regulatory requirements and quality control criteria are met.
3. PCBs are qualitatively identified as Aroclors and measured for compliance purposes as decachlorobiphenyl. Users of Method 505 may have more difficulty in achieving the required detection limits than users of Methods 508.1, 525.2 or 508.
4. Accurate determination of the chlorinated esters requires hydrolysis of the sample as described in EPA Methods 515.1, 515.2, 515.3, 515.4, and 555 and ASTM Method D 5317–93, 98 (Reapproved 2003).
5. This method may not be used for the analysis of atrazine in any system where chlorine dioxide is used for drinking water treatment. In samples from all other systems, any result for atrazine generated by Method AG–625 that is greater than one-half the maximum contaminant level (MCL) (in other words, greater than 0.0015mg/L or 1.5 µg/L) must be confirmed using another approved method for this contaminant and should use additional volume of the original sample collected for compliance monitoring. In instances where a result from Method AG–625 triggers such confirmatory testing, the confirmatory result is to be used to determine compliance.

Table A
The Organic Contaminants from Table 0400-45-01-.14(10)(g) that have Alternative Testing Methods

| Contaminant | Methodology | EPA Method | SM 21st Edition[1] | SM Online[2] |
|---|---|---|---|---|
| Benzene | Purge & Trap/Gas Chromatography/Mass Spectrometry (PT/GC/MS) | 524.3[3] | | |
| Carbon tetrachloride | PT/GC/MS | 524.3 | | |
| Chlorobenzene | PT/GC/MS | 524.3 | | |
| 1,2-Dichlorobenzene | PT/GC/MS | 524.3 | | |
| 1,4-Dichlorobenzene | PT/GC/MS | 524.3 | | |
| 1,2-Dichloroethane | PT/GC/MS | 524.3 | | |
| cis-Dichloroethylene | PT/GC/MS | 524.3 | | |
| trans-Dichloroethylene | PT/GC/MS | 524.3 | | |
| Dichloromethane | PT/GC/MS | 524.3 | | |
| 1,2-Dichloropropane | PT/GC/MS | 524.3 | | |
| Ethylbenzene | PT/GC/MS | 524.3 | | |
| Styrene | PT/GC/MS | 524.3 | | |
| Tetrachloroethylene | PT/GC/MS | 524.3 | | |
| 1,1,1-Trichloroethane | PT/GC/MS | 524.3 | | |
| Trichloroethylene | PT/GC/MS | 524.3 | | |

(Rule 0400-45-01-.14, continued)

| | | | | |
|---|---|---|---|---|
| Toluene | PT/GC/MS | 524.3 | | |
| 1,2,4-Trichlorobenzene | PT/GC/MS | 524.3 | | |
| 1,1-Dichloroethylene | PT/GC/MS | 524.3 | | |
| 1,1,2-Trichloroethane | PT/GC/MS | 524.3 | | |
| Xylenes (total) | PT/GC/MS | 524.3 | | |
| Vinyl chloride | PT/GC/MS | 524.3 | | |
| Carbofuran | High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection | | 6610 B | 6610 B-04 |
| Dalapon | Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS) | 557[4] | 6640 B | 6640 B-01 |
| Dibromochloropropane (DBCP) | PT/GC/MS | 524.3 | | |
| Ethyl dibromide (EDB) | PT/GC/MS | 524.3 | | |
| Oxamyl | High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection | | 6610 B | 6610 B-04 |
| Total Trihalomethanes | PT/GC/MS | 524.3 | | |

Footnotes
1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710
2. Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.
3. EPA Method 524.3, Version 1.0. "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry," June 2009. EPA 815-B-09-009. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.
4. EPA Method 557. "Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)," September 2009, EPA 815-B-09-012. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

1. To obtain certification for contaminants 1 through 20 listed in Table 0400-45-01-.14(10)(g) laboratories must:

   (i) Successfully analyze 80% of the contaminants included in the PE sample. To successfully analyze a contaminant a laboratory must achieve quantitative results which are: within ±40% of the actual amount in the PE sample when the actual amount is less than 0.010 mg/l, within ±20% of the actual amount in the PE sample when the actual amount is greater than or equal to 0.010 mg/l.

   (ii) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in 40 CFR part 136 Appendix B.

2. To obtain certification for vinyl chloride a laboratory must:

   (i) Achieve quantitative results on PE samples which are within ±40% of the actual amount of vinyl chloride in the PE sample.

(Rule 0400-45-01-.14, continued)

(ii) Achieve a method detection limit of 0.0005 mg/l, according to the procedures in 40 CFR part 136 Appendix B.

(iii) Achieve certification for contaminants 1 through 20 listed in Table 0400-45-01-.14(10)(g).

3. To obtain certification for contaminants 22 through 52 listed in Table 0400-45-01-.14(10)(g) certified laboratories must achieve quantitative results on PE samples within the following acceptance limits:

Table 0400-45-01-.14(10)(g)3.

| Contaminant | Acceptance limits (percent) |
|---|---|
| DBCP | + 40 |
| EDB | + 40 |
| Alachlor | + 45 |
| Atrazine | + 45 |
| Benzo[a]pyrene | 2 standard deviations |
| Carbofuran | + 45 |
| Chlordane | + 45 |
| Dalapon | 2 standard deviations |
| Di(2-ethylhexyl)adipate | 2 standard deviations |
| Di(2-ethylhexyl)phthalate | 2 standard deviations |
| Dinoseb | 2 standard deviations |
| Diquat | 2 standard deviations |
| Endothall | 2 standard deviations |
| Endrin | + 30 |
| Glyphosate | 2 standard deviations |
| Heptachlor | + 45 |
| Heptachlor Epoxide | + 45 |
| Hexachlorobenzene | 2 standard deviations. |
| Hexachlorocyclopentadiene | 2 standard deviations |
| Lindane | + 45 |
| Methoxychlor | + 45 |
| Oxamyl | 2 standard deviations |
| PCBs (as Decachlorobiphenyl) | 0 - 200 |
| Picloram | 2 standard deviations |
| Simazine | 2 standard deviations |
| Toxaphene | + 45 |
| Aldicarb | 2 standard deviations |
| Aldicarb sulfoxide | 2 standard deviations |
| Aldicarb sulfone | 2 standard deviations. |
| Pentachlorophenol | + 50 |
| 2,3,7,8-TCDD (Dioxin) | 2 standard deviations |
| 2,4-D | + 50 |
| 2,4,5-TP (Silvex) | + 50 |

4. Analysis for PCBs shall be conducted as follows:

(Rule 0400-45-01-.14, continued)

(i) Each system which monitors for PCBs shall analyze each sample using either Methods 508.1, 525.2, 508, or 505. Users of Method 505 may have more difficulty in achieving the required Aroclor detection limits than users of Methods 508.1, 525.2 or 508.

(ii) If PCBs (as one of seven Aroclors) are detected (as designated by Table 0400-45-01-.14(10)(g)4(ii)) in any sample analyzed using Methods 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

Table 0400-45-01-.14(10)(g)4(ii)

| Aroclor | Detection Limit (mg/l) |
|---|---|
| 1016 | 0.00008 |
| 1221 | 0.02 |
| 1232 | 0.0005 |
| 1242 | 0.0003 |
| 1248 | 0.0001 |
| 1254 | 0.0001 |
| 1260 | 0.0002 |

(iii) Compliance with the PCB MCL shall be determined based upon the quantitative results of analyses using Method 508A.

(h) Analytical methods used to determine compliance with paragraph (5) of Rule 0400-45-01-.06 shall be in accordance with Table 0400-45-01-.14(10)(h).

(Rule 0400-45-01-.14, continued)

Table 0400-45-01-.14(10)(h)

| | | *Reference (method or page number)* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Contaminant* | *Methodology* | *EPA*[1] | *EPA*[2] | *EPA*[3] | *EPA*[4] | *SM*[5] | *ASTM*[6] | *USGS*[7] | *DOE*[8] | *Other* |
| Naturally occurring: Gross alpha[11] and beta. | Evaporation | 900.0 | p 1 | 00-01 | p 1 | 302, 7110 B | | R-1120-76 | | |
| Gross alpha[11] | Co-precipitation | | | 00-02 | | 7110 C | | | | |
| Radium 226 | Radon emanation | 903.1 | p 16 | Ra-04 | p 19 | 7500-Ra C | D 3454-91 | R-1141-76 | Ra-05 | N.Y.[9] |
| | Radio chemical | 903.0 | p 13 | Ra-03 | | 304, 305, 7500-Ra B | D 2460-91 | R-1140-76 | | GA[14] |
| Radium 228 | Radio chemical | 904.0 | p 24 | Ra-05 | p 19 | 304, 7500-Ra D | | R-1142-76 | | N. Y.[9] N. J.[10] |
| Uranium[12] | Radio chemical | 908.0 | | | | 7500-U B | | | | |
| | Fluorometric | 908.1 | | | | 7500-U C (17th Ed.) | D 2907-91 | R-1180-76 R-1181-76 | U-04 | |
| | ICP-MS | 200.8[13] | | | | 3125 | D 5673-03 | | | |
| | Alpha spectrometry | | | 00-07 | P 33 | 7500-U C (18th or 19th Ed.) | D 3972-90 | R-1182-76 | U-02 | |
| | Laser Phosophorimetry | | | | | | D 5174-91 | | | |
| Man-made Radioactive cesium. | Radio chemical | 901.0 | p 4 | | | 7500-Cs B | D 2459-72 | R-1111-76 | | |
| | Gamma ray spectrometry. | 901.1 | | | p 92 | 7120 (19th Ed.) | D 3649-91 | R-1110-76 | 4.5.2.3 | |
| Radioactive iodine | Radio chemistry | 902.0 | p 6 p 9 | | | 7500-I B 7500-I C 7500-I D | D 3649-91 | | | |
| | Gamma ray spectrometry. | 901.1 | | | p 92 | 7120 (19th Ed.) | D 4785-88 | | 4.5.2.3 | |
| Radioactive Strontium 89, 90. | Radio chemical | 905.0 | p 29 | Sr-04 | p 65 | 303, 7500-Sr B | | R-1160-76 | Sr-01 Sr-02 | |
| Tritium | Liquid scintillation | 906.0 | p 34 | H-02 | p 87 | 306, 7500-3H B | D 4107-91 | R-1171-76 | | |
| Gamma emitters | Gamma ray | 901.1 | | | p 92 | 7120 (19th Ed.) | D 3649-91 | R-1110-76 | 4.5.2.3 | |
| | Spectrometry | 902.0 901.0 | | | | 7500-Cs B 7500-I B | D 4785-88 | | | |

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 was 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 documents may be obtained from the sources listed below. Information reguarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4691. Documents may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460 (Telephone: 202-260-3027); or at the Office of Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

Footnotes

1. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA 600/4-80-032, August 1980. Available at U. S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847), PB 80-224744.
2. "Interim Radiochemical Methodology for Drinking Water", EPA 600/4-75-008(revised), March 1976. Available at NTIS, ibid. PB 253258.
3. "Radiochemistry Procedures Manual", EPA 520/5-84-006, December 1987. Available at NTIS, ibid. PB 84-215581.
4. "Radiochemical Analytical Procedures for Analysis of Environmental Samples", March 1979. Available at NTIS, ibid. EMSL LV 053917.

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5. "Standard Methods for the Examination of Water and Wastewater", 13th, 17th, 18th, 19th Editions, 1971, 1989, 1992, 1995. Available at American Public Health Association, 1015 Fifteenth Street N. W., Washington, D. C. 20005. All methods are in the 17th, 18th, and 19th editions except 7500-U C Fluorometric Uranium was discontinued after the 17th Edition, 7120 Gamma Emitters is only in the 19th Edition, and 302, 303, 304, 305 and 306 are only in the 13th Edition.
6. Annual Book of ASTM Standards, Vol. 11.02, 1994. Available at American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
7. "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments", Chapter A5 in Book 5 of Techniques of Water-Resources Investigations of the United States Geological Survey, 1977. Available at U. S. Geological Survey (USGS) Information Services, Box 25286, Federal Center, Denver, CO 80225-0425.
8. "EML Procedures Manual", 27th Edition, Volume 1, 1990. Available at the Environmental Measurements Laboratory, U. S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.
9. "Determination of Ra-226 and Ra-228 (Ra-02)", January 1980, Revised June 1982. Available at Radiological Sciences Institute Center for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.
10. "Determination of Radium 228 in Drinking Water", August 1980. Available at State of New Jersey, Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analysis Services, 9 Ewing Street, Trenton, NJ 08625.
11. Natural uranium and thorium-230 are approved as gross alpha calibration standards for gross alpha with co-precipitation and evaporation methods; americium-241 is approved with co-precipitation methods.
12. If uranium (U) is determined by mass, a 0.67 pCi/ug of uranium conversion factor must be used. This conservative factor is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally occurring uranium.
13. ''Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry,'' Revision 5.4, which is published in ''Methods for the Determination of Metals in Environmental Samples—Supplement I,'' ' EPA 600–R–94–111, May 1994. Available at NTIS, PB 95–125472.
14. ''The Determination of Radium-226 and Radium-228 in Drinking Water by Gamma-ray Spectrometry Using HPGE or Ge(Li) Detectors,'' Revision 1.2, December 2004. Available from the Environmental Resources Center, Georgia Institute of Technology, 620 Cherry Street, Atlanta, GA 30332–0335, USA, Telephone: 404–894–3776. This method may be used to analyze for radium-226 and radium-228 in samples collected after January 1, 2005 to satisfy the radium-226 and radium-228 monitoring requirements specified at 40 CFR 141.26.

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1. When the identification and measurement of radionuclides other than those listed in Table 0400-45-01-.11(1), the following references are to be used, except in cases where alternative methods have been approved by the Department.

   (i) Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions, H. L. Krieger and S. Gold, EPA-RA-73-014, USEPA, Cincinnati, Ohio, May, 1973.

   (ii) HASL Procedure Manual, Edited by John H. Harley, HASL 300, ERDA Health and Safety Laboratory, New York, NY., 1973.

2. The inorganic contaminants from Table 0400-45-01-.14(10)(h) that have alternative testing methods are given in the following table:

Table 0400-45-01-.14(10)(h)2

| Contaminant | Methodology | SM 21st Edition[1] | ASTM[2] |
|---|---|---|---|
| Naturally Occurring | | | |
| Gross alpha and beta | Evaporation | 7110 B | |
| Gross alpha | Coprecipitation | 7110 C | |
| Radium 226 | Radon emanation | 7500-Ra C | D3454-05 |
| | Radiochemical | 7500-Ra B | D2460-07 |
| Radium 228 | Radiochemical | 7500-Ra D | |
| Uranium | Radiochemical | 7500-U B | |
| | ICP-MS | | D5673-05 |
| | Alpha spectrometry | 7500-U C | |
| | Laser Phosphorimetry | | D5174-07 |
| Man-Made: | | | |
| Radioactive Cesium | Radiochemical | 7500-Cs B | |
| | Gamma Ray Spectrometry | 7120 | D3649-06 |
| Radioactive Iodine | Radiochemical | 7500-I B | D3649-06 |
| | Gamma Ray Spectrometry | 7120 | D4785-08 |
| Radioactive Strontium 89, 90 | Radiochemical | 7500-Sr B | |
| Tritium | Liquid Scintillation | 7500-$^{3}$H B | D4107-08 |
| Gamma Emitters | Gamma Ray Spectrometry | 7120<br>7500-Cs B<br>7500-I B | D3649-06<br>D4785-08 |

Footnotes
1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710
2 Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://astm.org. The methods listed are the only alternative versions that may be used.

(i) Public Water Systems required to monitor disinfectant residuals by this Chapter must utilize one of the methods in the following table. In addition Water Systems may use of the ITS free chlorine test strip for the determination of free chlorine. Use of the test strips is described in Method D99–003, ‘‘Free Chlorine Species (HOCl- and OCl-) by Test Strip,’’ Revision 3.0, November 21, 2003, available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730. Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision

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remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five days, or with a protocol approved by the Department.

Table 0400-45-01-.14(10)(i)

| Methodology | SM (19th or 20th ed) | SM Online[2] | Other | Residual measured[1] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | $O_3$ | Free $Cl_2$ | Combined $Cl_2$ | Total $Cl_2$ | $ClO_2$ |
| Amperometric Titration | 4500-Cl D | 4500-Cl-D-00 | D 1253-03[3] | | X | X | X | |
| Low Level Amperometric Titration | 4500-Cl E | 4500-Cl-E-00 | | | | | X | |
| DPD Ferrous Titrimetric | 4500-Cl F | 4500-Cl-F-00 | | | X | X | X | |
| DPD Colorimetric | 4500-Cl G | 4500-Cl-G-00 | | | X | X | X | |
| Syringaldazine (FACTS) | 4500-Cl H | 4500-Cl-H-00 | | | X | | | |
| Iodometric Electrode | 4500-Cl I | 4500-Cl-I-00 | | | | | X | |
| DPD | 4500-$ClO_2$ D | | | | | | | X |
| Amperometric Method II | 4500-$ClO_2$ E | 4500 $ClO_2$ E-00 | | | | | | X |
| Spectrophotometric | | | 327.0 Rev 1.1[4] | | | | | X |
| Indigo Method | 4500-$O_3$ B | 4500-$O_3$ B-97 | | X | | | | |

Footnotes

1. X indicates method is approved for measuring specified disinfectant residual. Free chlorine or total chlorine may be measured for demonstrating compliance with the chlorine MRDL and combined chlorine, or total chlorine may be measured for demonstrating compliance with the chloramine MRDL.
2. The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at http://www.standardmethods.org.
3. Annual Book of ASTM Standards, Vol. 11.01, 2004 ; ASTM International; any year containing the cited version of the method may be used. Copies of this method may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428–2959.
4. EPA Method 327.0, Revision 1.1, ‘‘Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry,’’ USEPA, May 2005, EPA 815–R–05–008. Available online at http://www.epa.gov/safewater/methods/sourcalt.html.

1. Alternative testing methods for the disinfectant residuals given in Table 0400-45-01-.14(10)(i) are given in the following table:

Table 0400-45-01-.14(10)(i)1

| Residual | Methodology | SM 21st Edition[1] | ASTM[2] | Other |
|---|---|---|---|---|
| Free Chlorine | Amperometric Titration | 4500-Cl D | D 1253-08 | |
| | DPD Ferrous Titrimetric | 4500-Cl F | | |
| | DPD Colorimetric | 4500-Cl G | | |
| | Syringaldazine (FACTS) | 4500-Cl H | | |
| | On-line Chlorine Analyzer | | | EPA 334.0[3] |
| | Amperometric Sensor | | | Chlorosense[4] |
| Total Chlorine | Amperometric Titration | 4500-Cl D | D 1253-08 | |

(Rule 0400-45-01-.14, continued)

| | | | | |
|---|---|---|---|---|
| | Amperometric Titration (Low level measurement) | 4500-Cl E | | |
| | DPD Ferrous Titrimetric | 4500-Cl F | | |
| | DPD Colorimetric | 4500-Cl G | | |
| | Iodometric Electrode | 4500-Cl I | | |
| | On-line Chlorine Analyzer | | | EPA 334.0[3] |
| | Amperometric Sensor | | | Chlorosense[4] |
| Chlorine Dioxide | Amperometric Titration | 4500-$ClO_2$ C | | |
| | Amperometric Titration | 4500-$ClO_2$ E | | |
| Ozone | Indigo Method | 4500-$O_3$ B | | |

Footnotes
1 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710
2 Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://astm.org. The methods listed are the only alternative versions that may be used.
3 EPA Method 334.0. "Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer," September 2009. EPA 815-B-09-013. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.
4 Chlorosense. "Measurement of Free and Total Chlorine in Drinking Water by Palintest Chlorosense," August 2009. Available at http://www.nemi.gov or from Palintest Ltd, 21 Kenton Lands Road, PO Box 18395, Erlanger, KY 41018.

(j) Analysis conducted to determine compliance with Rule 0400-45-01-.12 shall be made in accordance with the methods described in the following table:

Table 0400-45-01-.14(10)(j)

| Contaminant | EPA | ASTM[3] | SM[4] 18th and 19th ed. | SM[4] 20th ed. | SM[7] Online | Other |
|---|---|---|---|---|---|---|
| 1. Aluminum | 200.7[2]<br>200.8[2]<br>200.9[2] | | 3120 B<br>3113 B<br>3111 D | 3120 B | 3120 B-99<br>3113 B-99<br>3111 D-99 | |
| 2. Chloride | 300.0[1]<br>300.1[6] | D4327–97, 03<br>D512–89<br>Reapproved<br>1999) B | 4110 B<br>4500–$Cl^-$ D<br>4500–$Cl^-$ B | 4110 B<br>4500–$Cl^-$ D<br>4500–$Cl^-$ B | 4110 B-00<br>4500–$Cl^-$ D-97<br>4500–$Cl^-$ B-97 | D6508, Rev. 2[8] |
| 3. Color | | | 2120 B | 2120 B | 2120 B-01 | |
| 4. Foaming Agents | | | 5540 C | 5540 C | 5540 C-00 | |
| 5. Iron | 200.7[2]<br>200.9[2] | | 3120 B<br>3111 B<br>3113 B | 3120 B | 3120 B-99<br>3111 B-99<br>3113 B-99 | |
| 6. Manganese | 200.7[2]<br>200.8[2]<br>200.9[2] | | 3120 B<br>3111 B<br>3113 B | 3120 B | 3120 B-99<br>3111 B-99<br>3113 B-99 | |
| 7. Odor | | | 2150 B | 2150 B | 2150 B-97 | |
| 8. Silver | 200.7[2]<br>200.8[2]<br>200.9[2] | | 3120 B<br>3111 B<br>3113 B | 3120 B | 3120 B-99<br>3111 B-99<br>3113 B-99 | I-3720-85[5] |

(Rule 0400-45-01-.14, continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| 9. Sulfate | 300.0[1]<br>300.1[6]<br>375.2[1] | D4327–97, 03<br>D516–90, 02 | 4110 B<br>4500–$SO_4^{2-}$F<br>4500–$SO_4^{2-}$C,D<br>4500–$SO_4^{2-}$E | 4110 B<br>4500–$SO_4^{2-}$F<br>4500–$SO_4^{2-}$C,D<br>4500–$SO_4^{2-}$E | 4110 B-00 | D6508, Rev. 2[8] |
| 10. Total Dissolved Solids | 200.7[2] | | 2540 C | 2540 C | 2540 C-97 | |
| 11. Zinc | 200.8[2] | | 3120 B<br>3111 B | 3120 B | 3120 B-99<br>3111 B-99 | |

Footnotes

1. ''Methods for the Determination of Inorganic Substances in Environmental Samples,'' EPA/600/R–93–100, August 1993. Available at NTIS, PB94–120821.
2. ''Methods for the Determination of Metals in Environmental Samples—Supplement I,'' EPA/600/R–94–111, May 1994. Available at NTIS, PB 95–125472.
3. Annual Book of ASTM Standards, 1994, 1996, 1999, or 2004, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. Copies may be obtained from the ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
4. Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used, except that the versions of 3111 B, 3111 D, and 3113 B in the 20th edition may not be used.
5. Method I–3720–85, Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A–1, 3rd ed., 1989. Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225–0425.
6. ''Methods for the Determination of Organic and Inorganic Compounds in Drinking Water,'' Vol. 1, EPA 815-R–00–014, August 2000. Available at NTIS, PB2000–106981.
7. Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.
8. Method D6508, Rev. 2, ''Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte,'' available from Waters Corp, 34 Maple St., Milford, MA, 01757, Telephone: 508/482–2131, Fax: 508/482–3625.

1. The alternative methods for the analyses identified in Rule 0400-45-01-.14(10)(j) conducted to determine compliance with Rule 0400-45-01-.12 shall be made in accordance with the methods described in the following table:

Table 0400-45-01-.14(10)(j)1

| Contaminant | Methodology | EPA Method | ASTM[1] | SM 21st Edition[2] | SM Online[3] |
|---|---|---|---|---|---|
| Aluminum | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2[4] | | | |
| | Atomic Absorption; Direct | | | 3111 D | |
| | Atomic Absorption; Furnace | | | 3113 B | |
| | Inductively Coupled Plasma | | | 3120 B | |

(Rule 0400-45-01-.14, continued)

| | | | | | |
|---|---|---|---|---|---|
| Chloride | Silver Nitrate Titration | | D 512-04 B | 4500-$Cl^-$ B | |
| | Ion Chromatography | | | 4110 B | |
| | Potentiometric Titration | | | 4500-$Cl^-$ D | |
| Color | Visual Comparison | | | 2120 B | |
| Foaming Agents | Methylene Blue Active Substances (MBAS) | | | 5540 C | |
| Iron | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | |
| | Atomic Absorption; Direct | | | 3111 B | |
| | Atomic Absorption; Furnace | | | 3113 B | |
| | Inductively Coupled Plasma | | | 3120 B | |
| Manganese | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | |
| | Atomic Absorption; Direct | | | 3111 B | |
| | Atomic Absorption; Furnace | | | 3113 B | |
| | Inductively Coupled Plasma | | | 3120 B | |
| Odor | Threshold Odor Test | | | 2150 B | |
| Silver | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | |
| | Atomic Absorption; Direct | | | 3111 B | |
| | Atomic Absorption; Furnace | | | 3113 B | |
| | Inductively | | | 3120 B | |

(Rule 0400-45-01-.14, continued)

| | | | | | |
|---|---|---|---|---|---|
| | Coupled Plasma | | | | |
| Sulfate | Ion Chromatography | | | 4110 B | |
| | Gravimetric with ignition of residue | | | 4500-$SO_4^{-2}$ C | 4500-$SO_4^{-2}$ C-97 |
| | Gravimetric with drying of residue | | | 4500-$SO_4^{-2}$ D | 4500-$SO_4^{-2}$ D-97 |
| | Turbidimetric method | | | 4500-$SO_4^{-2}$ E | 4500-$SO_4^{-2}$ E-97 |
| | Automated methylthymol blue method | | | 4500-$SO_4^{-2}$ F | 4500-$SO_4^{-2}$ F-97 |
| Total Dissolved Solids | Total Dissolved Solids Dried at 180 deg C | | | 2540 C | |
| Zinc | Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES) | 200.5, Revision 4.2 | | | |
| | Atomic Absorption; Direct Aspiration | | | 3111 B | |
| | Inductively Coupled Plasma | | | 3120 B | |

Footnotes

1 Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://astm.org. The methods listed are the only alternative versions that may be used.

2 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710

3 Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

4 EPA Method 200.5, Revision 4.2. "Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry." 2003. EPA/600/R-06/115. (Available at http://www.epa.gov/nerlcwww/ordmeth.htm.)

(k) Disinfection byproducts

1. Systems required to monitor by this Chapter for disinfection byproducts must utilize the approved methods in the following table:

Table 0400-45-01-.14(10)(k)1

Approved Methods for Disinfection Byproduct Compliance Monitoring

| Contaminant and methodology [1] | EPA method | Standard method [2] | SM online [9] | ASTM method [3] |
|---|---|---|---|---|
| TTHM | | | | |
| P&T/GC/ElCD & PID | 502.2 [4] | | | |
| P&T/GC/MS | 524.2 | | | |
| LLE/GC/ECD | 551.1 | | | |
| | | | | |
| HAA5 | | | | |
| LLE (diazomethane)/GC/ECD | | 6251 B [5] | 6251 B–94 | |
| SPE (acidic methanol)/GC/ECD | 552.1 [5] | | | |
| LLE (acidic methanol)/GC/ECD | 552.2, 552.3 | | | |
| | | | | |

(Rule 0400-45-01-.14, continued)

| | | | | |
|---|---|---|---|---|
| Bromate | | | | |
| Ion chromatography | 300.1 | | | D 6581–00 |
| Ion chromatography & post column reaction | 317.0 Rev 2.0 [6], 326.0 [6] | | | |
| IC/ICP–MS | 321.8[6,7] | | | |
| | | | | |
| Chlorite | | | | |
| Amperometric titration | | 4500–$ClO_2$ E[8] | 4500–$ClO_2$ E–00 [8] | |
| Spectrophotometry | 327.0 Rev 1.1 [8] | | | |
| Ion chromatography | 300.0, 300.1, 317.0 Rev 2.0, 326.0. | | | D 6581–00 |

[1] P&T = purge and trap; GC = gas chromatography; ElCD = electrolytic conductivity detector; PID = photoionization detector; MS = mass spectrometer; LLE = liquid/liquid extraction; ECD = electron capture detector; SPE = solid phase extraction; IC = ion chromatography; ICP–MS = inductively coupled plasma/mass spectrometer.

[2] 19th and 20th editions of Standard Methods for the Examination of Water and Wastewater, 1995 and 1998, respectively, American Public Health Association; either of these editions may be used.

[3] Annual Book of ASTM Standards, 2001 or any year containing the cited version of the method, Vol 11.01.

[4] If TTHMs are the only analytes being measured in the sample, then a PID is not required.

[5] The samples must be extracted within 14 days of sample collection.

[6] Ion chromatography & post column reaction or IC/ICP-MS must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in Rule 0400-45-01-.36(6)(b)3(ii).

[7] Samples must be preserved at the time of sampling with 50 mg ethylenediamine (EDA)/L of sample and must be analyzed within 28 days.

[8] Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in Rule 0400-45-01-.36(6)(b)2(i)(I). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in Rules 0400-45-01-.36(6)(b)2(i)(II) and (b)2(ii).

[9] The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at http://www.standardmethods.org.

(i) Alternative testing methods for the disinfection byproducts given in Table 0400-45-01-.14(10)(k)1 are given in the following table:

Table 0400-45-01-.14(10)(k)1(i)

| Contaminant | Methodology | EPA Method | ASTM[1] | SM 21st Edition[2] |
|---|---|---|---|---|
| TTHM | P&T/GC/MS | 524.3[3] | | |
| HAA5 | LLE (diazomethane)/GC/ECD | | | 6251 B |
| | Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS) | 557[4] | | |
| Bromate | Two-Dimensional Ion Chromatography (IC)* | 302.0[5] | | |
| | Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)* | 557[4] | | |
| | Chemically Supressed Ion Chromatography | | D 6581-08 A | |
| | Electrolytically Supressed Ion Chromatography | | D 6581-08 B | |
| Chlorite | Chemically Supressed Ion Chromatography | | D 6581-08 A | |
| | Electrolytically Supressed Ion Chromatography | | D 6581-08 B | |
| Chlorite – daily | Amperometric Titration | | | 4500-$ClO_2$ E |

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| | | | | |
|---|---|---|---|---|
| monitoring as prescribed in Rule 0400-45-01-.36(6)(b)2(i)(I) | | | | |

Footnotes
1 Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://astm.org. The methods listed are the only alternative versions that may be used.
2 Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street NW, Washington, DC 20001-3710
3 EPA Method 524.3, Version 1.0. "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry," June 2009. EPA 815-B-09-009. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.
4 EPA Method 557. "Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)," September 2009. EPA 815-B-09-012. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.
5 EPA Method 302.0. "Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Supressed Conductivity Detection," September 2009. EPA 815-B-09-014. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.
*Only IC and IC-ESI-MS/MS have an MRL <0.0010 mg/l and may be used for Bromate monitoring listed under EPA 815-B-09-014. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

2. Laboratories must achieve quantitative results on the PE sample analyses that are within the following acceptance limits:

| DBP | Acceptance limits (percent of true value) | Comments |
|---|---|---|
| TTHM | | |
| Chloroform | ±20 | Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a PE sample for TTHM |
| Bromodichloromethane | ±20 | |
| Dibromochloromethane | ±20 | |
| Bromoform | ±20 | |
| | | |
| HAA5 | | |
| Monochloroacetic Acid | ±40 | Laboratory must meet the acceptance limits for all 5 of the HAA5 compounds in order to successfully pass a PE sample for HAA5 |
| Dichloroacetic Acid | ±40 | |
| Trichloroacetic Acid | ±40 | |
| Monobromoacetic Acid | ±40 | |
| Dibromoacetic Acid | ±40 | |
| | | |
| Chlorite | ±30 | |
| | | |
| Bromate | ±30 | |

3. Laboratories must report quantitative data for concentrations at least as low as the ones listed in the following table for all DBP samples analyzed for compliance with Rules 0400-45-01-.06, 0400-45-01-.36, 0400-45-01-.37, and 0400-45-01-.38:

| DBP | Minimum reporting level (mg/L)[1] | Comments |
|---|---|---|
| TTHM[2] | | |
| Chloroform | 0.0010 | |
| Bromodichloromethane | 0.0010 | |
| Dibromochloromethane | 0.0010 | |
| Bromoform | 0.0010 | |
| | | |
| HAA5[2] | | |

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| | | |
|---|---|---|
| Monochloroacetic Acid | 0.0020 | |
| Dichloroacetic Acid | 0.0010 | |
| Trichloroacetic Acid | 0.0010 | |
| Monobromoacetic Acid | 0.0010 | |
| Dibromoacetic Acid | 0.0010 | |
| | | |
| Chlorite | 0.020 | Applicable to monitoring as prescribed in Rules 0400-45-01-.36(6)(b)2(i)(II) and (b)2(ii). |
| | | |
| Bromate | 0.0050 or 0.00010 | Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 must meet a 0.0010 mg/L MRL for bromate. The alternative methods for reduced monitoring under Rule 0400-45-01-.36(6)(b)3(ii)(II) meeting an MRL of < 0.0010 mg/L are EPA Method 302.0 and 557. |

[1] The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory. The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

[2] When adding the individual trihalomethane or haloacetic acid concentrations to calculate the TTHM or HAA5 concentrations, respectively, a zero is used for any analytical result that is less than the MRL concentration for that DBP, unless otherwise specified by the Department.

4. Additional analytical methods. Systems required to analyze parameters not included in subparagraph (i) and part (k)1 of this paragraph must use the following methods. A party approved by the EPA or the Department must measure these parameters.

(i) Alkalinity. All methods allowed in subparagraph (c) of this paragraph for measuring alkalinity.

(ii) Bromide. EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0, or ASTM D 6581–00.

(iii) Total Organic Carbon (TOC). Standard Method 5310 B or 5310 B–00 (High-Temperature Combustion Standard Method) or Standard Method 5310 C or 5310 C–00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D–00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples must be acidified at the time of sample collection to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within 28 days. The alternative testing methods for TOC are High Temperature Combustion, Standard Method 5310 B 21$^{st}$ edition (2005) or EPA Method 415.3, Revision 1.2; Persulfate-Ultraviolet or Heated Persulfate Oxidation, Standard Method 5310 C 21$^{st}$ edition (2005) or EPA Method 415.3, Revision 1.2; or Wet Oxidation, Standard Method 5310 D 21$^{st}$ edition (2005) or EPA Method 415.3, Revision 1.2.

(iv) Specific Ultraviolet Absorbance (SUVA). SUVA is equal to the UV absorption at 254 nm (UV254) (measured in $m^{-1}$ divided by the dissolved organic carbon (DOC) concentration) (measured as mg/L). In order to

(Rule 0400-45-01-.14, continued)

determine SUVA, it is necessary to separately measure UV254 and DOC. When determining SUVA, systems must use the methods stipulated in item (I) of this subpart to measure DOC and the method stipulated in item (II) of this subpart to measure UV254. SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV254 samples used to determine a SUVA value must be taken at the same time and at the same location. The alternative testing method for SUVA is Calculation using DOC and $UV_{254}$ data, EPA Method 415.3, Revision 1.2.

(I) Dissolved Organic Carbon (DOC). Standard Method 5310 B or 5310 B–00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C–00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D–00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. DOC samples must be filtered through the 0.45 µm pore-diameter filter as soon as practical after sampling, not to exceed 48 hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within 28 days of sample collection. Inorganic carbon must be removed from the samples prior to analysis. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet the following criteria: DOC < 0.5 mg/L. The alternative testing methods for DOC are High Temperature Combustion, Standard Method 5310 B 21st edition (2005) or EPA Method 415.3, Revision 1.2; Persulfate-Ultraviolet or Heated Persulfate Oxidation, Standard Method 5310 C 21st edition (2005) or EPA Method 415.3, Revision 1.2; or Wet Oxidation, Standard Method 5310 D 21st edition (2005) or EPA Method 415.3, Revision 1.2.

(II) Ultraviolet Absorption at 254 nm (UV254). Standard Method 5910 B or 5910 B–00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV254 samples must be filtered through a 0.45 µm pore-diameter filter. The pH of UV254 samples may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed 48 hours. The alternative testing method for $UV_{254}$ is Spectrophotometry, Standard Method 5910 B 21st edition (2005) or EPA Method 415.3, Revision 1.2.

(v) pH. All methods allowed in Table 0400-45-01-.14(10)(c) for measuring pH.

(vi) Magnesium. All methods allowed in Table 0400-45-01-.14(10)(c) for measuring magnesium.

(l) Cryptosporidium. Systems must analyze for Cryptosporidium using Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA–815-R–05–002 or Method 1622: Cryptosporidium in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA–815–R–05–001, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods online from http:// www.epa.gov/safewater/disinfection/lt2 or from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201

(Rule 0400-45-01-.14, continued)

Constitution Ave., NW, Washington, DC 20460 (Telephone: 800–426–4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202–566–2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

1. Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 ml as generated by the methods listed in this subparagraph. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in this subparagraph, up to a packed pellet volume of at least 2 ml.

2. (i) Matrix spike (MS) samples, as required by the methods in this subparagraph, must be spiked and filtered by a laboratory approved for Cryptosporidium analysis under part 4 of this subparagraph.

   (ii) If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

3. Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.

4. Systems must have Cryptosporidium samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of Cryptosporidium in Water or a laboratory that has been certified for Cryptosporidium analysis by an equivalent State laboratory certification program.

***Authority:*** *T.C.A. §§ 68-221-701 et seq., 68-203-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.15 MONITORING OF CONSECUTIVE PUBLIC WATER SYSTEMS.**

(1) Each public water system is required to provide monitoring data to the Department as required by Rules 0400-45-01-.07 through 0400-45-01-.12, 0400-45-01-.21, 0400-45-01-.24, 0400-45-01-.26 and unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency. Those public water systems which do not practice disinfection and which purchase all of their water from one or more public water systems that treats water may utilize the monitoring results obtained under Rules 0400-45-01-.08 through 0400-45-01-.12, 0400-45-01-.24, 0400-45-01-.26 and unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency to demonstrate compliance if the public water system that treats water is subject to the referenced monitoring requirements. Consecutive systems that do not disinfect will be required to collect and analyze all samples that must be collected at the tap including asbestos. Those systems purchasing water and which practice disinfection shall not use the monitoring results obtained by another system for contaminants to be monitored in unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency.

(2) Those public water systems which purchase all of their water and elect to perform the monitoring required by Rules 0400-45-01-.08 through 0400-45-01-.12, 0400-45-01-.21, 0400-45-01-.24, 0400-45-01-.26 and unregulated contaminant monitoring and reporting as required

(Rule 0400-45-01-.15, continued)

by the Environmental Protection Agency will have compliance with the MCL determined on the analytical results of its sampling.

(3) Those public water systems which purchase all their water and elect to use the analytical results of the system from which it purchases water shall be deemed to be in compliance with the monitoring and MCL requirements provided the seller of water is in compliance. Any violation of an MCL or monitoring requirement by the seller of water will constitute a violation for all systems which purchase water unless samples are taken as described in paragraph (2) of this rule.

(4) All public notification requirements as contained in Rule 0400-45-01-.19 are the responsibility of the individual public water system regardless of which public water system conducts the analysis.

(5) All public water systems must maintain records as required by Rule 0400-45-01-.20 of all analytical results which pertain to the system regardless of which system actually did the analysis.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.16 SITING REQUIREMENTS.**

(1) Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase capacity of an existing public water system, he shall notify the Department and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(a) Is subject to a significant risk from earthquakes, floods, fires, or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(b) Except for intake structures, is within the flood plain of a 100-years flood.

(2) All other siting requirements shall be in accordance with those set forth in “Design Criteria for Public Water Systems” as published by the Department.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.17 OPERATION AND MAINTENANCE REQUIREMENTS.**

(1) All community water systems which are designated as a surface supply and classified as a filtration system and all iron removal plants which use gravity filters must have an operator in attendance and responsible for the treatment process when the plant is in operation. Gravity iron removal plants which have installed continuous monitoring equipment including equipment for turbidity and chlorine residual with alarms and/or shutdown ability may seek approval from the Department to operate the treatment plant in an automated mode without an operator in attendance. All iron removal plants with pressure filters and using a ground water source from an approved sand and gravel formation will not be required to have an operator in attendance during all periods of operation provided suitable protection, acceptable to the Department, is provided.

Non–community water systems which are classified as a surface supply will be required to have a full time operator in attendance unless certain continuous monitoring equipment is installed.

(Rule 0400-45-01-.17, continued)

Pursuant to T.C.A. § 68-221-904, all operators in direct responsible charge of a water supply system, including the treatment plant and/or distribution system, must be certified by the Department as competent to operate same.

Because the proper operation and maintenance of water systems is critical to a system's ability to provide safe water to the public and to comply with these rules, all water supply systems must comply with the provisions of Chapter 0400-49-01. A violation of those rules is a violation of this rule as well.

(2) All community water systems and those non-community water systems classified as a surface source shall compile and maintain accurate daily operating records of the water works system on forms prepared and furnished by the Department. The daily operating records shall be submitted in a timely manner so they are received by the Department no later than ten days after the end of the reporting month. Any special reports, deemed necessary by the Department to assure continuous satisfactory operation of the water system, shall be submitted to the Department.

Water systems which desire to use their own forms to report the daily operating results to the Department must have prior approval of the form from the Department.

(3) All water quality tests, other than those listed in Rule 0400-45-01-.06 shall be made in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater" or alternate methods acceptable to the Department. The schedule of laboratory tests followed in controlling the operation of a waterworks system will vary with the character of the water; therefore, all waterworks systems must have the equipment necessary to perform all laboratory tests pertinent to the control of the plant or system operation, and the equipment shall be maintained in good working order at all times. Laboratory tests pertinent to proper operation shall be prescribed by the Department for each community water system.

(4) Chlorine is the recommended disinfection agent. Other agents will be considered by the Department provided they are effective and testing procedures for their effectiveness are recognized in the latest edition of "Standard Methods for the Examination of Water and Wastewater". All community water systems, using ground water as a raw water source and serving more than 50 connections or 150 persons shall continuously chlorinate (unless other disinfection methods are approved) and shall maintain a free chlorine residual in all parts of the distribution system in the amount of not less than 0.2 mg/l. Public Water Systems using surface water shall continuously chlorinate and maintain a free chlorine residual of 0.2 mg/l in all parts of the distribution system. The residual disinfectant concentration specified by this rule shall not be less than 0.2 mg/l in more than 5 percent of the samples each month, for any two consecutive months the system serves water to the public. All public water systems serving 50 or fewer connections that do not disinfect shall install continuous disinfection if the system fails to comply with the maximum contaminant level for coliform, experiences a disease outbreak or is directed to install disinfection by the department.

(5) All systems submitting samples for microbiological examination to the State laboratory must submit said sample in the bottle(s) provided by the State and return the samples to the proper State laboratory in the shipping carton provided by the State. The cost of postage for shipping the sample to the proper State laboratory shall be paid by the supplier of water. All samples submitted for microbiological examination must be collected and mailed to arrive at the proper State laboratory not later than Thursday noon of any week. Thirty hours is the limit allowed from the time of collection to the time of examination at the proper state laboratory.

(6) Pursuant to T.C.A. § 68-221-711(6) the installation, allowing the installation, or maintenance of any cross–connection, auxiliary intake, or bypass is prohibited unless the source and quality of water from the auxiliary supply, the method of connection, and the use and

(Rule 0400-45-01-.17, continued)

operation of such cross–connection, auxiliary intake, or bypass has been approved by the Department. The arrangement of sewer, soil, or other drain lines or conduits carrying sewage or other wastes in such a manner that the sewage or waste may find its way into any part of the public water system is prohibited.

All community water systems must adopt an ordinance or policy prohibiting all of the above and submit a copy of the executed ordinance or policy to the Department for approval. All community water systems shall develop a written plan for a cross–connection control program to detect and eliminate or protect the system from cross–connections. The written plan must be approved by the Department.

After adoption and approval of the cross–connection ordinance or policy and plan, each community water system must establish an ongoing program for the detection and elimination of hazards associated with cross–connections. Records of the cross–connection control program must be maintained by the water supplier and shall include such items as date of inspection, person contacted, recommendations, follow–up, and testing results.

(a) Public water systems must develop and implement an ongoing cross-connection program. Cross-connection plans and policies shall present all information in conformance with the "Design Criteria for Community Public Water Systems" as published by the Department.

(b) The public water system shall ensure that cross-connections between the distribution system and a consumer's plumbing are surveyed and/or inspected and determined not to exist or contain a significant risk or are eliminated or controlled by the installation of an approved backflow preventer commensurate with the degree of hazard.

(7) All community water system shall prepare and maintain an emergency operations plan in order to safeguard the water supply and to alert the public of unsafe drinking water in the event of natural or man-made disasters. Emergency operation plans shall be consistent with guidelines established by the Department and shall be reviewed and approved by the Department. Systems shall include a drought management plan as a part of the emergency operations plan. The drought management plans portions of the emergency operations shall be submitted for approval as follows:

(a) Systems serving 3,000 or more connections including consecutive systems: June 30, 2016.

(b) Systems serving more than 1,000 connections and less than 3,000 connections including consecutive systems: June 30, 2017.

(c) Systems serving 1,000 connections or less: June 30, 2018.

(8) (a) General-Public water systems, construction contractors and engineers shall follow and document sanitary practices used in inspecting, constructing or repairing water lines, finished water storage facilities, filters and wells. In lieu of writing their own disinfection standard operating procedures, public water systems, engineers and contractors may chose to follow the latest edition of the AWWA standards C-651, C-652 or equivalent methods provided the method has been approved in writing by the department and is available during the inspection, construction, maintenance or repair activity. The documentation shall include bacteriological sample results, construction logs, standard operating procedures and may include photographs where appropriate. All pipes, tanks, filters, filter media and other materials shall be properly disinfected prior to being placed in service. Any disinfectant used to disinfect shall be NSF approved or plain household bleach and used in a manner that assures sufficient contact time and concentration to inactivate any pathogens present. Bacteriological results including line

(Rule 0400-45-01-.17, continued)

repair records indicating adequacy of disinfection shall be maintained on file by the water system for five years. All public water systems, contractors, and engineers shall prepare and follow standard disinfection procedures approved by the Department when inspecting, maintaining, repairing or constructing lines, tanks, filters and wells. Procedures to ensure that water containing excessive concentrations of disinfectant is not supplied to the customers or discharged in such manner as to harm the environment shall be implemented.

All materials used for new or repaired water lines, storage facilities, filters, filter media, and wells will be inspected prior to use for any evidence of gross contamination. Any contamination observed shall be removed and the materials protected during installation.

(b) Disinfection of New Facilities-Bacteriological samples will be collected and analyzed to verify the effectiveness of the disinfection practices prior to placing new facilities in service. Bacteriological samples shall be collected to determine the effectiveness of the installation process including protecting the pipe material during storage, installation, and disinfection. This can be demonstrated by collecting two sets of microbiological samples 24 hours apart or collecting a single set of microbiological samples 48 hours or longer after flushing the highly chlorinated water from the lines. In either case microbiological samples in each set will be collected at approximately 2,500-foot intervals with samples near the beginning point and at the end point unless alternate sampling frequency and distance between sampling points approval has been obtained from the Department. Where sanitary conditions were not maintained before, during or after construction, an additional bacteriological sample shall be collected from a location representing the water from the contaminated area. Unsanitary conditions include failure to document the sanitary handling of materials, to conduct construction inspections and to maintain records, and to document sanitary practices during construction and other hazards such trench flooding during construction. If the constructed facility yields positive bacterial samples, additional flushing, disinfection and bacteriological sampling shall be repeated until the water is coliform free.

(c) Disinfection of Existing Facilities-Drinking water mains, storage facilities and filters that have been partially dewatered during inspection or repair shall, after the repair or inspection is completed, be disinfected, and flushed prior to placing it back in service. Bacteriological samples shall be collected immediately or as soon as possible after the repair is completed and from a location representing the water contained in the repaired line, tank or filter. The repaired facility may be returned to service prior to obtaining bacteriological results. If the repaired facility yields positive bacterial samples, additional flushing, disinfection and bacteriological sampling shall be repeated until the water is coliform free.

1. If one-half or more of either the original or repeat bacteriological samples collected from the repaired or renovated facility are total coliform positive, the system shall notify the Department within 30 days that it has reviewed its disinfection and sampling practices in an attempt to identify why the positive samples occurred and revise its disinfection and sampling plans accordingly.

2. If any public water system collects a fecal coliform positive repeat sample or e-coli positive repeat sample or a total coliform positive repeat sample following an initial positive fecal coliform or e-coli sample collected from the repaired or renovated facility, the system shall notify the Department within 24-hours and issue a tier 1 public notice using the language specified in Appendix B of Rule 0400-45-01-.19.

(Rule 0400-45-01-.17, continued)

(d) Inspectors, contractors, operators, public water systems or engineers that fail to document and follow adequate disinfection procedures, and fail to collect bacteriological samples during repairs, inspections or maintenance activities that potentially would compromise the microbial quality of the water shall issue a boil water advisory to the customers served by that portion of the public water system prior to returning the facility to service. The boil water advisory shall remain in effect until satisfactory microbial tests results are obtained.

(9) All community water systems shall be operated and maintained to provide minimum positive pressure of twenty (20) psi throughout the distribution system. No person shall install or maintain a water service connection to any premises where a booster pump has been installed unless such booster pump is equipped with a low pressure cut-off mechanism designed to cut off the booster pump when the pressure on the suction side of the pump drops to twenty (20) psi gauge.

(10) All community water systems having more than 50 service connections shall establish and maintain an adequate flushing program. The flushing program established shall help ensure that dead end and low usage mains are flushed periodically, drinking water standards are met, sediment and air removal and the free chlorine residual specified under paragraph (4) of this rule is maintained. Records of each flushing are to be maintained by the water system. These records shall include date, time, location, persons responsible and length of flushing. In addition to the above information, the free chlorine residual will have to be measured and recorded on the end of dead end mains after being flushed.

(11) All community public water systems serving more than 50 connections and which have their own source of water shall be required to install, operate and maintain duplicate disinfection equipment. Duplicate disinfection equipment means at least two chlorine cylinders connected to at least two chlorinators. Each set of chlorine cylinders consists of one or more cylinders which may be connected together by an automatic switchover valve. The two sets of chlorine cylinders may tee in to a common feed line leading to the chlorinators, but may not be connected together by an automatic switchover valve. The two sets of chlorine cylinders must be weighed independently and operated simultaneously. At least two chlorinators must be operated at all times with each feeding a part of the required dosage. The chlorinators may discharge to a common manifold piping network to allow multiple injection points. Facilities may be exempt from simultaneously operating duplicate disinfection equipment if the facility has a reliable chlorine residual analyzer with an alarm notifying a manned control center capable of immediately shutting down the treatment facility. Facilities, which are staffed during the time water is treated, can use one set of chlorine cylinders with the automatic switchover device provided the free chlorine residual is checked at the facility every two hours. A reliable free chlorine residual analyzer with an alarm system to a manned control center may be used for unmanned facilities that desire to use one set of chlorine cylinders with the automatic switchover device.

Community public water systems serving more than 50 service connections which use a hypochlorinator shall be required to have two solution pumps, two tanks for bleach solution and operate both units at the same time. Noncommunity systems and community systems serving less than 50 connections which use a hypochlorinator and show deficiencies in the disinfection process shall also be required to have duplicate disinfection units.

(12) All public water systems which utilize a filtration system shall use the following bed specifications and not exceed the following rates of filtration.

(a) Rapid Sand Filtration - 2.0 gallons per minute per square foot for turbidity removal, 3.0 gallons per minute per square foot for iron removal.

(Rule 0400-45-01-.17, continued)

There must be 30 inches of sand media with an effective size of 0.35 mm to 0.55 mm and a uniformity coefficient not greater than 1.70

(b) High Rate Filtration - 4.0 gallons per minute per square foot for turbidity removal, 4.0 gallons per minute per square foot for iron removal.

There must be 30 inches of dual media with 10 to 12 inches of sand and 18 to 20 inches of anthracite. The sand shall have an effective size of 0.35 mm to 0.55 mm and a uniformity coefficient not greater than 1.70. The anthracite shall have an effective size of 0.8 mm to 1.2 mm with a uniformity coefficient not greater than 1.85.

(c) Existing water systems with rapid sand filters and approved for higher rates of filtration by the Department will be allowed to continue at that rate provided the drinking water standards are met. The water supplier must be able to document that the Department approved the system for the higher rate.

(d) All mixed media filter beds will be at least 30 inches in depth and approved by the Department.

(e) Filtration rates above 4.0 gallons per minute per square foot will be considered on an individual basis. The Department will take into account the raw water characteristics, the treatment units, operational history, and operating personnel.

(13) All community water systems serving 50 connections or more shall install duplicate pumps for the raw water, finished water, and distribution pumping stations. A water system will not be required to have duplicate pumps in a distribution pumping station under the following conditions: limited number of service connections, availability of replacement pumps, maintaining adequate flows and pressures without the pumping station, and for emergency use only. All community public water systems using ground water supplies and having more than 50 service connections must have duplicate wells and/or duplicate pumps in a spring supply unless fed by gravity flow.

(14) All community water systems serving 50 connections or more are required to have 24 hours of distribution storage based on the average daily demand for the past twelve months. Distribution storage must be located so that the instantaneous demand can be met in all areas at any time.

(a) Systems which purchase water for resale may utilize the storage of the supplier provided the supplier has adequate distribution storage. Water systems that have large ground storage tanks will be given credit for distribution storage provided auxiliary power is available to pump water to the distribution system.

(b) Systems which have more than three (3) treatment facilities, have more than one source of water, and which have special power arrangements so that it is unlikely that all units would be down at the same time are not required to have distribution storage provided the peak demand can be met.

(c) Water systems which have an average daily demand of 10 million gallons or more are not required to have 24 hours of distribution storage provided the system has adopted a contingency plan for emergencies that has been approved by the Department. The contingency plan must demonstrate the water system is able to provide residential service to all customers for a 24 hour period during any emergency involving the shut down of the treatment facility.

(Rule 0400-45-01-.17, continued)

(d) Public water systems which utilize wells and provide only disinfection, pH adjustment, corrosion inhibitor and/or fluoridation as treatment, may use the capacity of the wells and the plant as part of the distribution storage under the following conditions:

1. The existing distribution storage tank(s) are adequate to meet the peak demands on the system,

2. The well(s), disinfection equipment and other pumping facilities needed to supply water to the distribution storage tank are equipped with an auxiliary power source with automatic controls, and

3. The well field capacity is determined by removing the largest well from consideration.

(e) Public water systems may take into account private distribution storage facilities in the following manner:

1. Private distribution storage may be counted as water system storage provided the private storage tank floats on the water utility's system and the water used serves both the private and utility system demand.

2. The water utility may reduce the amount of needed distribution storage by subtracting the average daily volume of any water user that has its own storage tank. This can be done provided the private storage tank is used on a daily basis.

3. Private distribution storage tanks used strictly for fire protection by the private owner cannot be in the water systems distribution storage capacity.

(15) All community water systems serving 50 or more service connections must have and maintain up-to-date maps of the distribution system. These maps must show the locations of the water mains, sizes of mains, valves, blow-offs or flush hydrants, air-release valves, and fire hydrants. One up-to-date copy of the overall system distribution map(s) is to be submitted to the Division of Water Supply every five years.

(16) All vents on wells, springs, storage tanks, overflows and clearwells shall be properly screened. All overflows on springs and tanks shall be screened and protected.

(17) All buildings and equipment used in and for the production and distribution of water (to include chemical and other storage buildings) must be well maintained and be reliable and fit for the purpose for which they are used. This includes, but is not limited to:

(a) When a water treatment plant is not producing water and an operator is not in attendance, plant entrances must be locked.

(b) Equipment such as chemical feeders, pumps, turbidimeters, pumpage meters, alarm systems, and air tanks shall be maintained and in good working condition. Pumps, tanks, hoses, and other equipment used by system personnel shall be disinfected and dedicated to its use if it comes into contact with water that may be consumed by humans.

(c) Duplicate or backup equipment shall be available as necessary to maintain the production of water meeting drinking water standards. Backup equipment or alternate treatment means shall be available for feeding all chemicals critical for adequate water treatment.

(Rule 0400-45-01-.17, continued)

(18) All community water systems planning to or having installed hydrants must protect the distribution system from contamination. All water mains designed for fire protection must be six inches or larger and be able to provide 500 gallons per minute with 20 pounds per square inch residual pressure. Fire hydrants shall not be installed on water mains less than six inches in diameter or on water mains that cannot produce 500 gpm at 20 psi residual pressure unless -the tops are painted red. Out of service hydrants shall have tops painted black or covered with a black shroud or tape.

Existing Class C hydrants (hydrants unable to deliver a flow of 500 gallons per minute at a residual pressure of 20 pounds per square inch (psi) shall have their tops painted red by January 1, 2008.

The water system must provide notification by certified mail at least once every five years beginning January 1, 2008, to each fire department that may have reason to utilize the hydrants, that fire hydrants with tops painted red (Class C hydrants) cannot be connected directly to a pumper fire truck. Fire Departments may be allowed to fill the booster tanks on any fire apparatus from an available hydrant by using the water system's available pressure only (fire pumps shall not be engaged during refill operations from a Class C hydrant).

(19) Before any new or modified community water treatment facility can be placed in service, it must be inspected and approved in writing by the Department.

(20) Each water system adjusting the fluoride content to the finished water must monitor for fluoride quarterly using a certified laboratory and the calculation of the fluoride level will be by running annual average. The recommended level of fluoridation in the finished water is 0.7 mg/l. Any public water system which determines to cease fluoridation treatment of its water supply shall notify the local environmental field office within the department of environment and conservation and the commissioner of the department of health of its decision to discontinue fluoridation within the timeframe as specified by T.C.A. § 68-221-708(c).

(21) New or modified turbidity removal facilities may not be placed into operation until the facility and the operator have been approved by the Department for the turbidity analysis.

(22) All pipe, pipe or plumbing fitting or fixture, solder, or flux which is used in the installation or repair of any public water system shall be lead free. The term "lead free" shall have the meaning given it in T.C.A. § 68-221-703.

(23) All dead end water mains and all low points in water mains shall be equipped with a blow-off or other suitable flushing mechanism capable of producing velocities adequate to flush the main.

(24) All community water systems must establish and maintain a file for customer complaints. This file shall contain the name of the person with the complaint, date, nature of complaint, date of investigation and results or actions taken to correct any problems.

(25) The Department may, upon written notice, require confirmation of any sampling results and also may require sampling and analysis for any contaminant when deemed necessary by the Department to protect the public health or welfare.

(26) Those public water systems required to monitor for turbidity and chlorine residual must have the laboratory approved by the Department before the results of these analyses can be accepted for compliance purposes.

(27) By December 30, 1991, or 18 months after the determination that a ground water system is influenced by surface water, all public water systems classified as a ground water system impacted by surface water shall utilize treatment techniques which achieve:

(Rule 0400-45-01-.17, continued)

(a) At least 99.9 percent (3 log) removal and/or inactivation of Giardia lamblia cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(b) At least 99.99 percent (4 log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(28) All public water systems using surface water shall provide disinfection to control the biological quality of the water. Due consideration shall be given to the contact time of the disinfectant in the water with relation to pH, ammonia, taste producing substances, temperature, presence and type of pathogens, and trihalomethane formation potential. All disinfection basins must be designed to prevent water short-circuiting the system. The disinfectant will be applied in the manner needed to provide adequate contact time.

(29) All community water systems using ground water as the raw water source serving water to more than 50 connections or 150 people will apply the disinfectant in the manner needed for adequate contact time. Contact time for ground water systems shall not be less than 15 minutes prior to the first customer.

(30) Any surface supplied public water system or ground water systems under the direct influence of surface water required to filter shall employ filtration in combination with disinfection that will achieve 99.9% (3 log) and 99.99% (4 log) inactivation of Giardia lamblia and viruses respectively between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer. For the purposes of determining removal or inactivation efficiencies for Giardia lamblia and viruses Table 0400-45-01-.17(30)1 and 0400-45-01-.17(30)2 shall apply. The free residual disinfectant concentration in the water entering the distribution system cannot be less than 0.2 mg/l for more than four hours.

TABLE 0400-45-01-.17(30)1

Assumed Log Removals by Filtration Method
and Required Levels of Disinfection

| Treatment | Assumed Log Removal | | Required Minimum Level of Disinfection | |
|---|---|---|---|---|
| | Giardia | Viruses | Giardia | Viruses |
| Conventional filtration | 2.5 | 2.0 | 0.5 | 2.0 |
| Direct filtration | 2.0 | 1.0 | 1.0 | 3.0 |
| Slow Sand filtration | 2.0 | 2.0 | 1.0 | 2.0 |
| Diatomaceous Earth filtration | 2.0 | 1.0 | 1.0 | 3.0 |

TABLE 0400-45-01-.17(30)2

CT Values for Achieving 1-Log Inactivation of
Giardia Cysts[1]

| | pH | Temperature | | | |
|---|---|---|---|---|---|
| | | 0.5°C | 5°C | 10°C | 15°C |
| Free Chlorine[2,3] | 6 | 55 | 39 | 29 | 19 |
| | 7 | 79 | 55 | 41 | 26 |
| | 8 | 115 | 81 | 61 | 41 |

(Rule 0400-45-01-.17, continued)

| | | | | |
|---|---|---|---|---|
| 9 | 167 | 118 | 88 | 59 |
| Ozone | 0.97 | 0.63 | 0.48 | 0.32 |
| Chlorine dioxide | 1270 | 735 | 615 | 500 |

[1] Values to achieve 0.5 log inactivation are one half those shown in the table.

[2] CT values are for 2.0 mg/l free chlorine.

[3] CT values for other concentrations of free chlorine may be taken from Appendix E of the guidance manual for Compliance with the "Filtration and Disinfection Requirements For Public Water Systems Using Surface Water Sources," October, 1989, Edition, Science and Technology Branch Criteria and Standards Division, Office of Drinking Water, USEPA, Washington, D.C.

(31) Each public water system must certify annually in writing to the Department that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified as follows:

Acrylamide = 0.05% dosed at 1 ppm (or equivalent)
Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent)

Public water systems can rely on manufacturer's or third parties' certification for complying with this requirement.

(32) New service taps on existing mains that must be uncovered to make the tap, shall be flushed and the free chlorine residual measured and recorded prior to connecting the service lines. These records shall be retained until the next sanitary survey or for three years.

(33) All public water systems shall properly maintain their distribution system finished water storage tanks. Each community water system shall establish and maintain a maintenance file on each of its finished water and distribution storage tanks. These maintenance files must be available for inspection by Department personnel. These files must include the dates and results of all routine water storage tank inspections by system personnel, any reports of detailed professional inspections of the water storage tanks by contractor personnel, dates and details of routine tank cleanings and surface flushings, and dates and details of all tank maintenance activities. The tank inspection records shall include dates of the inspections; the sanitary, coating and structural conditions of the tank; and all recommendations for needed maintenance activities. Community Water Systems shall have a professional inspection performed and a written report produced on each of their finished water and distribution storage tanks at least once every five years. Non-community water systems shall have a professional inspection and written report performed on each of their atmospheric pressure finished water and distribution storage tanks no less frequently than every five years. Records of these inspections shall be available to the Department personnel for inspection. Persons conducting underwater inspections of finished water storage tanks shall comply with AWWA standard C652-92 or later versions of the standard.

(34) Paints and coatings for the interior of potable water storage facilities must be acceptable to the Department. Paints and coatings accepted by the Environmental Protection Agency (EPA) and/or the National Sanitation Foundation (NSF) for potable water contact are generally acceptable to the Department. Paint systems for steel tanks shall be consistent with AWWA Standard D102-78. Factory coated bolted steel tanks shall be in accordance with AWWA D103-87. Wire-wound circular prestressed concrete tanks shall be in accordance with AWWA D110-86.

(35) By January 1, 1996, public water systems using surface water and ground water systems under the direct influence of surface water that filter shall have rewash capability. Such systems shall perform a rewash cycle, or filter to waste each time a filter is backwashed. The

(Rule 0400-45-01-.17, continued)

rewash cycle shall be conducted in a way and manner necessary to prevent the introduction of contaminants such as pathogens and turbidity trapped in the filter into the clear well or distribution system.

Existing filter plants may be approved to operate without rewash (filter-to-waste provisions) if existing operational and backwash practices prevent water of unacceptable quality from entering the clearwell or distribution system. To operate without rewash the water system must demonstrate to the Department that filtered water turbidity after backwashing is reliably and consistently below 0.5 NTU immediately after backwashing each filter. Approval to operate without rewash must be approved in writing and approval must be renewed if any modifications are made to the operation or design of the plant. Each filter that operates without rewash must have a continuous recording turbidimeter and retain the records for a period of five years.

(36) By January 1, 1995, all chemicals, additives, coatings or other materials used in the treatment, conditioning and conveyance of drinking water must have been approved by the National Sanitation Foundation (NSF) or American National Standards Institute (ANSI) certified parties as meeting NSF product standard 60 and 61. Until 1995, products used for treatment, conditioning and conveyance of drinking water shall have been listed as approved by the US EPA or NSF.

(37) Any new Community Water System or Non-Transient Non-Community Water System commencing operation after September 30, 1999 shall have a “Capacity Development Plan” and be a “viable water system.”

(38) Public Water Systems identified as not complying or potentially not complying with the requirements of the Safe Drinking Water Act and in accordance with the priorities established in the Department’s Capacity Development Strategy shall prepare a “Capacity Development Plan” and demonstrate viability.

(39) Public water systems are not permitted to construct uncovered finished water reservoirs after the effective date of this subparagraph.

(40) Benchtop and continuous turbidimeters used to determine compliance with limits set forth in this rule chapter must be calibrated at least every three months with primary standards and documented. Documentation shall be maintained for a period not less than five years. Primary standards are Formazin, AMCO clear, Stablcal, or alternatives approved in writing by the Department. Dilute Formazin solutions are unstable and must be prepared on the day of calibration. Manufacturers’ recommendations on calibration procedure must be followed.

(41) Verifications for benchtop turbidimeters are comparisons to approved reference materials. Verifications for continuous turbidimeters are comparisons to approved reference materials or comparisons to a properly calibrated benchtop turbidimeter. Secondary reference materials are assigned a value immediately after acceptable primary calibration has been completed. Acceptable verifications for turbidity measurements greater than 0.5 NTU must agree within ±10% from the reading assigned to the reference material after primary calibration. Acceptable verifications for measurements 0.5 NTU or less must be within ±0.05 NTU or less from the reading assigned to the reference material after primary calibration. When comparisons are made from a continuous turbidimeter to a benchtop turbidimeter, the continuous measurement must be within ±10% of the benchtop reading for measurements above 0.5 NTU and ±0.05 NTU for reading 0.5 NTU or less. When acceptable verifications are not achieved the instrument must be re-calibrated with primary standards according to paragraph (40) of this rule. Approved reference materials for benchtop turbidimeters are primary standards and materials suggested by the manufacturer such as sealed sample cells filled with metal oxide particles in a polymer gel. The 0.5 NTU ICE-PIC™ from Hach is an approved reference material for secondary turbidity verifications for Hach continuous

(Rule 0400-45-01-.17, continued)

turbidimeters when utilized as per Manufacturers' recommendations. All other reference materials for turbidimeter verifications must be approved in writing by the Department. Verifications for turbidimeters must be performed according to the following:

(a) Verification of benchtop turbidimeters must be performed daily and documented. Verifications must include a sample in the expected working range of the instrument or as close to the working range as possible. Documentation must include: assigned reference material value after calibration, recorded daily reading for all reference standards, instrument identification, and date.

(b) Combined filter effluent turbidimeters as required by part (5)(c)1 of Rule 0400-45-01-.31 must be verified daily and documented. When reference material is utilized documentation must include: instrument identification, date, assigned reference material value after calibration, and daily value for reference material. When comparisons to benchtop turbidimeters are utilized documentation must include: instrument identification, date, continuous turbidimeter value, and benchtop turbidimeter value.

(c) Individual filter turbidimeters as required by part (5)(c)4 of Rule 0400-45-01-.31 must be verified weekly.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016. Amendments filed March 7, 2016; effective June 5, 2016.*

**0400-45-01-.18 REPORTING REQUIREMENTS.**

(1) Except where a shorter period is specified in this Chapter, the supplier of water shall report to the Department the results of any test measurement or analysis required by this part within (a) the first ten days following the month in which the result is received or (b) the first ten days following the end of the required monitoring period as stipulated by the Department, which ever of these is shortest.

(2) All systems shall report to the Department within forty-eight (48) hours of the failure to comply with Departmental drinking water regulations or other requirements (including failure to comply with monitoring, maximum contaminant level or treatment technique requirements) set forth in these rules and regulations, and in case of any of the following events shall immediately notify the Department and responsible local officials:

(a) any major breakdown or failure of equipment in water treatment process which affects the quality or quantity of the water leaving the treatment plant;

(b) any serious loss of water service due to a failure of transmission or distribution facilities; or

(c) any situation with the water system which presents or may present an imminent and substantial endangerment to health.

(3) Systems are not required to report analytical results to the Department in cases where a State laboratory performs the analysis and reports the results to the Department.

(4) The public water system, within 10 days of completing the public notification requirements under Rule 0400-45-01-.19 for the initial public notice and any repeat notices, must submit to the department a certification that it has fully complied with the public notification regulations. The public water system must include with this certification a representative copy of each

(Rule 0400-45-01-.18, continued)

type of notice distributed, published, posted and made available to the persons served by the system and to the media.

(5) The water supply system shall submit to the Department, within the time stated in the request, copies of any records required to be maintained under Rule 0400-45-01-.20 hereof or copies of any documents then in existence which the Department is entitled to inspect pursuant T.C.A. §§ 68-221-701 et seq.

(6) The owner or operator of a community water system or non-transient non-community water system who is required to monitor under unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency shall send a copy of the results of such monitoring and any public notice issued under Rule 0400-45-01-.19 to the Department within 30 days of receipt of the results or issuance of the notice.

(7) The community water system or non-transient non-community water system shall furnish the following information on forms provided by the Department to the Department for each sample analyzed under unregulated contaminant monitoring and reporting as required by the Environmental Protection Agency:

(a) Results of all analytical methods, including negatives,
(b) Name and address of the system that supplied the sample,
(c) Contaminant(s),
(d) Analytical method(s) used,
(e) Date of sample,
(f) Date of analysis.

(8) It shall be a violation of these regulations for any person, public water system, engineer, operator or certified laboratory to:

(a) Record data or information and/or report any inaccurate, misleading, false or information known or that should be known to be false; or

(b) Report any data or information that is inaccurate, misleading or false because the person reporting has not used reasonable care, judgment or the application of his knowledge in the preparation of the report.

(c) Provide inaccurate or false statements to the Department.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.19 NOTIFICATION OF CUSTOMERS.**

(1) Each owner and operator of a public water system including community, non-transient non-community, and non-community water systems must comply with this rule.

(a) Each owner or operator of a public water system must give public notice for all violations of national primary drinking water regulations and for other situations as listed in Table 0400-45-01-.19(1)(a). The term national primary drinking water regulation is used in this rule to include violations of the maximum contaminant level (MCL), maximum residual disinfectant level (MRDL), treatment technique (TT), monitoring requirements, and testing procedures described in these regulations. Appendix A to this rule identifies the tier assignment for each specific violation or situation requiring a public notice.

(Rule 0400-45-01-.19, continued)

Table 0400-45-01-.19(1)(a)

Violation Categories and Other Situations
Requiring a Public Notice

1. NPDWR violations:

   (i) Failure to comply with an applicable maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL).
   (ii) Failure to comply with a prescribed treatment technique (TT).
   (iii) Failure to perform water quality monitoring, as required by the drinking water regulations.
   (iv) Failure to comply with testing procedures as prescribed by a drinking water regulation.

2. Variance and exemptions under sections 1415 and 1416 of SDWA:

   (i) Operation under a variance or an exemption.
   (ii) Failure to comply with the requirements of any schedule that has been set under a variance or exemption.

3. Special public notices:

   (i) Occurrence of a waterborne disease outbreak or other waterborne emergency.
   (ii) Exceedance of the alternate MCL for nitrate by non-community water systems (NCWS), where the non-community system has been granted an alternate standard by the department.
   (iii) Exceedance of the secondary maximum contaminant level (SMCL) for fluoride.
   (iv) Availability of unregulated contaminant monitoring data.
   (v) Other violations and situations determined by the department to require a public notice under this rule, not already listed in Appendix A.

(b) Public notice requirements are divided into three tiers to take into account the seriousness of the violation or situation and any potential adverse health effects that may be involved. The public notice requirements for each violation or situation listed in Table 0400-45-01-.19(1)(a) are determined by the tier to which it is assigned. Table 0400-45-01-.19(1)(b) provides the definition of each tier. Appendix A of this rule identifies the tier assignment for each specific violation or situation.

Table 0400-45-01-.19(1)(b)

Definition of Public Notice Tiers

1. Tier 1 public notice-required for NPDWR violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure.

2. Tier 2 public notice--required for all other NPDWR violations and situations with potential to have serious adverse effects on human health.

3. Tier 3 public notice--required for all other NPDWR violations and situations not included in Tier 1 and Tier 2.

(c) Who must be notified?

(Rule 0400-45-01-.19, continued)

1. Each public water system must provide public notice to persons served by the water system, in accordance with this rule. Public water systems that sell or otherwise provide drinking water to other public water systems (i.e., to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice to the persons it serves.

2. If a public water system has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system, the Department may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission by the department for limiting distribution of the notice must be granted in writing.

3. A representative copy of the each type of the notice distributed, published, posted and/or made available to the persons served by the system and/or to the media must also be sent to the Department within ten days of completion of each public notification.

(2) Tier 1 Public Notice-Form, manner, and frequency of notice.

(a) Violation of the MCL for total coliforms when fecal coliform or E. coli are present in the water distribution system as specified in Rule 0400-45-01-.06, or when the water system fails to test for fecal coliforms or E. coli when any repeat sample tests positive for coliform as specified in Rule 0400-45-01-.07; Violation of the MCL for E. coli (as specified in Rule 0400-45-01-.06(4)(f));

Table 0400-45-01-.19(2)(a)

Violation Categories and Other Situations
Requiring a Tier 1 Public Notice

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1. Violation of the MCL for total coliforms when fecal coliform or E. coli are present in the water distribution system as specified in Rule 0400-45-01-.06, or when the water system fails to test for fecal coliforms or E. coli when any repeat sample tests positive for coliform as specified in Rule 0400-45-01-.07;

2. Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, as defined in Rule 0400-45-01-.06, or when the water system fails to take a confirmation sample within 24 hours of the system's receipt of the first sample showing an exceedance of the nitrate or nitrite MCL, as specified in Rule 0400-45-01-.09;

3. Exceedance of the alternate MCL for nitrate by non-community water systems (NCWS), where the non-community system has been granted an alternate standard by the department;

4. Violation of the MRDL for chlorine dioxide, as defined in Rule 0400-45-01-.36, when one or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system, as specified in Rule 0400-45-01-.36;

5. Violation of the turbidity MCL under Rule 0400-45-01-.06, where the department determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;

(Rule 0400-45-01-.19, continued)

6. Violation of the Surface Water Treatment Rule (SWTR) Rule 0400-45-01-.31, Interim Enhanced Surface Water Treatment Rule (IESWTR) or Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit (as identified in Appendix A) where the department determines after consultation that a tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;

7. Occurrence of a waterborne disease outbreak, as defined in Rule 0400-45-01-.04, or other waterborne emergency (such as a failure or significant interruption in key water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination);

8. Other violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the Department either in its regulations or on a case-by-case basis.

9. Detection of E. coli or enterococci in source water samples as specified in paragraph (3) of Rule 0400-45-01-.40.

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(b) When is the Tier 1 public notice to be provided? What additional steps are required? Public water systems must:

1. Provide a public notice as soon as practical but no later than 24 hours after the system learns of the violation;

2. Initiate consultation with the Department as soon as practical, but no later than 24 hours after the public water system learns of the violation or situation, to determine additional public notice requirements; and

3. Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the Department. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.

(c) What is the form and manner of the public notice? Public water systems must provide the notice within 24 hours in a form and manner reasonably calculated to reach all persons served. The form and manner used by the public water system are to fit the specific situation, but must be designed to reach residential, transient, and non-transient users of the water system. In order to reach all persons served, water systems are to use, at a minimum, one or more of the following forms of delivery:

1. Appropriate broadcast media (such as radio and television);

2. Posting of the notice in conspicuous locations throughout the area served by the water system;

3. Hand delivery of the notice to persons served by the water system; or

4. Another delivery method approved in writing by the department.

(3) Tier 2 Public Notice--Form, manner, and frequency of notice.

(Rule 0400-45-01-.19, continued)

(a) Which violations or situations require a Tier 2 public notice? Table 0400-45-01-.19(3)(a) lists the violation categories and other situations requiring a Tier 2 public notice. Appendix A to this rule identifies the tier assignment for each specific violation or situation.

Table 0400-45-01-.19(3)(a)

Violation Categories and Other Situations
Requiring a Tier 2 Public Notice

| | |
|---|---|
| 1. | All violations of the MCL, MRDL, and treatment technique requirements, except where a Tier 1 notice is required under subparagraph (2)(a) of this rule or where the department determines that a Tier 1 notice is required; |
| 2. | Violations of the monitoring and testing procedure requirements, where the department determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation; and |
| 3. | Failure to comply with the terms and conditions of any variance or exemption in place. |
| 4. | Failure to take corrective action or failure to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer under subparagraph (4)(a) of Rule 0400-45-01-.40. |

(b) When is the Tier 2 public notice to be provided?

1. Public water systems must provide the public notice as soon as practical, but no later than 30 days after the system learns of the violation. If the public notice is posted, the notice must remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved. The department may, in appropriate circumstances, allow additional time for the initial notice of up to three months from the date the system learns of the violation. The department will not grant an extension to the 30-day deadline for any unresolved violation or to allow across-the-board extensions by rule or policy for other violations or situations requiring a Tier 2 public notice. Extensions granted by the department must be in writing.

2. The public water system must repeat the notice every three months as long as the violation or situation persists, unless the primacy agency determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstance may the repeat notice be given less frequently than once per year. The Department will not through its rules or policies permit across-the-board reductions in the repeat notice frequency for other ongoing violations requiring a Tier 2 repeat notice. The Department will not allow through its rules or policies less frequent repeat notice for an MCL or treatment technique violation under Rule 0400-45-01-.07 (Monitoring) or Rule 0400-45-01-.41 (Revised Total Coliform Rule) or a treatment technique violation under Rule 0400-45-01-.31 (Filtration and Disinfection). Department determinations allowing repeat notices to be given less frequently than once every three months must be in writing.

3. For the turbidity violations specified in this paragraph, public water systems must consult with the Department as soon as practical but no later than 24 hours after the public water system learns of the violation, to determine whether a Tier 1 public notice under subparagraph (2)(a) of this rule is required to protect public

(Rule 0400-45-01-.19, continued)

health. When consultation does not take place within the 24-hour period, the water system must distribute a Tier 1 notice of the violation within the next 24 hours (i.e., no later than 48 hours after the system learns of the violation), following the requirements under subparagraphs (2)(b) and (c) of this rule. Consultation with the department is required for:

(i) Violation of the turbidity MCL under Rule 0400-45-01-.06; or

(ii) Violation of the SWTR, IESWTR or LT1ESWTR treatment technique requirement (Rule 0400-45-01-.31) resulting from a single exceedance of the maximum allowable turbidity limit.

(c) What is the form and manner of the Tier 2 public notice? Public water systems must provide the initial public notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

1. Unless directed otherwise by the department in writing, community water systems must provide notice by:

(i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

(ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in subpart (i) of this part. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places served by the system or on the Internet; or delivery to community organizations.

2. Unless directed otherwise by the department in writing, non-community water systems must provide notice by:

(i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(ii) Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in subpart (i) of this part. Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. Other methods may include: publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

(4) Tier 3 Public Notice--Form, manner, and frequency of notice.

(a) Which violations or situations require a Tier 3 public notice? Table 0400-45-01-.19(4) lists the violation categories and other situations requiring a Tier 3 public notice.

(Rule 0400-45-01-.19, continued)

Appendix A to this rule identifies the tier assignment for each specific violation or situation.

Table 0400-45-01-.19(4)

Violation Categories and Other Situations Requiring a Tier 3 Public Notice

| | |
|---|---|
| 1. | Monitoring violations for the primary drinking water contaminants, except where a Tier 1 notice is required under subparagraph (2)(a) of this rule or where the department determines that a Tier 2 notice is required; |
| 2. | Failure to comply with an approved departmental or EPA testing procedure, except where a Tier 1 notice is required under subparagraph (2)(a) of this rule or where the department determines that a Tier 2 notice is required; |
| 3. | Operation under a variance granted under Section 1415 or an exemption granted under Section 1416 of the Safe Drinking Water Act; |
| 4. | Availability of unregulated contaminant monitoring results, as required under paragraph (7) of this rule; |
| 5. | Exceedance of the fluoride secondary maximum contaminant level (SMCL), as required under paragraph (8) of this rule; and |
| 6. | Reporting and Recordkeeping violations under Rule 0400-45-01-.41. |

(b) When is the Tier 3 public notice to be provided?

1. Public water systems must provide the public notice not later than one year after the public water system learns of the violation or situation or begins operating under a variance or exemption. Following the initial notice, the public water system must repeat the notice annually for as long as the violation, variance, exemption, or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, exemption, or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).

2. Instead of individual Tier 3 public notices, a public water system may use an annual report detailing all violations and situations that occurred during the previous twelve months, as long as the timing requirements of part 1 of this subparagraph are met.

(c) What is the form and manner of the Tier 3 public notice? Public water systems must provide the initial notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

1. Unless directed otherwise by the Department in writing, community water systems must provide notice by:

(Rule 0400-45-01-.19, continued)

(i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

(ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in subpart (i) of this part. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places or on the Internet; or delivery to community organizations.

2. Unless directed otherwise by the Department in writing, non-community water systems must provide notice by:

(i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(ii) Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in subpart (i) of this part. Such persons may include those who may not see a posted notice because the notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

(d) In what situations may the Consumer Confidence Report be used to meet the Tier 3 public notice requirements? For community water systems, the Consumer Confidence Report (CCR) may be used as a vehicle for the initial Tier 3 public notice and all required repeat notices, as long as:

1. The CCR is provided to persons served no later than 12 months after the system learns of the violation or situation as required under subparagraph (b) of this paragraph;

2. The Tier 3 notice contained in the CCR follows the content requirements under paragraph (5) of this rule; and

3. The CCR is distributed following the delivery requirements under subparagraph (c) of this paragraph.

(5) Content of the public notice.

(a) What elements must be included in the public notice for violations of National Primary Drinking Water Regulations (NPDWR) or other situations requiring a public notice? When a public water system violates a NPDWR or has a situation requiring public notification, each public notice must include the following elements:

1. A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);

(Rule 0400-45-01-.19, continued)

2. When the violation or situation occurred;

3. Any potential adverse health effects from the violation or situation, including the standard language under part (d)1 or (d)2 of this paragraph, whichever is applicable;

4. The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;

5. Whether alternative water supplies should be used;

6. What actions consumers should take, including when they should seek medical help, if known;

7. What the system is doing to correct the violation or situation;

8. When the water system expects to return to compliance or resolve the situation;

9. The name, business address, and phone number of the water system owner, operator, or designee of the public water system as a source of additional information concerning the notice; and

10. A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under part (d)3 of this paragraph, where applicable.

(b) What elements must be included in the public notice for public water systems operating under a variance or exemption?

1. If a public water system has been granted a variance or an exemption, the public notice must contain:

(i) An explanation of the reasons for the variance or exemption;

(ii) The date on which the variance or exemption was issued;

(iii) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(iv) A notice of any opportunity for public input in the review of the variance or exemption.

2. If a public water system violates the conditions of a variance or exemption, the public notice must contain the ten elements listed in subparagraph (a) of this paragraph.

(c) How is the public notice to be presented?

1. Each public notice required by this paragraph:

(i) Must be displayed in a conspicuous way when printed or posted;

(ii) Must not contain overly technical language or very small print;

(iii) Must not be formatted in a way that defeats the purpose of the notice;

(iv) Must not contain language which nullifies the purpose of the notice.

2. Each public notice required by this paragraph must comply with multilingual requirements, as follows:

(i) For public water systems serving a twenty-five percent or more of non-English speaking consumers, the public notice must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the notice or to request assistance in the appropriate language.

(d) What standard language must public water systems include in their public notice?

Public water systems are required to include the following standard language in their public notice:

1. Standard health effects language for MCL or MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption. Public water systems must include in each public notice the health effects language specified in Appendix B to this rule corresponding to each MCL, MRDL, and treatment technique violation listed in Appendix A to this rule, and for each violation of a condition of a variance or exemption.

2. Standard language for monitoring and testing procedure violations. Public water systems must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in Appendix A to this rule:

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During [compliance period], we "did not monitor or test" or "did not complete all monitoring or testing" for [contaminant(s)], and therefore cannot be sure of the quality of your drinking water during that time.

3. Standard language to encourage the distribution of the public notice to all persons served. Public water systems must include in their notice the following language (where applicable):

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

(6) Notice to new billing units or new customers.

(a) What is the requirement for community water systems? Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

(b) What is the requirement for non-community water systems? Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other

(Rule 0400-45-01-.19, continued)

situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

(7) Special notice of the availability of unregulated contaminant monitoring results.

(a) When is the special notice to be given? The owner or operator of a community water system of a non-transient, non-community water system required to monitor for unregulated contaminant monitoring and reporting by the Environmental Protection Agency must notify persons served by the system of the availability of the results of such sampling no later than 12 months after the monitoring results are known.

(b) What is the form and manner of the special notice? The form and manner of the public notice must follow the requirements for a Tier 3 public notice prescribed in subparagraph (4)(c), part (4)(d)1, and part (4)(d)3 of this rule. The notice must also identify a person and provide the telephone number to contact for information on the monitoring results.

(8) Special notice for exceedance of the SMCL for fluoride.

(a) When is the special notice to be given? Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of 2 mg/l as specified in Rule 0400-45-01-.12 (determined by the last single sample taken in accordance with Rule 0400-45-01-.09), but do not exceed the maximum contaminant level (MCL) of 4 mg/l for fluoride (as specified in Rule 0400-45-01-.06), must provide the public notice in subparagraph (c) of this paragraph to persons served. Public notice must be provided as soon as practical but no later than 12 months from the day the water system learns of the exceedance. A copy of the notice must also be sent to all new billing units and new customers at the time service begins and to the department and State public health officer. The public water system must repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice must remain in place for as long as the SMCL is exceeded, but in no case less than seven days (even if the exceedance is eliminated). On a case-by-case basis, the department may require an initial notice sooner than 12 months and repeat notices more frequently than annually.

(b) What is the form and manner of the special notice? The form and manner of the public notice (including repeat notices) must follow the requirements for a Tier 3 public notice in subparagraph (4)(c), part (4)(d)1, and part (4)(d)3 of this rule.

(c) What mandatory language must be contained in the special notice? The notice must contain the following language, including the language necessary to fill in the blanks:

This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/l) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your community water system [name] has a fluoride concentration of [insert value] mg/l.

Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water.

(Rule 0400-45-01-.19, continued)

Drinking water containing more than 4 mg/L of fluoride (the U.S. Environmental Protection Agency's drinking water standard) can increase your risk of developing bone disease. Your drinking water does not contain more than 4 mg/l of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed 2 mg/l.

For more information, please call [name of water system contact] of [name of community water system] at [phone number]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call NSF International at 1-877-8-NSF-HELP.

(9) Special notice for nitrate exceedances above MCL by non- community water systems (NCWS), where granted permission by the department under 40 CFR 141.11(d).

(a) When is the special notice to be given? The owner or operator of a non-community water system granted permission by the department under 40 CFR 141.11(d) to exceed the nitrate MCL must provide notice to persons served according to the requirements for a Tier 1 notice under subparagraph (2)(a) and (b) of this rule.

(b) What is the form and manner of the special notice? Non-community water systems granted permission by the department to exceed the nitrate MCL under 40 CFR 141.11(d) must provide continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure, according to the requirements for Tier 1 notice delivery under subparagraph (2)(c) of this rule and the content requirements under paragraph (5) of this rule.

(10) Notice by department on behalf of the public water system.

(a) May the department give the notice on behalf of the public water system? The department may give the notice required by this rule on behalf of the owner and operator of the public water system if the department complies with the requirements of this rule.

(b) What is the responsibility of the public water system when notice is given by the department? The owner or operator of the public water system remains responsible for ensuring that the requirements of this rule are met and civil penalties assessed against the system for failure to give the notice and for damages and expenses incurred by the department.

(11) Special notice for repeated failure to conduct monitoring of the source water for Cryptosporidium and for failure to determine bin classification or mean Cryptosporidium level.

(a) When is the special notice for repeated failure to monitor to be given? The owner or operator of a community or non-community water system that is required to monitor source water under paragraph (2) of Rule 0400-45-01-.39 must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any 3 months of monitoring as specified in subparagraph (2)(c) of Rule 0400-45-01-.39. The notice must be repeated as specified in subparagraph (3)(b) of this rule.

(b) When is the special notice for failure to determine bin classification or mean Cryptosporidium level to be given? The owner or operator of a community or non-community water system that is required to determine a bin classification under paragraph (11) of Rule 0400-45-01-.39, or to determine mean Cryptosporidium level under paragraph (13) of Rule 0400-45-01-.39, must notify persons served by the water

(Rule 0400-45-01-.19, continued)

system that the determination has not been made as required no later than 30 days after the system has failed report the determination as specified in subparagraph (11)(e) or (13)(a) of Rule 0400-45-01-.39, respectively. The notice must be repeated as specified in subparagraph (3)(b) of this rule. The notice is not required if the system is complying with a Department-approved schedule to address the violation.

(c) What is the form and manner of the special notice? The form and manner of the public notice must follow the requirements for a Tier 2 public notice prescribed in subparagraph (3)(c) of this rule. The public notice must be presented as required in subparagraph (5)(c) of this rule.

(d) What mandatory language must be contained in the special notice? The notice must contain the following language, including the language necessary to fill in the blanks.

1. The special notice for repeated failure to conduct monitoring must contain the following language:

   We are required to monitor the source of your drinking water for Cryptosporidium. Results of the monitoring are to be used to determine whether water treatment at the (treatment plant name) is sufficient to adequately remove Cryptosporidium from your drinking water. We are required to complete this monitoring and make this determination by (required bin determination date). We “did not monitor or test” or “did not complete all monitoring or testing” on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate Cryptosporidium removal. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, (date).

   For more information, please call (name of water system contact) of (name of water system) at (phone number).

2. The special notice for failure to determine bin classification or mean Cryptosporidium level must contain the following language:

   We are required to monitor the source of your drinking water for Cryptosporidium in order to determine by (date) whether water treatment at the (treatment plant name) is sufficient to adequately remove Cryptosporidium from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of (date). For more information, please call (name of water system contact) of (name of water system) at (phone number).

3. Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

APPENDIX A TO Rule 0400-45-01-.19

NPDWR VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE[1]

| Contaminant | MCL/MRDL/TT violations[2] | | Monitoring & testing procedure violations | |
|---|---|---|---|---|
| | Tier of public notice required | Citation | Tier of public notice required | Citation |
| I.Violations of National Primary Drinking Water Regulations (NPDWR):[3] | | | | |
| A. Microbiological Contaminants | | | | |
| 1. a. Total coliform bacteria † | 2 | 0400-45-01-.06(4)(a) | 3 | 0400-45-01-.07(1) and (2) |
| 1. b. Total coliform (TT violations resulting from failure to perform assessments or corrective actions, monitoring violations, and reporting violations) ‡ | 2 | 0400-45-01-.41(10)(a) through (b) | 3 | 0400-45-01-.41(10)(c) through (d) |
| 1. c. Seasonal system failure to follow Department-approved start-up plan prior to serving water to the public or failure to provide certification to the Department. ‡ | 2 | 0400-45-01-.41(10)(b)2 | | |
| 2. a. Fecal coliform/E. coli † | 1 | 0400-45-01-.06(4)(b) | [4]1,3 | 0400-45-01-.07(1) and (2) |
| 2. b. E. coli ‡ | 1 | 0400-45-01-.41(10)(a) | 3 | 0400-45-01-.41(10)(c)<br>0400-45-01-.41(10)(d)1 and 2 |
| 2. c. E. coli (TT violations resulting from failure to perform level 2 assessments or corrective action) ‡. | 2 | 0400-45-01-.41(10)(b) | | |
| 3. Turbidity MCL | 2 | 0400-45-01-.06(3)(a) | 3 | 0400-45-01-.08 |
| 4. Turbidity MCL(average of 2 days' samples > 2 NTU) | [5]2,1 | 0400-45-01-.06(3)(b) | 3 | 0400-45-01-.08 |
| 5. Turbidity (for TT violations resulting from a Single exceedance of maximum allowable turbidity level) | [6]2,1 | 0400-45-01-.31(2)(a)<br>0400-45-01-.31(2)(a)<br>0400-45-01-.31(4)(a)2<br>0400-45-01-.31(4)(b)2<br>0400-45-01-.31(4)(b)2<br>0400-45-01-.31(4)(b)2 | 3 | 0400-05-01-.31<br>0400-45-01-.31<br>0400-45-01-.31<br>0400-45-01-.31 |
| 6. Surface Water Treatment Rule violations other than violations resulting from single exceedance of max. allowable turbidity level (TT) [0400-45-01-.31(4)] | 2 | 0400-05-01-.31(1)-(4) | 3 | 0400-45-01-.31(4) |
| 7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max turbidity level (TT) [0400-45-01-.31(4) | [7]2 | 0400-45-01-.31(1)-(4) | 3 | 0400-45-01-.31(4) |
| 8. Filter Backwash Recycling Rule Violations | 2 | 0400-05-01-.31(9) | 3 | 0400-45-01-.31(9)(b) and (d) |
| 9.Long term 1 Enhanced Surface Water Treatment Rule Violations | 2 | 0400-45-01-.31(4) | 3 | 0400-45-01-.31(6) |
| 10. LT2ESWTR violation | 2 | 0400-45-01-.39(11)-(21) | [22]2,3 | 0400-45-01-.39(2)-(6)<br>0400-45-01-.39(9)-(10) |
| 11. Ground Water Rule violations | 2 | ~~Rule~~ 0400-45-01-.40(5) | 3 | 0400-45-01-.40 (3)(m)<br>0400-45-01-.40(4)(d) |
| B. Inorganic Chemicals (IOCs) | | | | |
| 1. Antimony | 2 | 0400-45-01-.06(1)(b)1 | 3 | 0400-45-01-.09 |
| 2. Arsenic | 2 | [8]0400-45-01-.06(1)(b)2 | 3 | [11]0400-45-01-.09 |

(Rule 0400-45-01-.19, continued)

| | | | | |
|---|---|---|---|---|
| 3. Asbestos (fibers >10 µm) | 2 | 0400-45-01-.06(1)(b)3 | 3 | 0400-45-01-.09 |
| 4. Barium | 2 | 0400-45-01-.06(1)(b)5 | 3 | 0400-45-01-.09 |
| 5. Beryllium | 2 | 0400-45-01-.06(1)(b)4 | 3 | 0400-45-01-.09 |
| 6. Cadmium | 2 | 0400-45-01-.06(1)(b)6 | 3 | 0400-45-01-.09 |
| 7. Chromium (total) | 2 | 0400-45-01-.06(1)(b)7 | 3 | 0400-45-01-.09 |
| 8. Cyanide | 2 | 0400-45-01-.06(1)(b)8 | 3 | 0400-45-01-.09 |
| 9. Fluoride | 2 | 0400-45-01-.06(1)(b)9 | 3 | 0400-45-01-.09 |
| 10. Mercury (inorganic) | 2 | 0400-45-01-.06(1)(b)10 | 3 | 0400-45-01-.09 |
| 11. Nickel | 2 | 0400-45-01-.06(1)(b)11 | 3 | 0400-45-01-.09 |
| 12. Nitrate | 1 | 0400-45-01-.06(1)(b)12 | [12]1,3 | 0400-45-01-.09 |
| 13. Nitrite | 1 | 0400-45-01-.06(1)(b)13 | [12]1,3 | 0400-45-01-.09 |
| 14. Total Nitrate and Nitrite | 1 | 0400-45-01-.06(1)(b)14 | 3 | 0400-45-01-.09 |
| 15. Selenium | 2 | 0400-45-01-.06(1)(b)15 | 3 | 0400-45-01-.09 |
| 16. Thallium | 2 | 0400-45-01-.06(1)(b)16 | 3 | 0400-45-01-.09 |
| C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L) | | | | |
| 1. Lead and Copper Rule (TT) | 2 | 0400-45-01-.33(1)-(6) | 3 | 0400-45-01-.33 |
| D. Synthetic Organic Chemicals (SOCs) | | | | |
| 1. 2,4-D | 2 | 0400-45-01-.06(2)(a)6 | 3 | 0400-45-01-.10 |
| 2. 2,4,5-TP (Silvex) | 2 | 0400-45-01-.06(2)(a)14 | 3 | 0400-45-01-.10 |
| 3. Alachlor | 2 | 0400-45-01-.06(2)(a)1 | 3 | 0400-45-01-.10 |
| 4. Atrazine | 2 | 0400-45-01-.06(2)(a)2 | 3 | 0400-45-01-.10 |
| 5. Benzo(a)pyrene (PAHs) | 2 | 0400-45-01-.06(2)(a)16 | 3 | 0400-45-01-.10 |
| 6. Carbofuran | 2 | 0400-45-01-.06(2)(a)3 | 3 | 0400-45-01-.10 |
| 7. Chlordane | 2 | 0400-45-01-.06(2)(a)4 | 3 | 0400-45-01-.10 |
| 8. Dalapon | 2 | 0400-45-01-.06(2)(a)17 | 3 | 0400-45-01-.10 |
| 9. Di (2-ethylhexyl) adipate | 2 | 0400-45-01-.06(2)(a)18 | 3 | 0400-45-01-.10 |
| 10. Di (2-ethylhexyl) phthalate | 2 | 0400-45-01-.06(2)(a)19 | 3 | 0400-45-01-.10 |
| 11. Dibromochloropropane | 2 | 0400-45-01-.06(2)(a)5 | 3 | 0400-45-01-.10 |
| 12. Dinoseb | 2 | 0400-45-01-.06(2)(a)20 | 3 | 0400-45-01-.10 |
| 13. Dioxin (2,3,7,8-TCDD) | 2 | 0400-45-01-.06(2)(a)29 | 3 | 0400-45-01-.10 |
| 14. Diquat | 2 | 0400-45-01-.06(2)(a)21 | 3 | 0400-45-01-.10 |
| 15. Endothall | 2 | 0400-45-01-.06(2)(a)22 | 3 | 0400-45-01-.10 |
| 16. Endrin | 2 | 0400-45-01-.06(2)(a)30 | 3 | 0400-45-01-.10 |
| 17. Ethylene Dibromide | 2 | 0400-45-01-.06(2)(a)7 | 3 | 0400-45-01-.10 |
| 18.Glyphospate | 2 | 0400-45-01-.06(2)(a)23 | 3 | 0400-45-01-.10 |
| 19. Heptachlor | 2 | 0400-45-01-.06(2)(a)8 | 3 | 0400-45-01-.10 |
| 20. Heptachlor epoxide | 2 | 0400-45-01-.06(2)(a)9 | 3 | 0400-45-01-.10 |
| 21. Hexachlorobenzene | 2 | 0400-05-01-.06(2)(a)24 | 3 | 0400-45-01-.10 |
| 22. Hexachlorocyclo-pentadiene | 2 | 0400-45-01-.06(2)(a)25 | 3 | 0400-45-01-.10 |
| 23. Lindane | 2 | 0400-45-01-.06(2)(a)10 | 3 | 0400-45-01-.10 |
| 24. Methoxchlor | 2 | 0400-05-01-.06(2)(a)11 | 3 | 0400-45-01-.10 |
| 25. Oxamyl (Vydate) | 2 | 0400-45-01-.06(2)(a)26 | 3 | 0400-45-01-.10 |
| 26. Pentachlorophenol | 2 | 0400-45-01-.06(2)(a)15 | 3 | 0400-45-01-.10 |
| 27. Picloram | 2 | 0400-45-01- | 3 | 0400-45-01-.10 |

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| | | | | |
|---|---|---|---|---|
| | | .06(2)(a)27 | | |
| 28. Polychlorinated biphenyls (PCBs) | 2 | 0400-45-01-.06(2)(a)12 | 3 | 0400-45-01-.10 |
| 29. Simazine | 2 | 0400-45-01-.06(2)(a)28 | 3 | 0400-45-01-.10 |
| 30. Toxaphene | 2 | 0400-45-01-.06(2)(a)13 | 3 | 0400-45-01-.10 |
| E. Volatile Organic Chemicals (VOCs) | | | | |
| 1. Benzene | 2 | 0400-45-01-.25(2)(e) | 3 | 0400-45-01-.26 |
| 2. Carbon tetrachloride | 2 | 0400-45-01-.25(2)(b) | 3 | 0400-45-01-.26 |
| 3. Chlorobenzene (monochlorbenzene) | 2 | 0400-45-01-.25(2)(l) | 3 | 0400-45-01-.26 |
| 4. o-Dichlorobenzene | 2 | 0400-45-01-.25(2)(m) | 3 | 0400-45-01-.26 |
| 5. p-Dichlorobenzene | 2 | 0400-45-01-.25(2)(h) | 3 | 0400-45-01-.26 |
| 6. 1,2-Dichloroethane | 2 | 0400-45-01-.25(2)(d) | 3 | 0400-45-01-.26 |
| 7. 1,1-Dichloroethylene | 2 | 0400-45-01-.25(2)(f) | 3 | 0400-45-01-.26 |
| 8. cis-1,2-Dichloroethylene | 2 | 0400-45-01-.25(2)(i) | 3 | 0400-45-01-.26 |
| 9. trans-1,2-Dichloroethylene | 2 | 0400-45-01-.25(2)(q) | 3 | 0400-45-01-.26 |
| 10. Dichloromethane | 2 | 0400-45-01-.25(2)(s) | 3 | 0400-45-01-.26 |
| 11. 1,2-Dichloropropane | 2 | 0400-45-01-.25(2)(j) | 3 | 0400-45-01-.26 |
| 12. Ethylbenzene | 2 | 0400-45-01-.25(2)(k) | 3 | 0400-45-01-.26 |
| 13. Styrene | 2 | 0400-45-01-.25(2)(n) | 3 | 0400-45-01-.26 |
| 14. Tetrachloroethylene | 2 | 0400-45-01-.25(2)(o) | 3 | 0400-45-01-.26 |
| 15. Toluene | 2 | 0400-45-01-.25(2)(p) | 3 | 0400-45-01-.26 |
| 16. 1,2,4-Trichlorobenzene | 2 | 0400-45-01-.25(2)(t) | 3 | 0400-45-01-.26 |
| 17. 1,1,1-Trichloroethane | 2 | 0400-45-01-.25(2)(g) | 3 | 0400-45-01-.26 |
| 18. 1,1,2-Trichloroethane | 2 | 0400-45-01-.25(2)(u) | 3 | 0400-45-01-.26 |
| 19. Trichloroethylene | 2 | 0400-45-01-.25(2)(a) | 3 | 0400-45-01-.26 |
| 20. Vinyl chloride | 2 | 0400-45-01-.25(2)(c) | 3 | 0400-45-01-.26 |
| 21. Xylenes (total) | 2 | 0400-45-01-.25(2)(r) | 3 | 0400-45-01-.26 |
| F. Radioactive Contaminants | | | | |
| 1. Beta/photon emitters | 2 | 0400-45-01-.06(5)(b) | 3 | 0400-45-01-.11 |
| 2. Alpha emitters | 2 | 0400-45-01-.06(5)(a) | 3 | 0400-45-01-.11 |
| 3. Combined radium (226 & 228) | 2 | 0400-45-01-.06(5)(a)2 | 3 | 0400-45-01-.11 |
| 4. Uranium | [9]2 | 0400-45-01-.06(5)(c) | [10].3 | 0400-45-01-.11 |
| G. Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where Disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water including trihalomethanes (THMs) and haloacetic acids (HAAs).[13] | | | | |
| 1. Total trihalomethanes (TTHMs) | 2 | [14]0400-45-01-.06(6)(b) | 3 | 0400-45-01-.36,.37, and .38 |
| 2. Haloacetic Acids (HAA5) | 2 | 0400-45-01-.06(6)(b) | 3 | 0400-45-01-.36,.37 and .38 |
| 3. Bromate | 2 | 0400-45-01-.06(6)(a) | 3 | 0400-45-01-.36 |
| 4. Chlorite | 2 | 0400-45-01-.06(6)(a) | 3 | 0400-45-01-.36 |
| 5. Chlorine (MRDL) | 2 | 0400-45-01-.06(6)(c) | 3 | 0400-45-01-.36 |
| 6. Chloramine (MRDL) | 2 | 0400-45-01-.06(6)(c) | 3 | 0400-45-01-.36 |
| 7. Chlorine dioxide (MRDL), where any 2 consecutive daily samples at entrance to distribution system only are above MRDL | 2 | 0400-45-01-.36(7)(c)2(ii) | 2[15], 3 | 0400-45-01-.36 |
| 8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL | [16]1 | 0400-45-01-.36(7)(c)2(i) | 1 | 0400-45-01-.36 |
| 9. Control of DBP precursors—TOC (TT) | 2 | 0400-45-01-.36(7)(d) | 3 | 0400-45-01-.36 |
| 10. Bench marking and disinfection profiling | N/A | N/A | 3 | 0400-45-01-.36 |
| 11. Development of monitoring plan | N/A | N/A | 3 | 0400-45-01-.36 |
| H. Other Treatment Techniques | | | | |
| 1. Acrylamide (TT) | 2 | 0400-45-01-.17(31) | N/A | N/A |
| 2. Epichlorohydrin (TT) | 2 | 0400-45-01-.17(31) | N/A | N/A |
| II. Unregulated Contaminant Monitoring: [17] | | | | |
| A. Unregulated contaminants | N/A | N/A | 3 | |
| B. Nickel | 2 | 0400-45-01-.06(1)(b)11 | 3 | 0400-45-01-.09 |

(Rule 0400-45-01-.19, continued)

| | | | | |
|---|---|---|---|---|
| III. Public Notification for Variances and Exemptions: | | | | |
| A. Operation under a variance or exemption | 3 | [18]0400-45-01-.19(1) | N/A | N/A |
| B. Violation of conditions of a variance or exemption[19] | 2 | 0400-45-01-.19(1) | N/A | N/A |
| IV. Other Situations Requiring Public Notification: | | | | |
| A. Fluoride secondary maximum contaminant Level (SMCL) exceedance | 3 | 0400-45-01-.19(1)(a)3(iii) | N/A | N/A |
| B. Exceedance of nitrate MCL for non-community systems, as allowed by department | 1 | 0400-45-01-.19(1)(a)3(ii) | N/A | N/A |
| C. Availability of unregulated contaminant monitoring data | 3 | 0400-45-01-.19(7) | N/A | N/A |
| D. Waterborne disease outbreak | 1 | 0400-45-01-.31(2)(c)2 | N/A | N/A |
| E. Other waterborne emergency [20] | 1 | N/A | N/A | N/A |
| F. Other situations as determined by the department | [21]1, 2, 3 | N/A | N/A | N/A |
| G. Source Water Sample Positive for GWR Fecal indicators: E. coli or enterococci | 1 | 0400-45-01-.40(3)(l) | N/A | N/A |

## Appendix A – Endnotes

† Until March 31, 2016
‡ Beginning April 1, 2016

1. Violations and other situations not listed in this table (e.g., failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the department. The department may, at its option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under subparagraphs (2)(a) and (3)(a) of Rule 0400-45-01-.19.
2. MCL – Maximum contaminant level, MRDL – Maximum residual disinfectant level, TT-Treatment technique.
3. The term Violations of National Primary Drinking Water Regulations (NPDWR) is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.
4. Failure to test for fecal coliform or E.coli is a Tier 1 violation if testing is not done after any repeat sample tests positive for coliform. All other total coliform monitoring and testing procedure violations are Tier 3.
5. Systems that violate the turbidity MCL of 2 NTU based on an average of measurements over two consecutive days must consult with the department within 24 hours after learning of the violation. Based on this consultation, the department may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the department in the 24-hour period, the violation is automatically elevated to Tier 1.
6. Systems with treatment technique violations involving a single exceedance of a maximum turbidity limit under the Surface Water Treatment Rule, Interim Enhanced Surface Water Treatment Rule, or the Long Term 1 Enhanced Surface Water Treatment Rule (0400-45-01-.31) are required to consult with the Department within 24 hours after learning of the violation. Based on this consultation, the department may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the department in the 24-hour period, the violation is automatically elevated to Tier 1.
7. Most of the requirements of the Interim Enhanced Surface Water Treatment Rule 0400-45-01-.31 become effective January 1, 2002 for Subpart H systems (surface water systems and ground water systems under the direct influence of surface water) serving at least 10,000 persons. The Surface Water Treatment Rule remains in effect for systems serving at least 10,000 persons even after 2002; the Interim Enhanced Surface Water Treatment Rule adds additional requirements and does not in many cases supersede the SWTR.
8. The arsenic MCL citations are effective January 23, 2006, or the effective date of this rule whichever comes first.
9. The uranium MCL tier 2 violation citations are effective December 8, 2003 for all community water systems.
10. The uranium tier 3 violations are effective December 8, 2003, for all community water systems.
11. The arsenic Tier 3 MCL violations are effective January 23, 2006 or the effective date of this rule whichever comes first.
12. Failure to take a confirmation sample within 24 hours for nitrate or nitrite after an initial sample exceeds the MCL is a Tier 1 violation. Other monitoring violations for nitrate are Tier 3.
13. Subpart H community and non-transient non-community systems serving ≥10,000 must comply with new DBP MCLs, disinfectant MRDLs, and related monitoring requirements beginning January 1, 2002. All other community and non-transient non-community systems must meet the MCLs and MRDLs beginning January 1, 2004. Subpart H transient non-community systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H transient non-community systems serving fewer than 10,000 persons and using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.
14. Paragraph (6) of Rule 0400-45-01-.06 and subparagraphs (5)(a) and (b) of Rule 0400-45-01-.36 apply until paragraphs (1) through (11) of Rule 0400-45-01-.38 take effect under the schedule in subparagraph (1)(c) of Rule 0400-45-01-.38.
15. Failure to monitor for chlorine dioxide at the entrance to the distribution system the day after exceeding the MRDL at the entrance to the distribution system is a Tier 2 violation.

(Rule 0400-45-01-.19, continued)

16. If any daily sample taken at the entrance to the distribution system exceeds the MRDL for chlorine dioxide and one or more samples taken in the distribution system the next day exceed the MRDL, Tier 1 notification is required. Failure to take the required samples in the distribution system after the MRDL is exceeded at the entry point also triggers Tier 1 notification.
17. Some water systems must monitor for certain unregulated contaminants.
18. This citation refers to §§1415 and 1416 of the Safe Drinking Water Act. §§1415 and 1416 require that "a schedule prescribed… for a public water system granted a variance [or exemption] shall require compliance by the system…"
19. In addition to §§1415 and 1416 of the Safe Drinking Water Act, 40 CFR 142.307 specifies the items and schedule milestones that must be included in a variance for small systems.
20. Other waterborne emergencies require a Tier 1 public notice under subparagraph (2)(a) of Rule 0400-45-01-.19 for situations that do not meet the definition of a waterborne disease outbreak given in Rule 0400-45-01-.04 but that still have the potential to have serious adverse effects on health as a result of short-term exposure. These could include outbreaks not related to treatment deficiencies, as well as situations that have the potential to cause outbreaks, such as failures or significant interruption in water treatment processes, natural disasters that disrupt the water supply or distribution system, chemical spills, or unexpected loading of possible pathogens onto the source water.
21. The department may place other situations in any tier it believes appropriate, based on threat to public health.
22. Failure to collect three or more samples for cryptosporidium analysis is a Tier 2 violation requiring special notice as specified in paragraph (11) of Rule 0400-45-01-.19. All other monitoring and testing procedure violations are Tier 3.

## APPENDIX B TO Rule 0400-45-01-.19

## STANDARD HEALTH EFFECTS LANGUAGE FOR PUBLIC NOTIFICATION

| Contaminant | MCLG[1] mg/l | MCL[2] mg/l | Standard health effects language for public notification |
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| National Primary Drinking Water Regulations (NPDWR): | | | |
| A. Microbiological Contaminants | | | |
| 1a. Total coliform | Zero | See foot note[3] | Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems. |
| 1b. Fecal coliform/E. coli † | Zero | Zero | Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special risk for infants, young children, some of the elderly, and people with severely compromised immune systems. |
| 1c. Fecal indicators (GWR) | | | Fecal indicators are microbes whose presence indicates |
| i. E. coli | Zero | TT | that the water may be contaminated with human or animal |
| ii. Enterococci | None | TT | wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems. |
| 1d. Ground Water Rule (GWR) TT violations | None | 1 NTU [5]/2 NTU | Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches. |
| 1e. Revised Total Coliform Rule: Coliform Assessment and/or Corrective Action Violations ‡ | N/A | TT | Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.] We failed to conduct the required assessment. We failed to correct all identified sanitary defects that were |

(Rule 0400-45-01-.19, continued)

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| | | | found during the assessment(s). |
| 1f. Revised Total Coliform Rule: E. coli Assessment and/or Corrective Action Violations ‡ | N/A | TT | E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We violated the standard for E. coli, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct a detailed assessment to identify problems and to correct any problems that are found.<br>[THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.]<br>We failed to conduct the required assessment.<br>We failed to correct all identified sanitary defects that were found during the assessment that we conducted. |
| 1g. E. coli ‡ | Zero | In compliance unless one of the following conditions occurs:<br>(1) The system has an E. coli-positive repeat sample following a total coliform-positive routine sample.<br>(2) The system has a total coliform-positive repeat sample following an E. coli-positive routine sample.<br>(3) The system fails to take all required repeat samples following an E. coli-positive routine sample.<br>(4) The system fails to test for E. coli when any repeat sample tests positive for total coliform. | E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. |

(Rule 0400-45-01-.19, continued)

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| 1h. Revised Total Coliform Rule Seasonal System TT Violations ‡. | N/A | TT | When this violation includes the failure to monitor for total coliforms or E. coli prior to serving water to the public, the mandatory language found at Rule 0400-45-01-.19(5)(d)2 must be used. When this violation includes the failure to complete other actions, the appropriate elements found in Rule 0400-45-01-.19(5)(a) must be used. |
| B. Surface Water Treatment Rule (SWTR) Long Term 1 (LT1ESWTR) and Interim Enhanced Surface Water Treatment Rule (IESWTR) violations: | | | |
| 3. Giardia lamblia (SWTR/ IESWTR/LT1ESWTR) | Zero | TT[10] | Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. |
| 4. Viruses (SWTR/IESWTR/ LT1ESWTR). | | | Same as B.3. |
| 5. Heterotrophic plate count (HPC) bacteria[9] (SWTR/(IESWTR/LT1ESWTR). | | | Same as B.3. |
| 6. Legionella (SWTR/IESWTR/LT1ESWTR). | | | Same as B.3. |
| 7. Cryptosporidium (IESWTR/LT1ESWTR) | | | Same as B.3. |
| C. Inorganic Chemicals | | | |
| 8. Antimony | 0.006 | 0.006 | Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar. |
| 9. Arsenic[11] | 0 | 0.01 | Some people who drink water containing arsenic in excess of the MCL over many years could experiences skin damage or problems with their circulatory system, and may have an increased risk of getting cancer. |
| 10. Asbestos (10 µm) | 7 MFL[12] | 7 MFL | Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps. |
| 11. Barium | 2 | 2 | Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure. |
| 12. Beryllium | 0.004 | 0.004 | Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions. |
| 13. Cadmium | 0.005 | 0.005 | Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage. |
| 14. Chromium (total) | 0.1 | 0.1 | Some people who drink water containing chromium well in excess of the MCL over many years could experience allergic dermatitis. |
| 15. Cyanide | 0.2 | 0.2 | Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid. |
| 16. Fluoride | 4.0 | 4.0 | Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums. |
| 17. Mercury (inorganic) | 0.002 | 0.002 | Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage. |
| 18. Nitrate | 10 | 10 | Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby symptoms. |
| 19. Nitrite | 1 | 1 | Infants below the age of six months who drink water |

(Rule 0400-45-01-.19, continued)

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| | | | containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby symptoms. |
| 20. Total Nitrate and Nitrite | 10 | 10 | Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby symptoms. |
| 21. Selenium | 0.05 | 0.05 | Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation. |
| 22. Thallium | 0.0005 | 0.002 | Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver. |
| D. Lead and Copper Rule: | | | |
| 23. Lead | Zero | TT[13] | Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities.<br>Adults who drink this water over many years could develop kidney problems or high blood pressure. |
| 24. Copper | 1.3 | TT[14] | Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor. |
| E. Synthetic Organic Compounds | | | |
| 25. 2,4-D | 0.07 | 0.07 | Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver or adrenal glands. |
| 26. 2,4,5-TP (Silvex) | 0.05 | 0.05 | Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems. |
| 27. Alachlor | Zero | 0.002 | Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer. |
| 28. Atrazine | 0.003 | 0.003 | Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties. |
| 29. Benzo(a)pyrene (PAHs) | Zero | 0.0002 | Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer. |
| 30. Carbofuran | 0.04 | 0.04 | Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems. |
| 31. Chlordane | Zero | 0.002 | Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer. |
| 32. Dalapon | 0.2 | 0.2 | Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes. |
| 33. Di (2-ethylexyl) adipate | 0.4 | 0.4 | Some people who drink water containing di (2-ethyhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties. |

(Rule 0400-45-01-.19, continued)

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| 34. Di (2-ethylhexyl) phthalate | Zero | 0.006 | Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer. |
| 35. Dibromochloropropane (DBCP) | Zero | 0.0002 | Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer. |
| 36. Dinoseb | 0.007 | 0.007 | Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties. |
| 37. Dioxin (2,3,7,8-TCDD) | Zero | $3x10^{-8}$ | Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer. |
| 38. Diquat | 0.02 | 0.02 | Some people who drink water containing diquat in excess of the MCL over many years could get cataracts. |
| 39. Endothall | 0.1 | 0.1 | Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines. |
| 40. Endrin | 0.002 | 0.002 | Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems. |
| 41. Ethylene dibromide | Zero | 0.00005 | Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer. |
| 42. Glyphosate | 0.7 | 0.7 | Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties. |
| 43. Heptachlor | Zero | 0.0004 | Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer. |
| 44. Heptachlor epoxide | Zero | 0.0002 | Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer. |
| 45. Hexachlorobenzene | Zero | 0.001 | Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer. |
| 46. Hexachlorocyclopentadiene | 0.05 | 0.05 | Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach. |
| 47. Lindane | 0.0002 | 0.0002 | Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver. |
| 48. Methoxychlor | 0.04 | 0.04 | Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties. |
| 49. Oxamyl (Vydate) | 0.2 | 0.2 | Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects. |
| 50. Pentachlorophenol | Zero | 0.001 | Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer. |
| 51. Picloram | 0.5 | 0.5 | Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver. |
| 52. Polychlorinated biphenyls (PCBs) | Zero | 0.0005 | Some people who drink water containing PCBs in excess of MCL over many years could experience changes in their skin, problems with their thymus gland, |

(Rule 0400-45-01-.19, continued)

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| | | | immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer. |
| 53. Simazine | 0.004 | 0.004 | Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood. |
| 54. Toxaphene | Zero | 0.003 | Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer. |
| F. Volatile Organic Compounds VOC) | | | |
| 55. Benzene | Zero | 0.005 | Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer. |
| 56. Carbon tetrachloride | Zero | 0.005 | Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer. |
| 57. Chlorobenzene (monochloro-benzene) | 0.1 | 0.1 | Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys. |
| 58. o-Dichlorobenzene | 0.6 | 0.6 | Some people who drink water containing o-dichlorobenzene in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems. |
| 59. p-Dichlorobenzene | 0.075 | 0.075 | Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood. |
| 60. 1,2-Dichloroethane | Zero | 0.005 | Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer. |
| 61. 1,1-Dichloroethylene | 0.007 | 0.007 | Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver. |
| 62. cis-1,2-Dichloroethylene | 0.07 | 0.07 | Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver. |
| 63. trans-1,2-Dichloroethylene | 0.1 | 0.1 | Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver. |
| 64. Dichloromethane | Zero | 0.005 | Some people who drink water containing dichloromethane in excess of the MCl over many years could have liver problems and may have an increased risk of getting cancer. |
| 65. 1,2-Dichloropropane | Zero | 0.005 | Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer. |
| 66. Ethylbenzene | 0.7 | 0.7 | Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys. |
| 67. Styrene | 0.1 | 0.1 | Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system. |
| 68. Tetrachloroethylene | Zero | 0.005 | Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their livers, and may have an increased risk of getting cancer. |
| 69. Toluene | 1 | 1 | Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver. |
| 70. 1,2,4-Trichlorobenzene | 0.07 | 0.07 | Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands. |
| 71. 1,1,1-Trichloroethane | 0.2 | 0.2 | Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years |

(Rule 0400-45-01-.19, continued)

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| | | | could experience problems with their liver, nervous system, or circulatory problems. |
| 72. 1,1,2-Trichloroethylene | 0.003 | 0.005 | Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems. |
| 73. Trichloroethylene | Zero | 0.005 | Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer. |
| 74. Vinyl chloride | Zero | 0.002 | Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer. |
| 75. Xylenes (total) | 10 | 10 | Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system. |
| G. Radioactive Contaminants | | | |
| 76. Beta/photon emitters | Zero | 4 mrem/yr[15] | Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer. |
| 77. Alpha emitters | Zero | 15 pCi/L[17] | Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer. |
| 78. Combined radium (226 & 228). | Zero | 5 pCi/L | Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer. |
| 79. Uranium[16] | Zero | 30ug/L | Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity. |
| H. Disinfection Byproducts (DBPs), Byproducts Precursors, and Disinfectant Residuals: Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection by-products (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs):[18] | | | |
| 80. Total trihalomethanes (TTHMs) | N/A | 080[19 20] | Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer. |
| 81. Haloacetic Acids (HAA) | N/A | 0.060[21] | Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer. |
| 82. Bromate | Zero | 0.010 | Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer. |
| 83. Chlorite | 0.08 | 1.0 | Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia. |
| 84. Chlorine | 4 (MRDLG)[22] | 4.0 (MRDL)[23] | Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could |

(Rule 0400-45-01-.19, continued)

| | | | |
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| | | | experience stomach discomfort. |
| 85. Chloramines | 4 (MRDLG) | 4.0 (MRDL) | Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia. |
| 86a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL. | 0.8 (MRDLG) | 0.8 (MRDL) | Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.<br>Add for public notification only: The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers. |
| 86b. Chlorine dioxide, where one or more distribution system samples are above the MRDL. | 0.8 (MRDLG) | 0.8 (MRDL) | Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.<br>Add for public notification only: The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure. |
| 87. Control of DBP precursors (TOC) | None | TT | Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer. |
| I. Other Treatment Techniques: | | | |
| 88. Acrylamide | Zero | TT | Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer. |
| 89. Epichlorohydrin | Zero | TT | Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer. |

## Appendix B – Endnotes

† Until March 31, 2016.
‡ Beginning April 1, 2016.

1. MCLG – Maximum contaminant level goal.
2. MCL – Maximum contaminant level.
3. For water systems analyzing at least 40 samples per month, no more than 5.0 percent of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms.
4. There are various regulations that set turbidity standards for different types of systems, including Rules 0400-45-01-.08 and 0400-45-01-.31. The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 2 NTU for systems that are required to filter but have not yet installed filtration.
5. NTU – Nephelometric turbidity unit.

(Rule 0400-45-01-.19, continued)

6. There are various regulations that set turbidity standards for different types of systems, including Rules 0400-45-01-.08 and 0400-45-01-.31. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95 percent of samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the department.
7. TT – Treatment technique.
8. There are various regulations that set turbidity standards for different types of systems, including Rules 0400-45-01-.08 and 0400-45-01-.31. For systems subject to the IESWTR (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. For systems subject to the LT1EWSTR (systems serving fewer than 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 14, 2005, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the IESWTR/LT1ESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the Department.
9. The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful. HPC is simply an alternative method of determining disinfectant residual levels. The number of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.
10. SWTR and IESWTR/LT1ESWTR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.
11. These arsenic values are effective January 23, 2006. Until then the MCL is 0.05 mg/L and there is no MCLG.
12. Millions fibers per liter.
13. Action Level = 0.015 mg/L.
14. Action Level = 1.3 mg/L.
15. Millirems per years.
16. The uranium MCL is effective December 8, 2003, for all community water systems.
17. Picocuries per liter.
18. Surface water systems and ground water systems under the direct influence of surface water are regulated under Rule 0400-45-01-.31. Subpart H community and non-transient non-community systems serving ≥10,000 must comply with DBP MCLs and disinfectant maximum residual disinfectant levels (MRDLs) beginning January 1, 2002. Subpart H transient non-community systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. All other community and non-transient non-community water systems must meet the MCLs and MRDLs beginning January 1, 2004.
19. Community and non-transient non-community systems must comply with LRAA TTHM and HAA5 MCLs of 0.080 mg/L and 0.060 mg/L, respectively (with compliance calculated as a locational running annual average) on the schedule in paragraph (1) of Rule 0400-45-01-.38.
20. The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.
21. The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.
22. MRDLG – Maximum residual disinfectant level goal.
23. MRDL – Maximum residual disinfectant level.

## APPENDIX C TO Rule 0400-45-01-.19

## LIST OF ACRONYMS USED IN PUBLIC NOTICE REGULATIONS

| | |
|---|---|
| CCR | Consumer Confidence Report |
| CWS | Community Water System |
| DBP | Disinfection Byproduct |
| EPA | Environmental Protection Agency |
| GWR | Ground Water Rule |
| HPC | Heterotrophic Plate Count |
| IESWTR | Interim Enhanced Surface Water Treatment Rule |
| IOC | Inorganic Chemical |
| LCR | Lead and Copper Rule |
| MCL | Maximum Contaminant Level |
| MCLG | Maximum Contaminant Level Goal |
| MRDL | Maximum Residual Disinfectant Level |
| MRDLG | Maximum Residual Disinfectant Level Goal |
| NPDWR | National Primary Drinking Water Regulation |
| NCWS | Non-community Water System |
| NTNCWS | Non-transient non-community Water System |

(Rule 0400-45-01-.19, continued)

| | |
|---|---|
| NTU | Nephelometric Turbidity Unit |
| OGWDW | Office of Ground Water and Drinking Water |
| OW | Office of Water |
| PN | Public Notification |
| PWS | Public Water System |
| SDWA | Safe Drinking Water Act |
| SMCL | Secondary Maximum Contaminant Level |
| SOC | Synthetic Organic Chemical |
| SWTR | Surface Water Treatment Rule |
| TCR | Total Coliform Rule |
| TT | Treatment Technique |
| TWS | Transient Non-community Water System |
| VOC | Volatile Organic Chemical |

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.20 RECORDS MAINTENANCE.**

(1) Any owner or operator of a public water system subject to the provisions of these rules shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of bacteriological analysis made pursuant to these rules shall be kept for not less than five (5) years. Records of chemical analyses made pursuant to these rules shall be kept for not less than ten (10) years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

1. The date, place, and time of sampling, the name of the person who collected the sample;

2. Identification of the sample as to whether it was a routine distribution system sample, repeat sample, raw or process water sample or other special purpose sample;

3. Date of analysis;

4. Laboratory and person responsible for performing analysis;

5. The analytical technique/method used; and

6. The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than three (3) years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any State or Federal agency, shall be kept for a period not less than ten (10) years after completion of the sanitary survey involved.

(Rule 0400-45-01-.20, continued)

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than five (5) years following the expiration of such variance or exemption.

(e) Any such reports required by the Department shall be available for inspection by the public at the appropriate public water system office during regular business hours.

(f) Records of turbidity analysis shall be maintained for not less than five years. These records shall include daily worksheets, calibration data and strip charts. The strip charts shall be labeled each day the system operates with the date, time, place of collection, operator's initials, and the operating scale of the instrument.

(g) Daily worksheets, strip charts, and shift logs used in the production of monthly operation reports or operation control of the plant shall be maintained for a minimum of five years.

(h) Cross-connection plans and inspection records, complaint logs, facility maintenance records, and storage tank inspection records shall be kept for 5 years.

(i) Copies of the public notices issued and certifications made to the Department pursuant to Rule 0400-45-01-.19 must be kept for three years after issuance.

(j) Any system subject to the requirements of Rule 0400-45-01-.33 shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, Department determinations, and any other information required by paragraphs (2) through (9) of Rule 0400-45-01-.33. Each water system shall retain the records required by this rule for no fewer than 12 years.

(k) Copies of monitoring plans developed pursuant to this Chapter shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under subparagraph (a) of this paragraph, except as specified elsewhere in this chapter.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.21 MONITORING FOR CORROSIVITY CHARACTERISTICS.**

(1) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the Department.

(a) Piping, solder, caulking, interior lining of distribution mains, service lines, and home plumbing made of lead;

(b) Piping and alloys, service lines, and home plumbing made of copper;

(c) Galvanized piping, service lines, and home plumbing;

(d) Ferrous piping materials such as cast iron and steel;

(e) Asbestos cement pipe;

(f) Vinyl lined asbestos cement pipe;

(g) Coal tar lined pipes and tanks.

(Rule 0400-45-01-.21, continued)
***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.22 RESERVED.**

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.23 RESERVED.**

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.24 SODIUM MONITORING.**

(1) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels. Samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the Department to collect the analyze water samples for sodium more frequently in locations where the sodium content is variable.

(2) The supplier of water shall report to the Department the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period whichever of these is first. If more than annual sampling is required, the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received.

(3) The supplier of water shall notify appropriate local and state public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to the Department within 10 days of its issuance.

(4) Analyses for sodium shall be performed by conducting analysis using inductively coupled plasma, EPA Method 200.7 or by using Standard Method 3111B.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.25 VOLATILE ORGANIC CHEMICALS.**

(1) The maximum contaminant levels for Volatile Organic Chemicals (VOC) set forth in subparagraphs (2)(a) through (h) of this rule became effective on January 9, 1989. The maximum contaminant levels set forth in 0400-45-01-.25(i) through (r) became effective October 8, 1992. The maximum contaminant levels set forth in subparagraphs (2)(r) through (u) of this rule shall become effective January 17, 1994 or the effective date of these rules whichever is earlier.

(2) Volatile Organic Chemicals in community water systems and non-transient non-community water systems shall not exceed any of the following maximum contaminant levels as determined by the sampling and analytical requirements of Rule 0400-45-01-.26.

(Rule 0400-45-01-.24, continued)

| | CONTAMINANT | MAXIMUM CONTAMINANT LEVEL IN MILLIGRAMS/LITERS |
|---|---|---|
| (a) | Trichloroethylene | 0.005 |
| (b) | Carbon tetrachloride | 0.005 |
| (c) | Vinyl chloride | 0.002 |
| (d) | 1,2-Dichloroethane | 0.005 |
| (e) | Benzene | 0.005 |
| (f) | 1,1 Dichloroethylene | 0.007 |
| (g) | 1,1,1-Trichloroethane | 0.20 |
| (h) | para-Dichlorobenzene | 0.075 |
| (i) | cis 1,2-Dichloroethylene | 0.07 |
| (j) | 1,2-Dichloropropane | 0.005 |
| (k) | Ethyl benzene | 0.7 |
| (l) | Monochlorobenzene | 0.1 |
| (m) | ortho-Dichlorobenzene | 0.6 |
| (n) | Styrene | 0.1 |
| (o) | Tetrachloroethylene | 0.005 |
| (p) | Toluene | 1 |
| (q) | trans 1,2-Dichloroethylene | 0.1 |
| (r) | Xylenes (total) | 10 |
| (s) | Dichloromethane | 0.005 |
| (t) | 1,2,4-Trichlorobenzene | 0.07 |
| (u) | 1,1,2-Trichloroethane | 0.005 |

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.26 VOLATILE ORGANIC CHEMICAL SAMPLING, ANALYTICAL AND OTHER REQUIREMENTS.**

(1) Analysis of the contaminants listed in paragraph (2) of Rule 0400-45-01-.25 for the purpose of determining compliance with the maximum contaminant level shall be conducted as follows:

(a) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). The Department may designate additional sampling points within the distribution system or at the consumer's tap which more accurately determines consumer exposure. Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant or within the distribution system.

(b) Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). The Department may designate additional sampling points within the distribution system or at the consumer's tap which more accurately determines consumer exposure. Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system. Surface water systems include systems with a combination of surface and ground sources.

(Rule 0400-45-01-.26, continued)

(c) If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods when water representative of all sources is being used.

(d) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in paragraph (2) of Rule 0400-45-01-.25 during each compliance period beginning in the initial compliance period.

(e) If the initial monitoring for contaminants listed in paragraph (2) of Rule 0400-45-01-.25 has been completed by December 31, 1992, and none of the contaminants were detected, then each ground and surface water system shall take one sample annually beginning with the initial compliance period.

(f) After a minimum of three years of annual sampling, ground water systems which have not detected any contaminant listed in paragraph (2) of Rule 0400-45-01-.25 shall take one sample during each compliance period.

(g) If a contaminant listed in paragraph (2) of Rule 0400-45-01-.25 is detected at a level exceeding 0.0005 mg/l in any sample, then:

1. The system must monitor quarterly at each sampling point which resulted in a detection.

2. The Department may decrease the quarterly monitoring requirement provided it has determined that the system is below the maximum contaminant level. In no case shall this determination be made unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

3. If the Department determines that the system is reliably and consistently below the MCL, the Department may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter(s) which previously yielded the highest analytical result.

(h) Systems which violate the maximum contaminant level for the contaminants listed in paragraph (2) of Rule 0400-45-01-.25 must monitor quarterly. After a minimum of four quarterly samples shows the system is in compliance with the MCL and the Department determines that the system is below the maximum contaminant level, the system may monitor annually during the quarter which previously yielded the highest result.

(i) The Department may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Department, the result must be averaged with the first sampling result and the average is used for the compliance determination. Results of documented sampling errors may be deleted provided the Department approves.

(j) The Department may reduce the total number of analyses a system must conduct by allowing the use of composite sampling. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.

1. If the concentration in the composite sample is greater than or equal to 0.0005 mg/l for any contaminant listed in Rule 0400-45-01-.25, then a follow-up sample

(Rule 0400-45-01-.26, continued)

must be taken and analyzed within 14 days from each sampling point included in the composite.

2. If duplicates of the original sample taken from each sampling point used in the original composite are available, the system may use the duplicate samples instead of resampling. The duplicate must be analyzed and the results reported to the Department within 14 days of collection.

3. If the population served by the system is >3,300 persons, then compositing may only be permitted at sampling points within the system itself. In systems serving 3,300 or less persons compositing among different systems provided the 5-sample limit is maintained is permitted.

4. Compositing samples prior to GC analysis:

   (i) Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.

   (ii) The samples must be cooled at 4°C during this step to minimize volatilization losses.

   (iii) Mix well and draw out a 5-ml aliquot for analysis.

   (iv) Follow sample introduction, purging, and desorption steps described in the applicable and approved method.

   (v) If less than five samples are used for compositing, a proportionately smaller syringe may be used.

5. Compositing samples prior to GC/MS analysis:

   (i) Inject 5-ml or equal larger amounts of each aqueous sample (up to 5 samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.

   (ii) The total volume of the sample in the purging device must be 25 ml.

   (iii) Purge and desorb as described in the applicable and approved method.

(k) Compliance with paragraph (2) of Rule 0400-45-01-.25 shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

1. For systems monitoring more than once per year, compliance with the MCL is determined by a running average at each sampling point.

2. Systems monitoring annually or less frequently whose sample result exceeds the MCL must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

3. If any sample result will cause the running annual average to exceed the MCL, at any sampling point, the system is out of compliance with the MCL immediately.

4. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.

(Rule 0400-45-01-.26, continued)

5. If a sample result is less than the detection limit, zero will be used to calculate the annual average.

(l) Analysis for the contaminants listed in paragraph (2) of Rule 0400-45-01-.25 shall be conducted using methods described in paragraphs (2) and (5) of this rule.

(m) The Department may allow the use of monitoring data collected after January 1, 1988, for the purposes of monitoring compliance. If the data are generally consistent with the other requirements in this rule, the Department may approve the use of such data, (i.e., a single sample rather than four quarterly samples) to satisfy the initial monitoring requirements of subparagraph (1)(d) of this rule.

(n) The Department may increase required monitoring where necessary to detect variations in the quality of the water produced by the system.

(o) Each approved laboratory must determine the method detection limit (MDL) as defined in Appendix B, 40 Code of Federal Regulations Part 136 at which it is capable of detecting VOCs. The acceptable MDL is 0.0005 mg/l. This concentration is the detection concentration for purposes of this rule.

(p) The Department may specify times within a compliance period for a public water system to complete its monitoring activity to insure that existing laboratory capacity is not exceeded.

(2) Reserved

(3) Analysis for vinyl chloride is required only of ground water systems that have detected one or more of the following two-carbon Organic Chemicals:

Trichloroethylene
Tetrachloroethylene
1, 2-Dichloroethane
1, 1, 1-Trichloroethane
Cis-1, 2-dichloroethylene
Trans-1, 2-dichloroethylene
1,1-Dichloroethylene

(4) The analysis for vinyl chloride is required at each distribution or entry point at which one or more of the two-carbon organic compounds listed in paragraph (3) of this rule were found. If the first analysis does not detect vinyl chloride, the system may, upon written notification to the Department, reduce the frequency of vinyl chloride monitoring to a minimum of once every three years for that sample location or other sample locations which are more representative of the same source.

(5) Reserved

(6) Each community and non-transient water system which does not detect a contaminant listed in paragraph (2) of Rule 0400-45-01-.25 may apply to the Department for a waiver from the requirement of subparagraphs (1)(d) and (e) of this rule after completing the initial monitoring. (For the purpose of this paragraph, detection is defined as > 0.0005 mg/l.) A waiver shall be effective for no more than six years (two compliance periods).

A system must provide the following data and analysis to the Department with a request for a waiver:

(Rule 0400-45-01-.26, continued)

(a) any previous use (including transport, storage, and/or disposal) of a contaminant within the watershed or zone of influence;

(b) previous analytical results;

(c) the proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities;

(d) the environmental persistence and transport of the contaminants;

(e) the number of persons served by the public water system and the proximity of a smaller system to a larger system;

(f) how well the water source is protected against contamination such as whether it is a surface or ground water system. Ground water systems must consider factors such as depth of the well, the type of soil, and wellhead protection. Surface water systems must consider watershed protection; and

(g) any other information required by the Department.

(7) The Department shall determine a reduced monitoring frequency which the system must implement, if the waiver is granted. The Department shall consider the following factors to determine the reduced monitoring frequency:

(a) the watershed recharge area; and

(b) the type of risks of contamination to the water source.

The Department shall either grant or deny a request for the waiver. The Department will notify the system of the decision, in writing, with the basis for the decision and any reduced monitoring frequency, if the waiver is granted. The term of a waiver shall not exceed six (6) years (two compliance periods).

A system which has been granted a waiver pursuant to this rule, must take a minimum of one (1) sample during the term of the waiver regardless of the reduced monitoring frequency.

A waiver for monitoring under this rule may be initiated by the Department or upon written request of the system as set forth in paragraph (6) of this rule. The Department shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other relevant data or information becomes available. A system must reapply for a waiver for each compliance period.

(8) As a condition of the waiver, a system must take one sample at each sampling point during the time the waiver is effective (i.e., one sample during two compliance periods or six years), and update its vulnerability assessment considering the factors listed in paragraph (7) of this rule. Based on this vulnerability assessment, the Department must confirm that the system is non-vulnerable. If the Department does not make this reconfirmation within three years of the initial determination, then the waiver is invalidated and the system is required to sample annually as specified in subparagraph (1)(c) of this rule. Surface systems shall monitor at the frequency specified by the Department (if any).

(9) All new systems or systems that use a new source of water must demonstrate compliance with the MCL within a period of time specified by the Department. The system must also comply with the initial sampling frequencies specified by the Department to ensure a system

(Rule 0400-45-01-.26, continued)

can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements of this rule.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.27 RESERVED.**

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.28 RESERVED.**

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.29 USE OF NON-CENTRALIZED TREATMENT DEVICES.**

(1) Public water systems shall not use bottled water or point-of-use devices to achieve compliance with an MCL. Bottled water or point-of-use devices may be used on a temporary basis to avoid an unreasonable risk to health.

(2) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the following requirements.

(a) It is the responsibility of the public water system to operate and maintain the point-of-entry treatment system, and

(b) The public water system must develop and obtain Departmental approval for the monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the Department, point-of-entry devices must provide health protection equivalent to central water treatment. "Equivalent" means that the water would meet all Primary Drinking Water Standards and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. In addition to the VOCs, monitoring must include physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(3) Engineering reports and construction documents must be submitted to and approved by the Department in accordance with Rule 0400-45-01-.05.

(4) The design and application of the point-of-entry device must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(5) Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The public water system must certify that every building is subject to treatment and monitoring and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.30 RESERVED.**

(Rule 0400-45-01-.29, continued)
***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.31 FILTRATION AND DISINFECTION.**

(1) General Requirements

(a) The requirements of this rule constitute national primary drinking water regulations. These regulations establish criteria under which filtration is required as a treatment technique for public water systems supplied by a surface water source or a ground water source under the direct influence of surface water. Each public water system with a surface water source or a ground water source under the direct influence of surface water must provide treatment of that source water that complies with these treatment technique requirements. These regulations establish treatment technique requirements in lieu of maximum contaminant levels for Giardia lamblia, cryptosporidium, viruses, heterotrophic plate count bacteria, Legionella, and turbidity. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve removal of Giardia lamblia cysts, cryptosporidium and viruses as set forth herein.

(b) A public water system using a ground water source under the direct influence of surface water shall:

1. Meet the requirements for avoiding filtration in paragraph (2) of this rule and meet the disinfection requirements in subparagraph (3)(a) of this rule; or

2. Meet the filtration requirements in paragraph (4) of this rule and the disinfection requirements in paragraph (30) of Rule 0400-45-01-.17.

(c) A public water supply using surface water shall meet disinfection requirements in paragraph (30) of Rule 0400-45-01-.17 and filtration requirements in paragraph (4) of this rule to be in compliance with paragraph (a) of this paragraph.

(d) Each public water system using a surface water source or a ground water source under the direct influence of surface water must be operated by certified personnel who meet the requirements of the Tennessee Water Environmental Health Act T.C.A. §§ 68-221-901 et seq. and Certification Board Regulations contained in Chapter 0400-49-01.

(e) Beginning December 31, 2001, subpart H systems serving 10,000 or more persons shall install treatment which achieve at least 99 percent (2-log) removal of cryptosporidium between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, and ground water systems under the direct influence of surface water and serving 10,000 or more persons must have a watershed control plan which controls cryptosporidium. Subpart H systems shall conduct filter and disinfection profiling and benchmarking as required by this rule. Subpart H systems serving 10,000 or more persons shall also comply with the turbidity criteria in subparagraph (4)(c) of this rule.

(f) Subpart H systems that did not conduct optional monitoring under paragraph (8) of this rule [Profiling and Benchmarking] because they served fewer than 10,000 persons in 2002, but serve more than 10,000 persons prior to January 14, 2005, must comply with the filtration, disinfection, and treatment technique requirements of this rule, or meet the criteria to avoid filtration. They shall also comply with the individual filter effluent turbidity monitoring, and other monitoring and reporting requirements of this rule. These systems must also consult with the Department to establish a disinfection

(Rule 0400-45-01-.31, continued)

benchmark. A system that decides to make a significant change to its disinfection practice as described in subparagraph (8)(e) of this rule must obtain approval from the department prior to making such change.

(2) Criteria for Avoiding Filtration for Ground Water Systems Impacted by Surface Water.

A public water system that uses a ground water source under the direct influence of surface water must meet all of the conditions of subparagraphs (a) and (b) of this paragraph and is subject to subparagraph (c) of this paragraph, beginning 18 months after the Department determines that it is under the direct influence of surface waters or December 30, 1991, whichever is later, unless the Department has determined, in writing, that filtration is required. If the Department determines in writing before December 30, 1991, that filtration is required, the system must have installed filtration and meet the criteria for filtered systems specified in paragraphs (3) and (4) of this rule by June 29, 1993. A ground water system under the direct influence of surface water that fails to meet all the requirements of subparagraphs (a) and (b) of this paragraph must install filtration by June 29, 1993, or within eighteen (18) months of the failure which ever is later. The treatment techniques used must meet the criteria specified in paragraphs (3) and (4) of this rule.

(a) Source Water Quality Conditions.

1. The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than 100/100 ml [measured as specified in parts (5)(a)1 and 2 and (5)(b)1 of this rule], in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph must be met.

2. The turbidity level cannot exceed 5 NTU (measured as specified in parts (5)(a)4 and (5)(b)2 of this rule in representative samples of the source water immediately prior to the first or only point of disinfectant application unless:

(i) the Department determines that any such event was caused by circumstances that were unusual and unpredictable; and

(ii) there have not been more than two such events in the past 12 months the system served water to the public, or more than five events in the past 120 months the system served water to the public, in which the turbidity level exceeded 5 NTU. An “event” is a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

Unusual and unpredictable circumstances would be events outside the system’s control such as, but not limited to, earthquakes, tornados, and hurricanes.

(b) Site Specific Conditions.

1. (i) The public water system must meet the requirements of part (3)(a)1 of this rule at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and the Department determines that at least one of these failures was caused by circumstances that were unusual and unpredictable. Unusual and unpredictable circumstances would be events

(Rule 0400-45-01-.31, continued)

outside the system's control such as, but not limited to, earthquakes, tornados and hurricanes.

(ii) The public water system must meet the redundant disinfection components specified by part (3)(a)2 of this rule at all times the system serves water to the public.

(iii) The public water system must meet 0.2 mg/l free chlorine residual at the point of distribution.

(iv) The public water system must meet 0.2 mg/l free chlorine residual in the distribution system on an ongoing basis unless the Department determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water. The residual disinfectant concentration cannot be less than 0.2 mg/l in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public.

2. A wellhead protection program that meets the requirements of Section 1428 of the Federal Safe Drinking Water Act and meets the approval of the Department must be developed and implemented by the public water system to protect its watershed. The public water system must develop a wellhead protection program that identifies, monitors and controls activities that might contribute to the release of cryptosporidium organisms inside the wellhead protection area by maximizing land ownership or by zoning ordinances.

3. The public water system shall be subject to an annual on-site inspection to assess the wellhead protection program and disinfection treatment process. Either the Department or a party approved by the Department must conduct the on-site inspection. The inspection must be conducted by competent individuals such as sanitary and civil engineers, sanitarians, or technicians who have experience and knowledge about the operation and maintenance of a public water system, and who have a sound understanding of public health principles and waterborne diseases. A report of the on-site inspection summarizing all findings must be prepared every year. The on-site inspection must indicate to the Department's satisfaction that the wellhead protection program and disinfection treatment process are adequately designed and maintained. The on-site inspection shall include at least the following:

(i) A review of the effectiveness of the wellhead protection program;

(ii) A review of the physical condition of the source intake and how well it is protected;

(iii) A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;

(iv) An inspection of the disinfection equipment for physical deterioration;

(v) A review of operating procedures;

(vi) A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and

(vii) Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

4. The public water system must not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system must have been modified sufficiently to prevent another such occurrence, as determined by the Department.

5. The public water system must comply with the maximum contaminant level (MCL) for total coliforms in paragraph (4) of Rule 0400-45-01-.06. The system must achieve the standard at a frequency of at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the Department determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

6. The public water system must comply with the requirements for trihalomethanes in Rules 0400-45-01-.36 and 0400-45-01-.38. After December 31, 2001, subpart H systems serving 10,000 or more persons shall comply with the trihalomethane, haloacetic acid, bromated, chlorite, chlorine dioxide and chloramines standards described in Rules 0400-45-01-.06 and 0400-45-01-.36.

(c) Treatment Technique Violations.

1. A system is in violation of a treatment technique requirement if it:

(i) fails to meet any one of the criteria in subparagraphs (a) and (b) of this paragraph; or

(ii) is required to have filtration, by written directive of the Department; and

(iii) fails to install filtration by the date specified in the introductory text of this paragraph.

2. A system that has not installed filtration is in violation of a treatment technique requirement if:

(i) The turbidity level (measured as specified in parts (5)(a)4 and (5)(b)2 of this rule) in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or

(ii) The system is identified as a source of a waterborne disease outbreak.

(3) Disinfection.

A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment within 6 months of being notified by the Department. Failure to meet any requirement of this paragraph after the applicable date specified in this introductory text of this paragraph is a treatment technique violation.

(a) Each public water system using ground water impacted by surface water that does not provide filtration treatment must provide disinfection treatment beginning December 30, 1991 or 6 months following a determination that the system is under the direct influence of surface water whichever is later. The disinfection treatment shall comply with the following:

1. The disinfection treatment must be sufficient to ensure at least 99.9 percent (3-log) inactivation of Giardia lamblia cysts and 99.99 percent (4-log) inactivation of

(Rule 0400-45-01-.31, continued)

viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer, every day the system serves water to the public, except any one day each month. Each day a system serves water to the public, the public water system must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in part (5)(b)3 of this rule. It must also determine whether this value(s) is sufficient to achieve the specified inactivation rates for Giardia lamblia cysts and viruses. If a system uses a disinfectant other than chlorine, the system may demonstrate to the Department, through the use of a Department-approved protocol for on-site disinfection challenge studies or other information satisfactory to the Department, that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in part (5)(b)3 of this rule or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by this part.

2. The disinfection system must have either (i) redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system, or (ii) automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/l of residual is infectant concentration in the water.

3. The free chlorine residual concentration in the water entering the distribution system, measured as specified in part (5)(a)5 and (5)(b)5 of this rule cannot be less than 0.2 mg/l for more than 4 hours.

4. The residual disinfectant concentration in the distribution system, measured as free chlorine shall not be less than 0.2 mg/l in more than 5 percent of the samples each month, for any two consecutive months the system serves water to the public.

(4) Filtration.

A public water system that uses a surface water source must provide treatment consisting of both disinfection and filtration specified in paragraph (30) of Rule 0400-45-01-.17 and subparagraph (4)(a) or (b) of this rule by June 29, 1993. A public water system that uses ground water under the direct influence of surface water and does not meet all criteria specified in subparagraphs (2)(a) and (b) of this rule for avoiding filtration must meet the requirements specified by subparagraph (4)(a) or (b) of this rule and paragraph (30) of Rule 0400-45-01-.17 by June 29, 1993 or within eighteen (18) months of the failure to meet any one of the criteria for avoiding filtration in subparagraphs (2)(a) and (b) of this rule whichever is later. Failure to meet any requirement of this paragraph after the dates specified is a treatment technique violation.

(a) For systems using conventional or direct filtration:

1. Representative samples of a system's filtered water must be less than or equal to 0.5 NTU in at least 95 percent of the measurements taken each month, except when the Department determines adequate disinfection can be achieved at higher turbidity levels. The Department shall not approve a turbidity limit that allows more than 1 NTU in more than 5 percent of the samples taken each month.

2. The turbidity level of representative samples must at no time exceed 5 NTU.

(b) For systems using slow sand, diatomaceous earth filtration or other technology:

(Rule 0400-45-01-.31, continued)

1. Representative samples of a system's filtered water effluent must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month. In systems using slow sand filtration, if the Department determines there is no significant interference with disinfection at a higher turbidity level, the Department may substitute this higher turbidity limit for a system.

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU.

(c) By December 31, 2001, subpart H systems that use conventional or direct filtration and serve 10,000 or more persons and by January 14, 2005, subpart H systems serving fewer than 10,000 persons shall employ filtration treatment that:

1. For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in subparagraphs (5)(a) and (c) of this rule.

2. The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU, measured as specified in subparagraphs (5)(a) and (c) of this rule.

3. A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the Department.

(d) A public water system may use a filtration technology not listed in subparagraph (c) of this paragraph or in subparagraph (b) of this paragraph if it demonstrates to the Department, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of paragraph (30) of Rule 0400-45-01-.17, consistently achieves 99.9 percent removal and/or inactivation of Giardia lamblia cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of Cryptosporidium oocysts, and the Department approves the use of the filtration technology. For each approval, the Department will set turbidity performance requirements that the system must meet at least 95 percent of the time and that the system may not exceed at any time at a level that consistently achieves 99.9 percent removal and/or inactivation of Giardia lamblia cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of Cryptosporidium oocysts. The maximum allowable turbidity limits for subpart H systems serving fewer than 10,000 persons using an alternative filtration technology excluding slow sand and diatomaceous earth cannot exceed 1 NTU in 95 percent of the samples taken each month or 5 NTU on any single sample.

(5) Monitoring Requirements

(a) Reserved

(b) The public water system must comply with the maximum contaminant level (MCL) for total coliforms in paragraph (4) of Rule 0400-45-01-.06 and the MCL for E. coli in subparagraph (4)(g) of Rule 0400-45-01-.06. The system must achieve the standard at a frequency of at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the Department determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(Rule 0400-45-01-.31, continued)

1. Fecal coliform or total coliform density measurements as required by part (2)(a)1 of this rule must be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system must sample for fecal or total coliforms at the following minimum frequency each week the system serves water to the public. Fecal coliform or total coliform densities must meet the limits specified in part (2)(a)1 of this rule.

| System size (persons served) | Samples/week[1] |
|---|---|
| ≤500 | 1 |
| 501 to 3,300 | 2 |
| 3,301 to 10,000 | 3 |
| 10,001 to 25,000 | 4 |
| >25,000 | 5 |

[1] Must be taken on separate days.

Also one fecal or total coliform density measurement must be made every day the system serves water to the public and the turbidity of the source water exceeds 1 NTU (these samples count toward the weekly coliform sampling requirement) unless the Department determines that the system, for reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection.

2. Turbidity measurements must be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the Department. Turbidity must comply with the limits specified in part (2)(a)2 of this rule.

3. The total inactivation ratio for each day that the system is in operation must be determined based on the $CT_{99.9}$ values in Tables 1.1 through 1.6, 2.1 and 3.1 of this paragraph, as appropriate. The parameters necessary to determine the total inactivation ratio must be monitored as follows:

   (i) The temperature of the disinfected water must be measured at least once per day at each chlorine residual disinfectant concentration sampling point.

   (ii) If the system uses chlorine, the pH of the disinfected water must be measured at least once per day at each chlorine residual disinfectant concentration sampling point.

   (iii) The disinfectant contact time(s) ("T") must be determined for each day during peak hourly flow.

   (iv) The residual disinfectant concentration(s) ("C") of the water before or at the first customer must be measured each day during peak hourly flow.

   (v) If a system uses a disinfectant other than chlorine, the system may demonstrate to the Department, through the use of a Department-approved protocol for on-site disinfection challenge studies or other information satisfactory to the Department, that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in this paragraph or other operational

(Rule 0400-45-01-.31, continued)

parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by part (3)(a)1 of this rule.

Table 1.1 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts

Free Chlorine at 0.5°C or Lower[1]

| Free Residual (mg/L) Disinfectant Concentration | pH | | | | | | |
|---|---|---|---|---|---|---|---|
| | ≤6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | ≤9.0 |
| ≤0.4 | 137 | 163 | 195 | 237 | 277 | 329 | 390 |
| 0.6 | 141 | 168 | 200 | 239 | 286 | 342 | 407 |
| 0.8 | 145 | 172 | 205 | 246 | 295 | 354 | 422 |
| 1.0 | 148 | 176 | 210 | 253 | 304 | 365 | 437 |
| 1.2 | 152 | 180 | 215 | 259 | 313 | 376 | 451 |
| 1.4 | 155 | 184 | 221 | 266 | 321 | 387 | 464 |
| 1.6 | 157 | 189 | 226 | 273 | 329 | 397 | 477 |
| 1.8 | 162 | 193 | 231 | 279 | 338 | 407 | 489 |
| 2.0 | 165 | 197 | 236 | 286 | 346 | 417 | 500 |
| 2.2 | 169 | 201 | 242 | 297 | 353 | 426 | 511 |
| 2.4 | 172 | 205 | 247 | 298 | 361 | 435 | 522 |
| 2.6 | 175 | 209 | 252 | 304 | 368 | 444 | 533 |
| 2.8 | 178 | 213 | 257 | 310 | 375 | 452 | 543 |
| 3.0 | 181 | 217 | 261 | 316 | 382 | 460 | 552 |

[1]These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

(Rule 0400-45-01-.31, continued)

Table 1.2 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Free Chlorine at 5.0°C[1]

| Free Residual (mg/L) Disinfectant Concentration | pH | | | | | | |
|---|---|---|---|---|---|---|---|
| | ≤6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | ≤9.0 |
| ≤0.4 | 97 | 117 | 139 | 166 | 198 | 236 | 279 |
| 0.6 | 100 | 120 | 143 | 171 | 204 | 244 | 291 |
| 0.8 | 103 | 122 | 146 | 175 | 210 | 252 | 301 |
| 1.0 | 105 | 125 | 149 | 179 | 216 | 260 | 312 |
| 1.2 | 107 | 127 | 152 | 183 | 221 | 267 | 320 |
| 1.4 | 109 | 130 | 155 | 187 | 227 | 274 | 329 |
| 1.6 | 111 | 132 | 158 | 192 | 232 | 281 | 337 |
| 1.8 | 114 | 135 | 162 | 196 | 238 | 287 | 345 |
| 2.0 | 116 | 138 | 165 | 200 | 243 | 294 | 353 |
| 2.2 | 118 | 140 | 169 | 204 | 248 | 300 | 361 |
| 2.4 | 120 | 143 | 172 | 209 | 253 | 306 | 368 |
| 2.6 | 122 | 146 | 175 | 213 | 258 | 312 | 375 |
| 2.8 | 124 | 148 | 178 | 217 | 263 | 318 | 382 |
| 3.0 | 126 | 151 | 182 | 221 | 268 | 324 | 389 |

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 1.3 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Free Chlorine at 10.0°C[1]

| Free Residual (mg/L) Disinfectant Concentration | pH | | | | | | |
|---|---|---|---|---|---|---|---|
| | ≤6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | ≤9.0 |
| ≤0.4 | 73 | 88 | 104 | 125 | 149 | 177 | 209 |
| 0.6 | 75 | 90 | 107 | 128 | 153 | 183 | 218 |
| 0.8 | 78 | 92 | 110 | 131 | 158 | 189 | 226 |
| 1.0 | 79 | 94 | 112 | 134 | 162 | 195 | 234 |
| 1.2 | 80 | 95 | 114 | 137 | 166 | 200 | 240 |
| 1.4 | 82 | 98 | 116 | 140 | 170 | 206 | 247 |
| 1.6 | 83 | 99 | 119 | 144 | 174 | 211 | 253 |
| 1.8 | 86 | 101 | 122 | 147 | 179 | 215 | 259 |
| 2.0 | 87 | 104 | 124 | 150 | 182 | 221 | 265 |
| 2.2 | 89 | 105 | 127 | 153 | 186 | 225 | 271 |
| 2.4 | 90 | 107 | 129 | 157 | 190 | 230 | 276 |
| 2.6 | 92 | 110 | 131 | 160 | 194 | 234 | 281 |
| 2.8 | 93 | 111 | 134 | 163 | 197 | 239 | 287 |
| 3.0 | 95 | 113 | 137 | 166 | 201 | 243 | 292 |

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

(Rule 0400-45-01-.31, continued)

Table 1.4 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Free Chlorine at 15.0°C[1]

| Free Residual (mg/L) Disinfectant Concentration | pH | | | | | | |
|---|---|---|---|---|---|---|---|
| | ≤6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | ≤9.0 |
| ≤0.4 | 49 | 59 | 70 | 83 | 99 | 118 | 140 |
| 0.6 | 50 | 60 | 72 | 86 | 102 | 122 | 146 |
| 0.8 | 52 | 61 | 73 | 88 | 105 | 126 | 151 |
| 1.0 | 53 | 63 | 75 | 90 | 108 | 130 | 156 |
| 1.2 | 54 | 64 | 76 | 92 | 111 | 134 | 160 |
| 1.4 | 55 | 65 | 78 | 94 | 114 | 137 | 165 |
| 1.6 | 56 | 66 | 79 | 96 | 116 | 141 | 169 |
| 1.8 | 57 | 68 | 81 | 98 | 119 | 144 | 173 |
| 2.0 | 58 | 69 | 83 | 100 | 122 | 147 | 177 |
| 2.2 | 59 | 70 | 85 | 102 | 124 | 150 | 181 |
| 2.4 | 60 | 72 | 86 | 105 | 127 | 153 | 184 |
| 2.6 | 61 | 73 | 88 | 107 | 129 | 156 | 188 |
| 2.8 | 62 | 74 | 89 | 109 | 132 | 159 | 191 |
| 3.0 | 63 | 76 | 91 | 111 | 134 | 162 | 195 |

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 1.5 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Free Chlorine at 20.0°C[1]

| Free Residual (mg/L) Disinfectant Concentration | pH | | | | | | |
|---|---|---|---|---|---|---|---|
| | ≤ 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | ≤9.0 |
| ≤0.4 | 36 | 44 | 52 | 62 | 74 | 89 | 105 |
| 0.6 | 38 | 45 | 54 | 64 | 77 | 92 | 109 |
| 0.8 | 39 | 46 | 55 | 66 | 79 | 95 | 113 |
| 1.0 | 39 | 47 | 56 | 67 | 81 | 98 | 117 |
| 1.2 | 40 | 48 | 57 | 69 | 83 | 100 | 120 |
| 1.4 | 41 | 49 | 58 | 70 | 85 | 103 | 123 |
| 1.6 | 42 | 50 | 59 | 72 | 87 | 105 | 126 |
| 1.8 | 43 | 51 | 61 | 74 | 89 | 108 | 129 |
| 2.0 | 44 | 52 | 62 | 75 | 91 | 110 | 132 |
| 2.2 | 44 | 53 | 63 | 77 | 93 | 113 | 135 |
| 2.4 | 45 | 54 | 65 | 78 | 95 | 115 | 138 |
| 2.6 | 46 | 55 | 66 | 80 | 97 | 117 | 141 |
| 2.8 | 47 | 56 | 67 | 81 | 99 | 119 | 143 |
| 3.0 | 47 | 57 | 68 | 83 | 101 | 122 | 146 |

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

(Rule 0400-45-01-.31, continued)

Table 1.6 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Free Chlorine at 25.0°C[1]

| Free Residual (mg/L) Disinfectant Concentration | pH | | | | | | |
|---|---|---|---|---|---|---|---|
| | ≤6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | ≤ 9.0 |
| ≤0.4 | 24 | 29 | 35 | 42 | 50 | 59 | 70 |
| 0.6 | 25 | 30 | 36 | 43 | 51 | 61 | 73 |
| 0.8 | 26 | 31 | 37 | 44 | 53 | 63 | 75 |
| 1.0 | 26 | 31 | 37 | 45 | 54 | 65 | 78 |
| 1.2 | 27 | 32 | 38 | 46 | 55 | 67 | 80 |
| 1.4 | 27 | 33 | 39 | 47 | 57 | 69 | 82 |
| 1.6 | 28 | 33 | 40 | 48 | 58 | 70 | 84 |
| 1.8 | 29 | 34 | 41 | 49 | 60 | 72 | 86 |
| 2.0 | 29 | 35 | 41 | 50 | 61 | 74 | 88 |
| 2.2 | 30 | 35 | 42 | 51 | 62 | 75 | 90 |
| 2.4 | 30 | 36 | 43 | 52 | 63 | 77 | 92 |
| 2.6 | 31 | 37 | 44 | 53 | 65 | 78 | 94 |
| 2.8 | 31 | 37 | 45 | 54 | 66 | 80 | 96 |
| 3.0 | 32 | 38 | 46 | 55 | 67 | 81 | 97 |

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 2.1 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Chlorine Dioxide and Ozone[1]

| Disinfectant | Temperature | | | | | |
|---|---|---|---|---|---|---|
| | <1°C | 5°C | 10°C | 15°C | 20°C | ≥25°C |
| Chlorine Dioxide | 63 | 26 | 23 | 19 | 15 | 11 |
| Ozone | 2.9 | 1.9 | 1.4 | 0.95 | 0.72 | 0.48 |

[1]These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ values at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

Table 3.1 – CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia lamblia Cysts by Chloramines[1]

| | Temperature | | | | |
|---|---|---|---|---|---|
| <1°C | 5°C | 10°C | 15°C | 20°C | 25°C |
| 3,800 | 2,200 | 1,850 | 1,500 | 1,100 | 750 |

[1]These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system must demonstrate, based upon on-site studies or other information, as approved by the Department, that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

(Rule 0400-45-01-.31, continued)

4. The total inactivation ratio must be calculated as follows:

   (i) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio based on either of the following two methods:

      (I) One inactivation ratio ($CTcalc/CT_{99.9}$) is determined before or at the first customer during peak hourly flow and if the $CTcalc/CT_{99.9} > 1.0$, the 99.9 percent Giardia lamblia inactivation requirement has been achieved; or

      (II) Successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, are determined between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the following method must be used to calculate the total inactivation ratio:

         I. Determine $\frac{CTcalc}{CT_{99.9}}$ for each sequence

         II. Add the $\frac{CTcalc}{CT_{99.9}}$ values together

         III. If the sum $\frac{CTcalc}{CT_{99.9}}$ is greater than or equal

         to 1.0 the 99.9 percent Giardia lamblia inactivation requirement has been achieved.

   (ii) If the system uses more than one point of disinfectant application before or at the first customer, the system must determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The $CTcalc/CT_{99.9}$ value of each sequence and the sum of

$$\sum \frac{CTcalc}{CT_{99.9}}$$

   must be calculated using the method in item (i)(II) of this part to determine if the system is in compliance with disinfection requirements.

5. The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day. If there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

| System Size by Population | Samples/ day [1] |
|---|---|
| ≤500 | 1 |
| 501 to 1,000 | 2 |
| 1,001 to 2,500 | 3 |
| 2,501 to 3,300 | 4 |

(Rule 0400-45-01-.31, continued)

[1] The day's samples cannot be taken at the same time. The sampling intervals are subject to Department review and approval.

If at any time the free chlorine concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every 4 hours until the free residual concentration is equal to or greater than 0.2 mg/l.

6. Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in paragraph (1) of Rule 0400-45-01-.07. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in paragraphs (4) through (8) of Rule 0400-45-01-.41. The Department may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the Department determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in part (10)(a)4 of Rule 0400-45-01-.14, may be measured in lieu of residual disinfectant concentration.

(c) Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in paragraph (1) of Rule 0400-45-01-.07. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in paragraphs (4) through (8) of Rule 0400-45-01-.41. The Department may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the Department determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in part (10)(a)4 of Rule 0400-45-01-.14, may be measured in lieu of residual disinfectant concentration.

1. Turbidity as required by paragraph (4) of this rule must be continuously measured and recorded on representative samples of the system's combined filtered water while the system serves water to the public. The highest turbidity value obtained during each four-hour period must be reported. A public water system may substitute grab sample monitoring if approved by the Department. For any system using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the Department may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the Department may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the Department determines that less frequent monitoring is sufficient to indicate effective filtration performance. The highest turbidity measured each four hours must be reported according to the following four hour segments: 12:01 a.m. to 4:00 a.m., 4:01 to 8:00 a.m., 8:01 to 12 noon, 12:01 to 4:00 p.m., 4:01 p.m. to 8:00 p.m., 8:01 to 12 midnight. The intake of the combined filter effluent turbidity monitor shall be located at or near the entry point to the clearwell or at a location approved by the Department.

(Rule 0400-45-01-.31, continued)

2. The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day. If there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples each day in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

| System Size by Population | Samples/ day[1] |
|---|---|
| ≤500 | 1 |
| 501 to 1,000 | 2 |
| 1,001 to 2,500 | 3 |
| 2,501 to 3,300 | 4 |

[1]The day's samples cannot be taken at the same time. The sampling intervals are subject to Department review and approval.

If at any time the free residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every 4 hours until the free residual disinfectant concentration is equal to or greater than 0.2 mg/l.

3. The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in paragraph (1) of Rule 0400-45-01-.07. The Department may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source to take disinfectant residual samples at points other than the total coliform sampling points if the Department determines that such points are more representative of treated (disinfected) water quality within the distribution system.

4. In addition to monitoring required by parts 1, 2 and 3 of this subparagraph, a subpart H system serving 10,000 or more persons using conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in subparagraph (10)(b) of Rule 0400-45-01-.14 and must calibrate turbidimeters using the procedure specified in paragraphs (40) and (41) of Rule 0400-45-01-.17. Systems must record the results of individual filter monitoring every 15 minutes. In addition to monitoring required by parts 1, 2 and 3 of this subparagraph by January 14, 2005, a subpart H system serving fewer than 10,000 persons using conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in subparagraph (10)(b) of Rule 0400-45-01-.14 and must calibrate turbidimeters using the procedure specified in paragraphs (40) and (41) of Rule 0400-45-01-.17. Systems must record the results of individual filter monitoring every 15 minutes.

5. If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is repaired and back on-line. A system has a maximum of five working days after failure to repair the equipment or it is in violation.

(6) Reporting and recordkeeping requirements.

(Rule 0400-45-01-.31, continued)

(a) A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must report monthly to the Department the information specified in this subparagraph beginning December 31, 1990, or 6 months after the determination that the ground water source is under the direct influence of surface water, whichever is later, unless the Department has determined in writing that filtration is required, in which case the Department may specify alternative reporting requirements, as appropriate, until filtration is in place.

1. Source water quality information must be reported to the Department within 10 days after the end of each month the system serves water to the public. Information that must be reported includes but is not limited to:

(i) The cumulative number of months for which results are reported.

(ii) The number of fecal and/or total coliform samples, whichever are analyzed during the month (if a system monitors for both, only fecal coliforms must be reported), the dates of sample collection, and the dates when the turbidity level exceeded 1 NTU.

(iii) The number of samples during the month that had equal to or less than 20/100 ml fecal coliforms and/or equal to or less than 100/100 ml total coliforms, whichever are analyzed.

(iv) The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous six months the system served water to the public.

(v) The cumulative number of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.

(vi) The percentage of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.

(vii) The maximum turbidity level measured during the month, the date(s) of occurrence for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the Department.

(viii) For the first 12 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after one year of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 12 months the system served water to the public.

(ix) For the first 120 months of recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of recordkeeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 120 months the system served water to the public.

2. Disinfection information specified in subparagraph (5)(b) of this rule must be reported to the Department within 10 days after the end of each month the

(Rule 0400-45-01-.31, continued)

system serves water to the public. Information that must be reported includes but is not limited to:

(i) For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.

(ii) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the Department was notified of the occurrence.

(iii) The daily residual disinfectant concentration(s) (in mg/l) and disinfectant contact time(s) (in minutes) used for calculating the CT value(s).

(iv) If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection.

(v) The daily measurement(s) of water temperature in $^{o}C$ following each point of disinfection.

(vi) The daily CTcalc and $CTcalc/CT_{99.9}$ values for each disinfectant measurement or sequence and the sum of all $CTcalc/CT_{99.9}$ values before or at the first customer.

(vii) The daily determination of whether disinfection achieves adequate Giardia cyst and virus inactivation, i.e., whether ($CTcalc/CT_{99.9}$) is at least 1.0 or, where disinfectants other than chlorine are used, other indicator conditions that the Department determines are appropriate, are met.

(viii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to paragraph (3) of this rule [Disinfection].

(I) Number of instances where the free residual disinfectant concentration is measured and the number of instances where the free residual is below 0.2 mg/l.

3. No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the Department a report which summarizes its compliance with all watershed control program requirements specified in part (2)(b)2 of this rule.

4. No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the Department a report which describes the on-site inspection conducted during that year pursuant to part (2)(b)3 of this rule, unless the on-site inspection was conducted by the Department. If the inspection was conducted by the Department, the Department must provide a copy of its report to the public water system.

5. (i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the Department as soon as possible, but no later than by the close of the following business day.

(ii) If at any time the turbidity exceeds 5 NTU, the system must consult with the department as soon as practical, but no later than 24 hours after the

(Rule 0400-45-01-.31, continued)

exceedance is known, in accordance with the requirements of Rule 0400-45-01-.19.

(iii) If at any time the disinfectant residual falls below 0.2 mg/l in the water entering the distribution system, the system must notify the Department as soon as possible, but no later than by the end of the next business day. The system also must notify the Department by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

(b) A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment must report monthly to the Department the information specified in this subparagraph beginning June 29, 1993, or when filtration is installed, whichever is later.

1. Turbidity measurements as required by part (5)(c)1 of this rule must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes but is not limited to:

(i) The total number of filtered water turbidity measurements taken during the month.

(ii) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the applicable limits specified in paragraph (4) of this rule.

(iii) The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

2. Disinfection information specified in subparagraph (5)(c) of this rule must be reported to the Department within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

(i) For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.

(ii) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the Department was notified of the occurrence.

(iii) The following information on the samples taken in the distribution system in conjunction with total monitoring pursuant to 0400-45-01-.07;

(I) Number of instances where the free residual disinfectant concentration is measured.

(II) The number of instances where the free residual is below 0.2 mg/l.

3. (i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the Department as soon as possible, but no later than by the close of the following business day.

(ii) If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system must consult with the department as soon as practical,

(Rule 0400-45-01-.31, continued)

but no later than 24 hours after the exceedance is known, in accordance with the requirements of Rule 0400-45-01-.19. If at any time the turbidity in representative samples of filtered water exceed the maximum level set by the department for filtration technologies other than conventional and direct filtration treatment, the system must consult with the department as soon as practical, but not later than 24 hours after the exceedance is known, in accordance with Rule 0400-45-01-.19.

(iii) If at any time the disinfectant residual falls below 0.2 mg/l in the water entering the distribution system, the system must notify the Department as soon as possible, but no later than by the end of the next business day. The system also must notify the Department by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

4. In addition to the reporting and recordkeeping requirements in parts 1, 2, and 3 of this subparagraph, water systems serving 10,000 or more persons that provides conventional filtration treatment or direct filtration must report monthly to the Department the information specified in this part beginning January 1, 2002. In addition to the reporting and recordkeeping requirements in parts 1, 2, and 3 of this rule, a public water system serving fewer than 10,000 persons that provides conventional filtration treatment or direct filtration must report monthly to the Department the information specified in this part beginning January 14, 2005. In addition to the reporting and recordkeeping requirements in this paragraph, a public water system serving 10,000 or more persons that provides filtration approved under subparagraph (4)(d) of this rule must report monthly to the Department the information specified in subpart (i) of this part beginning January 1, 2002. In addition to the reporting and recordkeeping requirements in this paragraph, a public water system serving fewer than 10,000 persons that provides filtration approved under subparagraph (4)(d) of this rule must report monthly to the Department the information specified in subpart (i) of this part beginning January 14, 2005. The reporting in subpart (i) of this part is in lieu of the reporting specified in part 1 of this subparagraph.

(i) Turbidity measurements as required by this rule must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

(I) The total number of filtered water turbidity measurements taken during the month.

(II) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in subparagraph (4)(c) or (d) of this rule.

(III) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the Department under subparagraph (4)(d) of this rule.

(ii) Systems must maintain the results of individual filter monitoring taken for at least five years.

(I) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart, the system must report the filter number, the turbidity

(Rule 0400-45-01-.31, continued)

measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(II) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(III) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of three consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(IV) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of two consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must arrange for the conduct of a comprehensive performance evaluation by the Department or a third party approved by the Department no later than 30 days following the exceedance and have the evaluation completed and submitted to the Department no later than 90 days following the exceedance.

(7) Variances and Exemptions from the Requirements of Filtration and Disinfection

(a) No variance from the requirements in this rule are permitted.

(b) No exemptions from the requirements in part (3)(a)3 of this rule and paragraph (30) of Rule 0400-45-01-.17 to provide disinfection are permitted.

(8) Disinfection Profiling and Benchmarking

(a) Subpart H public water systems serving 10,000 or more persons must conduct monitoring for haloacetic acids and trihalomethanes or conduct disinfection profiling. By January 14, 2005, subpart H public water systems must develop a disinfection profile unless the Department determines it is not necessary. Those systems that exceed 0.064 mg/L of total trihalomethanes or 0.048 mg/L of total haloacetic acids

(Rule 0400-45-01-.31, continued)

annual arithmetic average based on four quarters of data must calculate disinfection profiles. Subpart H systems that serve between 500 and 9,999 persons must begin to collect data needed to calculate disinfection profiles or demonstrate exemption from the profiling requirements no later than July 1, 2003. Subpart H systems serving fewer than 500 persons must begin to collect data for profiling or demonstrate exemption from the profiling requirements no later than July 1, 2004. Systems that must calculate profiles and that are planning changes in the disinfection process must also calculate disinfection benchmarks and submit the benchmark calculations with engineering plans for Departmental approval prior to making any process changes. Sampling analytical methods, frequency of sampling, and sample locations must be in accordance with procedures described in Rules 0400-45-01-.14 and 0400-45-01-.36. Disinfection profiles and benchmarks must be determined by calculating daily inactivation ratios in accordance with Departmental and EPA rules. Systems may elect to calculate profiles in lieu of conducting trihalomethanes and haloacetic acid monitoring for the purpose of complying with the disinfection and filtration rule.

(b) The department may approve the use of a more representative set of annual data for disinfection profiling. Systems that elect to conduct disinfection profiling rather than monitoring must notify the department. Systems may use existing data if approved by the department to comply with the disinfection byproduct monitoring or profiling required by this rule.

(c) A system that uses chloramines, chlorine dioxide, or ozone for a primary disinfectant must calculate the logs of inactivation for viruses using a method approved by the department.

(d) The system subject to the profiling requirements must retain disinfection profiles data in graphic form, such as a spreadsheet, or in some other format acceptable to the department for review during sanitary surveys.

(e) Any system that decides to change its disinfection practices must submit plans to the department for approval prior to making any changes. Changes to disinfection practices include but are not limited to:

1. Changes to the point of disinfection application;

2. Change in the disinfectant used;

3. Change in the disinfectant process, and

4. Any other modification identified by the department.

(f) Any system subject to the profiling requirements of this rule shall calculate its disinfection benchmark using methods approved by the department. A disinfection benchmark is the lowest monthly average value of the monthly logs of Garidia lamblia inactivation. A system using ozone or chloramines must also calculate the disinfection benchmark for viruses using methods approved by the department.

(9) Recycle Provisions

(a) Applicability. All subpart H systems that employ conventional filtration or direct filtration treatment and that recycle spent filter backwash water, thickener supernatant, or liquids from dewatering processes must meet the requirements in subparagraphs (b) through (d) of this paragraph.

(Rule 0400-45-01-.31, continued)

(b) Reporting. A system must notify the department in writing by December 8, 2003, if the system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the information specified in parts 1 and 2 of this subparagraph.

1. A plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are re-introduced back into the treatment plant.

2. Typical recycle flow in gallons per minute (gpm), the highest observed plant flow experienced in the previous year (gpm), design flow for the treatment plant (gpm), and department-approved operating capacity for the plant where the department has made such determinations.

(c) Treatment technique requirement. Any system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes must return these flows through the processes of a system's existing conventional or direct filtration system as defined in Rule 0400-45-01-.04 or at an alternate location approved by the Department by June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.

(d) Recordkeeping. The system must collect and retain on file recycle flow information specified in parts 1 through 6 of this subparagraph for review and evaluation by the Department beginning June 8, 2004.

1. Copy of the recycle notification and information submitted to the Department under subparagraph (b) of this paragraph.

2. List of all recycle flows and the frequency with which they are returned.

3. Average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in minutes.

4. Typical filter run length and a written summary of how filter run length is determined.

5. The type of treatment provided for the recycle flow.

6. Data on the physical dimensions of the equalization and/or treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used and average dose and frequency of use, and frequency at which solids are removed, if applicable.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.32 FEES FOR PUBLIC WATER SYSTEMS.**

(1) Annual facility maintenance fee - On the due date specified in the invoice from the Department, all public water systems shall pay the following fees to the Department:

(a) Community Water Systems

(Rule 0400-45-01-.32, continued)

1. All community water systems, except as provided for in parts 2 and 3 of this subparagraph, shall pay fees based on the number of service connections as shown below:

Number of Connections

| | |
|---|---|
| (i) greater than 200,000 connections | $105,000 plus $0.35 per each connection for each connection over 200,000 |
| (ii) 100,001-200,000 connections | $75,000 plus $0.45 per each connection over 100,000 |
| (iii) 50,000-100,000 connections | $47,500 plus $0.55 per each connection over 50,000 |
| (iv) 30,001-49,999 connections | $37,500 plus $0.65 per each connection over 30,000 |
| (v) 250-30,000 connections | $1.30 per connection |
| (vi) less than 250 connections | $300 |

(i) For the purposes of calculating population served and facility maintenance fees, public water systems serving multi-family dwellings such as apartment complexes and mobile home parks shall count each separate dwelling unit as a connection and shall add the number of dwellings to the total number of connections served by the system unless each dwelling unit is billed separately by the water system and is already counted as an individual connection.

2. Systems with less than 15 service connections that are strictly wholesalers of water:

| | | |
|---|---|---|
| (i) | surface water source | $2,000 |
| (ii) | ground water source | $400 |

3. State facilities:

| | | |
|---|---|---|
| (i) | surface water source | $2,000 |
| (ii) | ground water source | $250 |

The number of connections and population will be based on the latest sanitary survey conducted by the Department.

(b) Non-Community Water Systems

1. Non-Transient Non-Community Water Systems

| | | |
|---|---|---|
| (i) | Schools | $300 |
| (ii) | Industries (surface water source) | $2,000 |
| (iii) | Industries (ground water source) | $250 |

2. Transient Non-Community Water Systems

| | | |
|---|---|---|
| (i) | Churches | $100 |
| (ii) | All others including, but not limited to, restaurants, campgrounds, motels, and rest areas | $200 |

(Rule 0400-45-01-.32, continued)

Surface water systems include those systems that use surface water in whole or in part.

(c) Facility maintenance fee invoices will be prepared and mailed to each water utility at least 45 days prior to the due date. If any part of any fee imposed under this paragraph is not paid within fifteen (15) days of the due date, a penalty of five percent (5%) of the amount due shall at once accrue and be added thereto. Thereafter, on the first day of each month during which any part of any fee or any prior accrued penalty remains unpaid, an additional penalty of five percent (5%) of the unpaid balance shall accrue and be added thereto. In addition, the fees not paid within fifteen (15) days after the due date shall bear interest at the maximum lawful rate from the due date to the date paid.

(d) Any person required to pay fees set forth under this paragraph who disagrees with the calculation or applicability of the fee may petition the Water Quality Control Board for a hearing. In order to perfect the hearing, a petition for a hearing together with the total amount of the fee due must be received by the Commissioner not later than fifteen days after the due date. If it is finally determined that the amount in dispute was improperly assessed, the Commissioner shall return the amount determined to be improperly assessed with interest.

(e) Any water system discovered to be a public water system during the course of a fiscal year will owe the full fee on the date specified in the invoice.

(f) Any new public water system that begins operation after October 1, 1991, will owe the full fee on the date specified by the invoice.

(2) (a) Plans Review Fee – Beginning July 1, 1992, any person submitting non-transient non-community and community water system plans for approval shall be required to pay the fees listed in parts 1 through 14 of this subparagraph for the purpose of plans review. Transient non-community water systems shall be required to pay the fee listed in part 13 of this subparagraph. The fees apply to new facilities as well as the expansion or modification of existing facilities. If the submittal includes multiple activities, the fee will be the sum of the fees listed for each individual activity. Approval of plan documents will not be granted until all fees required by parts 1 through 14 of this subparagraph are paid in full. Units of local government which have been granted plans review authority in accordance with T.C.A. § 68-221-706 shall pay an annual fee of $1,000. Failure of local governments to pay this fee will be cause for the revocation of plans review authority.

| Type Activity | | Fee Schedule |
|---|---|---|
| 1. | Well or Spring Development | $ 200 |
| 2. | Chemical Control Plant | $ 400 |
| 3. | Disinfection System | |
| | (i) Gaseous | $ 300 |
| | (ii) Hypochlorinator | $ 150 |
| 4. | Filter Plant | $ 1000 |
| 5. | Pump Station | $ 250 |
| 6. | Tank | $ 225 |
| 7. | Standard Specifications | $ 100 |
| 8. | Tank Coating | $ 50 |
| 9. | Sludge Treating | $ 150 |
| 10. | Distribution Lines | |
| | (i) Less than 1000 feet | $ 100 |
| | (ii) Greater than 1000 feet | $ 100 + $.01/ft |

(Rule 0400-45-01-.32, continued)

| | | |
|---|---|---|
| 11. | Change Orders | $ 50 |
| 12. | Review of Operations and Maintenance Manuals | $ 150 |
| 13. | New Raw Water Source and Site Evaluation for Public Water Systems and Water Bottling Operations | $ 300 |
| 14. | Site Evaluation for Water Treatment Sludge Use | $ 300 |
| 15. | Miscellaneous (Includes other items not specifically mentioned above) | $ 50 |

(b) The Department shall complete its review of plan documents within thirty days of the receipt of plans containing sufficient information to allow the Department to make the necessary determinations. Fees will not be refunded for projects that are not approved or that are withdrawn voluntarily by the applicant. Plans resubmitted within 30 days of an initial denial will be reviewed without additional fees provided the scope of the project has not changed.

(c) Penalties and interest on late payments shall be computed as specified in subparagraph (1)(c) of this rule. Appeals shall be perfected as specified in subparagraph (1)(d) of this rule.

(3) Sanitary Survey Re-inspection Fee. A public water system requesting a re-inspection of the system pursuant to subparagraph (4)(e) of Rule 0400-45-01-.07 shall be required to pay a fee for the cost of the re-inspection. The fee shall be based on the number of connections and the complexity of the water plant as follows:

| | | |
|---|---|---|
| (a) | Community water systems with 10,000 or greater connections | $750 |
| (b) | Community water systems with 1,000 to 9,999 connections | $500 |
| (c) | Community water systems with 100 to 999 connections | $250 |
| (d) | Community water systems with less than 100 connections and noncommunity water systems | $150 |
| (e) | Community water systems with less than fifteen (15) service connections that are strictly wholesalers of water: | $500 |

***Authority:*** *T.C.A. §§ 68-221-701 et seq., 68-203-101 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.33 CONTROL OF LEAD AND COPPER.**

(1) General Requirements

(a) Applicability

1. The requirements of this rule constitute primary drinking water regulations for lead and copper. Unless otherwise indicated each of the provisions of this rule apply to community and non-transient, non-community water systems.

2. Reserved

(b) Scope. These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These actions are triggered, in some cases, by lead and copper action levels measured in samples collected at consumers' tap.

(Rule 0400-45-01-.33, continued)

(c) Lead and Copper action levels.

1. The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period is greater than 0.015 mg/l (i.e., if the “90th percentile” lead level is greater than 0.015 mg/l).

2. The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period is greater than 1.3 mg/l (i.e., if the “90th percentile” copper level is greater than 1.3 mg/l).

3. The 90th percentile lead and copper levels shall be computed as follows:

(i) The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(ii) The number of samples taken during the monitoring period shall be multiplied by 0.9.

(iii) The contaminant concentration in the numbered sample yielded by the calculation in subpart (ii) of this part is the 90th percentile contaminant level.

(iv) For water systems serving fewer than 100 people that collect 5 samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.

(v) For a public water system that has been allowed by the Department to collect fewer than five samples in accordance with subparagraph (7)(c) of this rule, the sample result with the highest concentration is considered the 90th percentile value.

(d) Corrosion control treatment requirements.

1. All water systems shall install and operate optimal corrosion control treatment as defined in Rule 0400-45-01-.04.

2. Any water system that complies with the applicable corrosion control treatment requirements set forth in paragraphs (2) and (3) of this rule shall be deemed in compliance with the treatment requirement contained in part 1 of this subparagraph.

(e) Source water treatment requirements. Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements set forth in paragraph (4) of this rule.

(f) Lead service line replacement. Any system exceeding the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the lead service line replacement requirements set forth in paragraph (5) of this rule.

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(g) Public education requirements. Pursuant to paragraph (6) of this rule, all water systems must provide a consumer notice of lead tap water monitoring results to persons served at the sites (taps) that are tested. Any system exceeding the lead action level shall implement the public education requirements set forth in paragraph (6) of this rule.

(h) Monitoring and analytical requirements. Tap water monitoring for lead and copper, monitoring for water quality parameters, source water monitoring for lead and copper, and analysis of the monitoring results shall be completed in compliance with paragraphs (7), (8), (9) and (10) of this rule.

(i) Reporting Requirements. Systems shall report to the Department any information required by the treatment provisions of this rule.

(j) Recordkeeping requirements. Systems shall maintain records in accordance with paragraph (12) of this rule.

(k) Violation of primary drinking water regulations. Failure to comply with the applicable requirements of this rule, including requirements established by the Department pursuant to these provisions, shall constitute a violation of the primary drinking water regulations for lead and/or copper.

(2) Applicability of corrosion control treatment steps to small, medium and large water systems.

(a) Systems shall complete the applicable corrosion control treatment requirements described in paragraph (3) of this rule by the deadlines established in this paragraph.

1. A large system (serving > 50,000 persons) shall complete the corrosion control treatment steps specified in subparagraph (d) of this paragraph, unless it is deemed to have optimized corrosion control under part (b)2 or 3 of this paragraph.

2. A small system (serving $\leq$ 3300 persons) and a medium-size system (serving > 3,300 and $\leq$ 50,000 persons) shall complete the corrosion control treatment steps of specified in subparagraph (e) of this paragraph, unless it is deemed to have optimized corrosion control under part (b)1, 2 or 3 of this paragraph.

(b) A system is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified if the system satisfies one of the criteria specified in parts 1 through 3 of this subparagraph. Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the Department determines appropriate to ensure optimal corrosion control treatment is maintained.

1. A small or medium-size water system is deemed to have optimized corrosion control if the system meets the lead and copper action levels during each of two consecutive six-month monitoring periods conducted in accordance with paragraph (7) of this rule.

2. Any water system may be deemed by the Department to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the Department that it has conducted activities equivalent to the corrosion control steps applicable to such system under this paragraph. If the Department makes this determination, it shall provide the system with written notice explaining the basis for its decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with subparagraph (3)(f) of

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this rule. Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the Department-designated optimal water quality control parameters in accordance with subparagraph (3)(g) of this rule and continue to conduct lead and copper tap and water quality parameter sampling in accordance with part (7)(d)3 and subparagraph (8)(d) of this rule, respectively. A system shall provide the Department with the following information in order to support a determination under this paragraph:

(i) The results of all test samples collected for each of the water quality parameters in part (3)(c)3 of this rule.

(ii) A report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in part (3)(c)1 of this rule. The results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment;

(iii) A report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps;

(iv) The results of tap water samples collected in accordance with paragraph (7) of this rule at least once every six months for one year after corrosion control has been installed.

3. Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with paragraph (7) of this rule and source water monitoring conducted in accordance with paragraph (9) of this rule that demonstrates for two consecutive 6-month monitoring periods that the difference between the 90th percentile tap water lead level computed under part (1)(c)3 of this rule, and the highest source water lead concentration is less than the Practical Quantitation Level for lead specified in subpart (10)(a)1(ii) of this rule.

(i) Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if the 90th percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two consecutive 6-month monitoring periods.

(ii) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall continue monitoring for lead and copper at the tap no less frequently than once every three calendar years using the reduced number of sites specified in subparagraph (7)(c) of this rule and collecting the samples at times and locations specified in subpart (7)(d)4(iv) of this rule. Any such system that has not conducted a round of monitoring pursuant to subparagraph (7)(d) of this rule since September 30, 1997, shall complete a round of monitoring pursuant to this paragraph no later than September 30, 2000.

(iii) Any water system deemed to have optimized corrosion control pursuant to this paragraph shall notify the Department in writing pursuant to subparagraph (11)(a) of this rule of any upcoming long term change in treatment or addition of a new source as described in this rule. The Department must review and approve the addition of a new source or long term change in water treatment before it is implemented by the water systems. The Department may require any such system to conduct

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additional monitoring or to take other action the Department deems appropriate to ensure that such systems maintain minimal levels of corrosion in the distribution system.

(iv) As of July 12, 2001, a system is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment pursuant to subpart (v) of this part unless it meets the copper action level.

(v) Any system triggered into corrosion control because it is no longer deemed to have optimized corrosion control under this paragraph shall implement corrosion control treatment in accordance with the deadlines in subparagraph (e) of this paragraph. Any such large system shall adhere to the schedule specified in that paragraph for medium-size systems, with the time periods for completing each step being triggered by the date the system is no longer deemed to have optimized corrosion control under this paragraph.

(c) Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two consecutive monitoring periods conducted pursuant to paragraph (7) of this rule and submits the results to the Department. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The Department may require a system to repeat treatment steps previously completed by the system where the Department determines that this is necessary to implement properly the treatment requirements of this paragraph. The Department shall notify the system in writing of such a determination and explain the basis for its decision that includes but is limited to the information required under part (b)2 of this paragraph. The requirement for any small or medium-size system to implement corrosion control treatment steps in accordance with subparagraph (e) of this paragraph (including systems deemed to have optimized corrosion control under part (b)1 of this paragraph) is triggered whenever any small or medium-size system exceeds the lead or copper action level.

(d) Treatment steps and deadlines for large systems. Except as provided in parts (b)2 and 3 of this paragraph, large systems shall complete the following corrosion control treatment steps [described in the referenced portions of paragraphs (3), (7) and (8) of this rule] by the indicated dates.

1. Step 1: The system shall conduct initial monitoring [part (7)(d)1 and subparagraph (8)(b) of this rule], during two consecutive six-month monitoring periods by January 1, 1993.

2. Step 2: The system shall complete corrosion control studies [subparagraph (3)(c) of this rule] by July 1, 1994.

3. Step 3: The Department shall designate optimal corrosion control treatment [subparagraph (3)(d) of this rule] by January 1, 1995.

4. Step 4: The system shall install optimal corrosion control treatment [subparagraph (3)(e) of this rule] by January 1, 1997.

5. Step 5: The system shall complete follow-up sampling by [part (7)(d)2 and subparagraph (8)(c) of this rule] by January 1, 1998.

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6. Step 6: The Department shall review installation of treatment and designate optimal water quality control parameters [subparagraph (3)(f) of this rule] by July 1, 1998.

7. Step 7: The system shall continue thereafter to operate in compliance with the Department-specified optimal water quality control parameters [subparagraph (3)(g) of this rule] and continue to conduct tap sampling [part (7)(d)3 and subparagraph (8)(d) of this rule].

(e) Treatment steps and deadlines for small and medium-sized systems. Except as provided in subparagraph (b) of this paragraph, small and medium-size systems shall complete the following corrosion control treatment steps by the indicated time periods.

1. Step 1: The system shall conduct initial tap sampling until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under part (7)(d)4 of this rule. A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment [subparagraph (3)(a) of this rule] within six months after the end of the monitoring period during which it exceeds one of the action levels; and

2. Step 2: Within 12 months after the end of the monitoring period during which a system exceeds the lead or copper action level, the Department may require the system to perform corrosion control studies [subparagraph (3)(b) of this rule]. If the Department does not require the system to perform such studies, the Department shall specify optimal corrosion treatment pursuant to subparagraph (3)(d) of this rule within the following timeframes:

   (i) for medium-size systems, within 18 months after the end of the monitoring period during which such system exceeds the lead or copper action level; and

   (ii) for small systems, within 24 months after the end of the monitoring period during which such system exceeds the lead or copper action level.

3. Step 3: If the Department requires a system to perform corrosion control studies under step 2, the system shall complete the studies within 18 months after the Department requires that such studies be conducted.

4. Step 4: If the system has performed corrosion control studies under step 2, the Department shall designate optimal corrosion treatment within 6 months after completion of step 3.

5. Step 5: The system shall install optimal corrosion control treatment within 24 months after the Department designates such treatment.

6. Step 6: The system shall complete follow-up sampling within 36 months after the Department designates optimal corrosion control treatment.

7. Step 7: The Department shall review the system's installation of treatment and designate optimal water quality control parameters within 6 months after completion of step 6.

8. Step 8: The system shall continue thereafter to operate in compliance with the Department-designated optimal water quality control parameters and continue to conduct tap sampling.

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(3) Description of corrosion control treatment requirements. Each system shall complete the corrosion control treatment requirement described in this paragraph, which are applicable to such a system as described in paragraph (2) of this rule.

(a) System recommendation regarding corrosion control treatment. Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one or more of the corrosion control treatments listed in part (c)1 of this paragraph, which the system believes constitutes optimal corrosion control for that system. The Department may require the system to conduct additional water quality parameter monitoring in accordance with subparagraph (8)(b) of this rule to assist the Department in reviewing the system's recommendation.

(b) The Department may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under subparagraph (c) of this paragraph to identify optimal corrosion control treatment for the system.

(c) Performance of corrosion control studies.

1. Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:

(i) Alkalinity and pH adjustment;

(ii) Calcium hardness adjustment; and

(iii) The addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.

2. The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments approved by the Department with other systems of similar size, water chemistry and distribution system configuration.

3. The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed in part 1 of this subparagraph:

(i) Lead;

(ii) Copper;

(iii) pH;

(iv) Alkalinity;

(v) Calcium;

(vi) Conductivity

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(vii) Orthophosphate (when an inhibitor containing a phosphate compound is used);

(viii) Silicate (when an inhibitor containing a silicate compound is used);

(ix) Water temperature; and

(x) Other parameters identified by the Department.

4. The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:

(i) Data and documentation showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; and/or

(ii) Data documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.

5. The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.

6. On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the Department, in writing, the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in parts 1 through 5 of this subparagraph.

(d) Department designation of optimal corrosion control treatment.

1. Based upon consideration of available information including, where applicable, studies performed under subparagraph (c) of this paragraph and a system's recommended treatment alternative, the Department shall either approve the corrosion control treatment option recommended by the system, or designate alternative corrosion control treatment(s) from among those listed in part (c)1 of this paragraph. When designating optimal treatment the Department may consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

2. The Department shall notify the system of its decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the Department requests additional information to aid its review, the water system shall provide the information.

(e) Installation of optimal corrosion control. Each system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated by the Department under subparagraph (d) of this paragraph.

(f) Department review of treatment and specification of optimal water quality control parameters. The Department shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the water system and

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determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the Department in subparagraph (d) of this paragraph. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the Department shall designate at least the following:

1. A minimum value or a range of values for pH measured at each entry point to the distribution system;

2. A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the Department determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;

3. If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the Department determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

4. If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples;

5. If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed in this subparagraph shall be those that the Department determines to reflect optimal corrosion control treatment for the system. The Department may designate values for additional water quality control parameters determined by the Department to reflect optimal corrosion control for the system. The Department shall notify the system in writing of these determinations and explain the basis for its decisions.

(g) Continued operation and monitoring. All systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the Department under subparagraph (f) of this paragraph for all samples collected under subparagraphs (8)(d) through (f) of this rule. Compliance with the requirements of this paragraph shall be determined every six months, as specified by subparagraph (8)(d) of this rule. A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any Department-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the Department. Daily values are calculated as follows (the Department has the discretion to delete results of obvious sampling errors from this calculation):

1. On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both. If EPA has approved an alternative formula under 40 CFR 142.16 in the Department's application for a program revision submitted pursuant to 40 CFR 142.12, the

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Department's formula shall be used to aggregate multiple measurements taken at a sampling point for the water quality parameter in lieu of the formula in this subparagraph.

2. On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

3. On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the sample site.

(h) Modification of Department treatment decisions. Upon its own initiative or in response to a request by a water system, the Department may modify its determination of the optimal corrosion control treatment under subparagraph (d) of this paragraph or optimal water quality control parameters under subparagraph (f) of this paragraph. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The Department may modify its determination where it concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the Department's decision, and provide an implementation schedule for completing the treatment modifications.

(4) Source water treatment requirements. Systems shall complete the applicable source water monitoring and treatment requirements by the following deadlines.

(a) Deadlines for Completing Source Water Treatment Steps:

1. Step 1: A system exceeding the lead or copper action level shall complete lead and copper source water monitoring and make a treatment recommendation to the Department not later than 180 days after the end of the monitoring period during which the lead or copper action level was exceeded.

2. Step 2: The Department shall make a determination regarding source water treatment within 6 months after submission of monitoring results under step 1.

3. Step 3: If the Department requires installation of source water treatment the system shall install the treatment within 24 months after completion of step 2.

4. Step 4: The system shall complete follow-up tap water monitoring and source water monitoring within 36 months after completion of step 2.

5. Step 5: The Department shall review the system's installation and operation of source water treatment and specify maximum permissible source water levels within 6 months after completion of step 4.

6. Step 6: The system shall continue thereafter to operate in compliance with the Department-specified maximum permissible lead and copper source water levels and continue source water monitoring in accordance with part (9)(d)4 of this rule.

(b) Description of Source Water Treatment Requirements:

1. System treatment recommendation. Any system which exceeds the lead or copper action level shall recommend in writing to the Department the installation and operation of one of the source water treatments listed in part 2 of this

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subparagraph. A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at users' taps.

2. Department determination regarding source water treatment. The Department shall complete an evaluation of the results of all source water samples submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the Department determines, based on source water levels of lead and copper, that treatment is needed, the Department shall either require installation and operation of the source water treatment recommended by the system (if any) or require the installation and operation of another source water treatment from among the following: ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the Department requests additional information to aid in its review, the water system shall provide the information by the date specified by the Department in its request. The Department shall notify the system in writing of its determination and set forth the basis for its decision.

3. Installation of source water treatment. Each system shall properly install and operate the source water treatment designated by the Department under part 2 of this subparagraph.

4. Department review of source water treatment and specification of maximum permissible source water levels. The Department shall review the source water samples taken by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment designated by the Department. Based upon its review, the Department shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and maintained. The Department shall notify the system in writing and explain the basis for its decision.

5. Continued operation and maintenance. Each water system shall maintain lead and copper levels below the maximum permissible concentrations designated by the Department at each sampling point monitored. The system is out of compliance if the level of lead or copper at any sampling is greater than the maximum permissible concentration designated by the Department.

6. Modification of Department treatment decisions. Upon its own initiative or in response to a request by a water system, the Department may modify its determination of the source water treatment under part 2 of this subparagraph, or maximum permissible lead and copper concentrations for finished water entering the distribution system under part 4 of this subparagraph. A request for modification by a system shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The Department may modify its determination where it concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the Department's decision, and provide an implementation schedule for completing the treatment modifications.

7. Treatment decisions by EPA in lieu of the Department. The EPA Regional Administrator may review treatment determinations made by a Department under parts 2, 4, or 6 of this subparagraph and issue Federal treatment determinations

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consistent with the requirements of those parts where the Administrator finds that:

(i) The Department has failed to issue a treatment determination by the applicable deadlines contained in subparagraph (a) of this paragraph,

(ii) The Department has abused its discretion in a substantial number of cases or in cases affecting a substantial population, or

(iii) The technical aspects of a Department's determination would be indefensible in an expected Federal enforcement action taken against a system.

(5) Lead service line replacement requirements.

(a) Systems that fail to meet the lead action level in tap samples, after installing corrosion control and/or source water treatment, shall replace lead service lines in accordance with the requirements of this paragraph. If a system is in violation of the rules or Act for failure to install source water or corrosion control treatment, the Department may require the system to commence lead service line replacement under this paragraph after the date by which the system was required to conduct monitoring under part (7)(d)2 of this rule has passed.

(b) A water system shall replace annually at least 7 percent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The system shall identify the initial number of lead service lines in its distribution system, including an identification of the portion(s) owned by the system, based on a materials evaluation, including the evaluation required under subparagraph (7)(a) of this rule and relevant legal authorities (e.g., contracts, local ordinances) regarding the portion owned by the system. The first year of lead service line replacement shall begin on the first day following the end of the monitoring period in which the action level was exceeded in subparagraph (a) of this paragraph.

1. If monitoring is required annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs. If the Department has established an alternate monitoring period, then the end of the monitoring period will be the last day of that period.

2. Any water system resuming a lead service line replacement program after the cessation of its lead service line replacement program as allowed by subparagraph (f) of this paragraph shall update its inventory of lead service lines to include those sites that were previously determined not to require replacement through the sampling provision under subparagraph (c) of this paragraph. The system will then divide the updated number of remaining lead service lines by the number of remaining years in the program to determine the number of lines that must be replaced per year (7 percent lead service line replacement is based on a 15-year replacement program, so, for example, systems resuming lead service line replacement after previously conducting two years of replacement would divide the updated inventory by 13). For those systems that have completed a 15-year lead service line replacement program, the Department will determine a schedule for replacing or retesting lines that were previously tested out under the replacement program when the system re-exceeds the action level.

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(c) A system is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to part (7)(b)3 of this rule, is less than or equal to 0.015 mg/l.

(d) A water system shall replace that portion of the lead service line that it owns. In cases where the system does not own the entire lead service line, the system shall notify the owner of the line, or the owner's authorized agent, that the system will replace the portion of the service line that it owns and shall offer to replace the owner's portion of the line. A system is not required to bear the cost of replacing the privately-owned portion of the line, nor is it required to replace the privately-owned portion where the owner chooses not to pay the cost of replacing the privately-owned portion of the line, or where replacing the privately-owned portion would be precluded by State, local or common law. A water system that does not replace the entire length of the service line also shall complete the following tasks.

1. At least 45 days prior to commencing with the partial replacement of a lead service line, the water system shall provide notice to the resident(s) of all buildings served by the line explaining that they may experience a temporary increase of lead levels in their drinking water, along with guidance on measures consumers can take to minimize their exposure to lead. The Department may allow the water system to provide notice under the previous sentence less than 45 days prior to commencing partial lead service line replacement where such replacement is in conjunction with emergency repairs. In addition, the water system shall inform the resident(s) served by the line that the system will, at the system's expense, collect a sample from each partially-replaced lead service line that is representative of the water in the service line for analysis of lead content, as prescribed under part (7)(b)3 of this rule, within 72 hours after the completion of the partial replacement of the service line. The system shall collect the sample and report the results of the analysis to the owner and the resident(s) served by the line within three business days of receiving the results. Mailed notices post-marked within three business days of receiving the results shall be considered "on time."

2. The water system shall provide the information required by part 1 of this subparagraph to the residents of individual dwellings by mail or by other methods approved by the Department. In instances where multi-family dwellings are served by the line, the water system shall have the option to post the information at a conspicuous location.

(e) The Department shall require a system to replace lead service lines on a shorter schedule than that required by this paragraph, taking into account the number of lead service lines in the system, where such shorter replacement schedule is feasible. The Department shall make this determination in writing and notify the system of its finding within 6 months after the system is triggered into lead service line replacement based on monitoring referenced in subparagraph (a) of this paragraph.

(f) Any system may cease replacing lead service lines whenever first draw samples collected pursuant to part (7)(b)2 of this rule meets the lead action level during each of two consecutive monitoring periods and the system submits the results to the Department. If the first draw samples in any such water system thereafter exceeds the lead action level, the system shall recommence replacing lead service lines, pursuant to subparagraph (b) in this paragraph; and

(g) To demonstrate compliance with subparagraphs (a) through (d) of this paragraph, a system shall report to the Department the information specified in subparagraph (11)(e) of this rule.

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(6) Public education and supplemental monitoring requirements.

All water systems must deliver a consumer notice of lead tap water monitoring results to persons served by the water system at sites that are tested, as specified in subparagraph (e) of this paragraph. A water system that exceeds the lead action level based on tap water samples collected in accordance with paragraph (7) of this rule shall deliver to its customers the public education materials contained in subparagraph (a) of this paragraph in accordance with the requirements of subparagraph (c) of this paragraph. Water systems that exceed the lead action level must sample the tap water of any customer who requests it in accordance with subparagraph (d) of this paragraph.

(a) Content of written public education materials.

1. Community water systems and Non-transient non-community water systems. Water systems must include the following elements in printed materials (e.g., brochures and pamphlets) in the same order as listed below. In addition, language in subparts (i), (ii) and (vi) of this part must be included in the materials, exactly as written, except for the text in brackets in these subparts for which the water system must include system-specific information. Any additional information presented by a water system must be consistent with the information in this part and be in plain language that can be understood by the general public. Water systems must submit all written public education materials to the Department prior to delivery. The Department may require the system to obtain approval of the content of written public materials prior to delivery.

(i) Important Information About Lead in Your Drinking Water. [Insert Name of Water System] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and young children. Please read this information closely to see what you can do to reduce lead in your drinking water.

(ii) Health effects of lead. Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother’s bones, which may affect brain development.

(iii) Sources of Lead

(I) Explain what lead is.

(II) Explain possible sources of lead in drinking water and how lead enters drinking water. Include information on home/building plumbing materials and service lines that may contain lead.

(III) Discuss other important sources of lead exposure in addition to drinking water (e.g., paint).

(Rule 0400-45-01-.33, continued)

(iv) Discuss the steps the consumer can take to reduce their exposure to lead in drinking water.

(I) Encourage running the water to flush out the lead.

(II) Explain concerns with using hot water from the tap and specifically caution against the use of hot water for preparing baby formula.

(III) Explain that boiling water does not reduce lead levels.

(IV) Discuss other options consumers can take to reduce their exposure to lead in drinking water, such as alternative sources or treatment of drinking water.

(V) Suggest that parents have their child's blood tested for lead. The following is a list of some Department approved laboratories in your area that you can call to have your water tested for lead (Insert names and phones numbers of at least two laboratories).

(v) The steps described above will reduce the lead concentrations in your drinking water. However, if a water test indicates that the drinking water coming from your tap contains lead concentrations in excess of 15 ppb after flushing, or after we have completed our actions to minimize lead levels, then you may want to take the following additional measures:

(I) Purchase or lease a home treatment device. Home treatment devices are limited in that each unit treats only the water that flows from the faucet to which it is connected, and all of the devices require periodic maintenance and replacement. Devices such as reverse osmosis systems or distillers can effectively remove lead from your drinking water. Some activated carbon filters may reduce lead levels at the tap, however all lead reduction claims should be investigated. Be sure to check the actual performance of a specific home treatment device before and after installing the unit.

(II) Purchase bottled water for drinking and cooking.

(vi) You can consult a variety of sources for additional information. Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead. State and local government agencies that can be contacted include:

(I) (insert the name of city or county department of public utilities) at (insert phone number) can provide you with information about your community's water supply, and a list of local laboratories that have been certified by EPA for testing water quality;

(II) (insert the name of the city or county department that issues building permits (at insert telephone number) can provide you with information about building permit records that should contain the name of plumbing contractors that plumbed your home; and

(III) (insert the name of the State Department of Public Health) at (insert phone number) or the (insert the name of the city or county health department) at (insert phone number) can provide you with

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information about the health effects of lead and how you can have your child's blood tested.

(vii) The following is a list of some Department approved laboratories in your area that you can call to have your water tested for lead (Insert names and phones numbers of at least two laboratories).

(viii) Explain why there are elevated levels of lead in the system's drinking water (if known) and what the water system is doing to reduce the lead levels in homes/buildings in this area.

(ix) For more information call us at [Insert Your Number] [(If Applicable), or visit our Web site at [Insert Your Web Site Here]]. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at http://www.epa.gov/lead or contact your health care provider.

2. Community water systems. In addition to including the elements specified in part (a)1 of this paragraph, community water systems must:

(i) Tell consumers how to get their water tested.

(ii) Discuss lead in plumbing components and the difference between low lead and lead free.

(b) Reserved

(c) Delivery of a public education materials.

1. For public water systems serving a large proportion of non-English speaking consumers, as determined by the Department, the public education materials must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the public education materials or to request assistance in the appropriate language.

2. A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with paragraph (7) of this rule, and that is not already conducting public education tasks under this subparagraph, must conduct the public education tasks under this subparagraph within 60 days after the end of the monitoring period in which the exceedance occurred:

(i) Deliver printed materials meeting the content requirements of subparagraph (a) of this paragraph to all bill paying customers.

(ii) Contact of customers most at risk.

(I) Contact customers who are most at risk by delivering education materials that meet the content requirements of subparagraph (a) of this paragraph to local public health agencies even if they are not located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users. The water system must contact the local public health agencies directly by phone or in person. The local public health agencies may provide a specific list of additional community

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based organizations serving target populations, which may include organizations outside the service area of the water system. If such lists are provided, systems must deliver education materials that meet the content requirements of subparagraph (a) of this paragraph to all organizations on the provided lists.

(II) Contact customers who are most at risk by delivering materials that meet the content requirements of subparagraph (a) of this paragraph to the following organizations listed in subitems I through VI of this item that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users:

I. Public and private schools or school boards.

II. Women, Infants and Children (WIC) and Head Start programs.

III. Public and private hospitals and medical clinics.

IV. Pediatricians.

V. Family planning clinics.

VI. Local welfare agencies.

(III) Make a good faith effort to locate the following organizations within the service area and deliver materials that meet the content requirements of subparagraph (a) of this paragraph to them, along with an informational notice that encourages distribution to all potentially affected customers or users. The good faith effort to contact at-risk customers may include requesting a specific contact list of these organizations from the local public health agencies, even if the agencies are not located within the water system's service area:

I. Licensed childcare centers

II. Public and private preschools.

III. Obstetricians-Gynecologists and Midwives.

(iii) No less often than quarterly, provide information on or in each water bill as long as the system exceeds the action level for lead. The message on the water bill must include the following statement exactly as written except for the text in brackets for which the water system must include system-specific information: [Insert Name of Water System] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information please call [Insert Name of Water System] [or visit (Insert Your Web Site Here)]. The message or delivery mechanism can be modified in consultation with the Department; specifically, the Department may allow a separate mailing of public education materials to customers if the water system cannot place the information on water bills.

(Rule 0400-45-01-.33, continued)

(iv) Post material meeting the content requirements of subparagraph (a) of this paragraph on the water system's Web site if the system serves a population greater than 100,000.

(v) Submit a press release to newspaper, television and radio stations.

(vi) In addition to subparts (i) through (v) of this part, systems must implement at least three activities from one or more categories listed below. The educational content and selection of these activities must be determined in consultation with the Department.

(I) Public Service Announcements.

(II) Paid advertisements.

(III) Public Area Informational Displays.

(IV) E-mails to customers.

(V) Public Meetings.

(VI) Household Deliveries.

(VII) Targeted Individual Customer Contact.

(VIII) Direct material distribution to all multi-family homes and institutions.

(IX) Other methods approved by the Department.

(vii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the Department has established an alternate monitoring period, the last day of that period.

3. As long as a community water system exceeds the action level, it must repeat the activities pursuant to part 2 of this subparagraph as described in subparts (i) through (iv) of this part.

(i) A community water system shall repeat the tasks contained in subparts 2(i), (ii) and (vi) of this subparagraph every 12 months.

(ii) A community water system shall repeat tasks contained in subpart 2(iii) of this subparagraph with each billing cycle.

(iii) A community water system serving a population greater than 100,000 shall post and retain material on a publicly accessible Web site pursuant to subpart 2(iv) of this subparagraph.

(iv) The community water system shall repeat the task in subpart 2(v) of this subparagraph twice every 12 months on a schedule agreed upon with the Department. The Department can allow activities in part 2 of this subparagraph to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the Department in advance of the 60-day deadline.

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4. Within 60 days after the end of the monitoring period in which the exceedance occurred (unless it already is repeating public education tasks pursuant to part 5 of this subparagraph), a non-transient noncommunity water system shall deliver the public education materials specified by subparagraph (a) of this paragraph as follows:

   (i) Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system; and

   (ii) Distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the non-transient non-community water system. The Department may allow the system to utilize electronic transmission in lieu of or combined with printed materials as long as it achieves at least the same coverage.

   (iii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the Department has established an alternate monitoring period, the last day of that period.

5. A non-transient non-community water system shall repeat the tasks contained in part 4 of this subparagraph at least once during each calendar year in which the system exceeds the lead action level. The Department can allow activities in part 4 of this subparagraph to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the Department in advance of the 60-day deadline.

6. A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six-month monitoring period conducted pursuant to paragraph (7) of this rule. The system shall recommence public education in accordance with this paragraph if it subsequently exceeds the lead action level during any monitoring period.

7. A community water system may apply to the Department, in writing, (unless the Department has waived the requirement for prior Department approval) to use only the text specified in part (a)1 of this paragraph in lieu of the text in parts (a)1 and (a)2 of this paragraph and to perform the tasks listed in parts 4 and 5 of this subparagraph in lieu of the tasks in parts 2 and 3 of this subparagraph if:

   (i) The system is a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing or installing point of use treatment devices; and

   (ii) The system provides water as part of the cost of services provided and does not separately charge for water consumption.

8. A community water system serving 3,300 or fewer people may limit certain aspects of their public education programs as follows:

   (i) With respect to the requirements of subpart 2(vi) of this subparagraph, a system serving 3,300 or fewer must implement at least one of the activities listed in that subpart.

   (ii) With respect to the requirements of subpart 2(ii) of this subparagraph, a system serving 3,300 or fewer people may limit the distribution of the public education materials required under that subparagraph to facilities

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and organizations served by the system that are most likely to be visited regularly by pregnant women and children.

(iii) With respect to the requirements of subpart 2(v) of this subparagraph, the Department may waive this requirement for systems serving 3,300 or fewer persons as long as system distributes notices to every household served by the system.

(d) Supplemental monitoring and notification of results.

A water system that fails to meet the lead action level on the basis of tap samples collected in accordance with paragraph (7) of this rule shall offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

(e) Notification of results.

1. Reporting requirement. All water systems must provide a notice of the individual tap results from lead tap water monitoring carried out under the requirements of paragraph (7) of this rule to the persons served by the water system at the specific sampling site from which the sample was taken (e.g., the occupants of the residence where the tap was tested).

2. Timing of notification. A water system must provide the consumer notice as soon as practical, but no later than 30 days after the system learns of the tap monitoring results.

3. Content. The consumer notice must include the results of lead tap water monitoring for the tap that was tested, an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water and contact information for the water utility. The notice must also provide the maximum contaminant level goal and the action level for lead and the definitions for these two terms from Rule 0400-45-01-.35.

4. Delivery. The consumer notice must be provided to persons served at the tap that was tested, either by mail or by another method approved by the Department. For example, upon approval by the Department, a non-transient non-community water system could post the results on a bulletin board in the facility to allow users to review the information. The system must provide the notice to customers at sample taps tested, including consumers who do not receive water bills.

(7) Monitoring requirements for lead and copper in tap water.

(a) Sample site location.

1. By the applicable date for commencement of monitoring under part (d)1 of this paragraph, each water system shall identify a pool of sampling sites that meets the requirements of this paragraph, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in subparagraph (c) of this paragraph. All sites from which first draw samples are collected shall be selected from this pool of sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

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2. A water system shall review at least the information on lead, copper, and galvanized steel under paragraph (4) of Rule 0400-45-01-.21 when conducting a materials evaluation. When an evaluation of the information collected pursuant to paragraph (4) of Rule 0400-45-01-.21 is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in subparagraph (a) of this paragraph, the water system shall review at least the sources of information listed below in order to identify a sufficient number of sampling sites. In addition, the system shall seek to collect such information in the course of its normal operations (e.g., checking service line materials when reading water meters or performing maintenance activities):

   (i) all plumbing codes, permits, and records in the files of the building department(s) which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system;

   (ii) all inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and

   (iii) all existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.

3. Community water systems shall use tier 1 sampling sites for monitoring for lead and copper action level determination. Tier 1 sampling sites for a community water system shall consist of single family structures that:

   (i) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

   (ii) are served by a lead service line. When multiple-family residences comprise at least 20 percent of the structures served by a water system, the system may include these types of structure in its sampling pool.

4. Any community water system with insufficient tier 1 sampling sites shall use “tier 2 sampling sites”, which consists of buildings, including multiple-family residences that:

   (i) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

   (ii) are served by a lead service line.

5. Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with “tier 3 sampling sites”, consisting of single family structures that contain copper pipes with lead solder installed before 1983. A community water system with insufficient tier 1, tier 2, and tier 3 sampling sites shall complete its sampling pool with representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

(Rule 0400-45-01-.33, continued)

6. Non-transient non-community water systems shall use tier 1 sampling sites for lead and copper. The sampling sites selected for a non-transient non-community water system ("tier 1 sampling sites") shall consist of buildings that:

   (i) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

   (ii) are served by a lead service line.

7. A non-transient non-community water system with insufficient tier 1 sites that meet the targeting criteria in part 6 of this subparagraph shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983. If additional sites are needed to complete the sampling pool, the non- transient non-community water system shall use representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

8. Any water system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first-draw samples from all of the sites identified as being served by such lines.

(b) Sample collection methods.

1. All tap samples for lead and copper collected in accordance with this rule, with the exception of lead service line samples collected under subparagraph (5)(c) of this rule and samples collected under part 5 of this subparagraph, shall be first-draw samples.

2. Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. First-draw samples from residential housing shall be collected from the cold water kitchen tap or bathroom sink tap. First-draw samples from a nonresidential building shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to part 5 of this subparagraph shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. First-draw samples may be collected by the system or the system may allow residents to collect first-draw samples after instructing the residents of the sampling procedures specified in this subparagraph. To avoid problems of residents handling nitric acid, acidification of first-draw samples may be done up to 14 days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

3. Each lead service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:

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(i) at the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and lead service line;

(ii) tapping directly into the lead service line.

(iii) If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

4. A water system shall collect each first draw tap sample from the same sampling site from which it collected the previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

5. A non-transient non-community water system, or a community water system that meets the criteria of subparts (6)(c)7(i) and (ii) of this rule, that does not have enough taps that can supply first-draw samples, as defined in Rule 0400-45-01-.04, may apply to the Department in writing to substitute non-first-draw samples. Such systems must collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites. The Department has the discretion to waive the requirement for prior Department approval of non-first-draw sample sites selected by the system, either through Department regulation or written notification to the system.

(c) Number of samples. Water systems shall collect at least one sample during each monitoring period specified in subparagraph (d) of this paragraph from the number of sites listed in the first column ("standard monitoring") of the table in this subparagraph. A system conducting reduced monitoring under part (d)4 of this paragraph shall collect at least one sample from the number of sites specified in the second column ("reduced monitoring") of the table in this paragraph during each monitoring period specified in part (d)4 of this paragraph. Such reduced monitoring sites shall be representative of the sites required for standard monitoring. A public water system that has fewer than five drinking water taps, that can be used for human consumption meeting the sample site criteria of subparagraph (a) of this paragraph to reach the required number of sample sites listed in this subparagraph, must collect at least one sample from each tap and then must collect additional samples from those taps on different days during the monitoring period to meet the required number of sites. Alternatively, the Department may allow these public water systems to collect a number of samples less than the number of sites specified in this subparagraph, provided that 100 percent of all taps that can be used for human consumption are sampled. The Department must approve this reduction of the minimum number of samples in writing based on a request from the system or onsite verification by the Department. The Department may specify sampling locations when a system is conducting reduced monitoring. The table is as follows:

TABLE 0400-45-01-.33(7)(c)

| System size (number of People served)[1] | Number of sites (standard monitoring) | Number of sites (reduced monitoring) |
|---|---|---|
| >100,000 | 100 | 50 |
| 10,001 to 100,000 | 60 | 30 |

(Rule 0400-45-01-.33, continued)

| | | |
|---|---|---|
| 3,301 to 10,000 | 40 | 20 |
| 501 to 3,300 | 20 | 10 |
| 101 to 500 | 10 | 5 |
| less than or equal to 100 | 5 | 5 |

[1] Populations shall be determined by count of the population served or by the household factor multiplied by the number of connections the system has as determined by the latest federal census. Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.

(d) Timing of Monitoring

1. Initial tap sampling. The first six-month monitoring period for small, medium-size and large systems shall begin on the following dates:

TABLE 0400-45-01-.33(7)(d)1

| System size (No. People served)[1] | First six-month monitoring period begins on |
|---|---|
| > 50,000 | January 1, 1992 |
| 3,301 to 50,000 | July 1, 1992 |
| less than or equal to 3,300 | July 1, 1993 |

[1] Populations shall be determined by count of the population served or by the household factor multiplied by the number of connections the system has as determined by the latest federal census. Water systems serving multi-family residences such as apartment complexes and mobile home parks shall include each individual residence unit as a connection in determining the population for the system.

(i) All large systems shall monitor for at least two consecutive six-month periods; and

(ii) All small and medium-size systems shall monitor during each six-month monitoring period until:

(I) the system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under paragraph (2) of this rule, in which case the system shall continue monitoring in accordance with part 2 of this subparagraph, or

(II) the system meets the lead or copper action levels during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with part 4 of this subparagraph.

2. Monitoring after installation of corrosion control and source water treatment.

(i) Any large system which installs optimal corrosion control treatment pursuant to part (2)(d)4 of this rule shall monitor for at least two consecutive six-month monitoring periods by the date specified in part (2)(d)5 of this rule by January 1, 1998.

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(ii) Any small or medium-size system which installs optimal corrosion control treatment pursuant to part (2)(e)5 of this rule shall monitor for at least two consecutive six-month monitoring periods by the date specified in part (2)(e)6 of this rule.

(iii) Any system which installs source water treatment pursuant to part (4)(a)3 of this rule shall monitor for at least two consecutive six-month monitoring periods by the date specified in part (4)(a)4 of this rule.

3. Monitoring after the Department specifies water quality parameter values for optimal corrosion control. After the Department specifies the values for water quality control parameters pursuant to subparagraph (3)(f) of this rule, the system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the Department specifies the optimal values pursuant to subparagraph (3)(f) of this rule.

4. Reduced Monitoring

(i) A small or medium-size water system that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the number of samples in accordance with subparagraph (c) of this paragraph and reduce the frequency of sampling to once per year. A small or medium water system collecting fewer than five samples as specified in subparagraph (c) of this paragraph, that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the frequency of sampling to once per year. In no case can the system reduce the number of samples required below the minimum of one sample per available tap. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.

(ii) Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Department under subparagraph (3)(f) of this rule during each of two consecutive six-month monitoring periods may reduce the frequency of monitoring to once per year and reduce the number of lead and copper samples in accordance with subparagraph (c) of this paragraph if it receives written approval from the Department. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. The Department shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with paragraph (11) of this rule, and shall notify the system in writing when it determines the system is eligible to commence reduced monitoring pursuant to this paragraph. The Department shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iii) A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Department under subparagraph (3)(f) of this rule during three consecutive years of

(Rule 0400-45-01-.33, continued)

monitoring may reduce the frequency of monitoring from annually to once every three years if it receives written approval from the Department. Samples collected once every three years shall be collected no later than every third calendar year. The Department shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with paragraph (11) of this rule, and shall notify the system in writing when it determines the system is eligible to reduce the frequency of monitoring to once every three years. The Department shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iv) A water system that reduces the number and frequency of sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in subparagraph (a) of this paragraph. Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August, or September unless the Department has approved a different sampling period in accordance with item (I) of this subpart.

(I) The Department may approve a different period for conducting the lead and copper tap sampling for systems collecting a reduced number of samples. Such a period shall be no longer than four consecutive months and must represent a time of normal operation where the highest levels of lead are most likely to occur. For a non-transient non-community water system that does not operate during the months of June through September, and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the Department shall designate a period that represents a time of normal operation for the system. This sampling shall begin during the period approved or designated by the Department in the calendar year immediately following the end of the second consecutive six-month monitoring period for systems initiating annual monitoring and during the three-year period following the end of the third consecutive calendar year of annual monitoring for systems initiating triennial monitoring.

(II) Systems monitoring annually, that have been collecting samples during the months of June through September and that receive Department approval to alter their sample collection period under item (I) of this subpart, must collect their next round of samples during a time period that ends no later than 21 months after the previous round of sampling. Systems monitoring triennially that have been collecting samples during the months of June through September, and receive Department approval to alter the sampling collection period as per item (I) of this subpart, must collect their next round of samples during a time period that ends no later than 45 months after the previous round of sampling. Subsequent rounds of sampling must be collected annually or triennially, as required by this section. Small systems with waivers, granted pursuant to subparagraph (g) of this paragraph, that have been collecting samples during the months of June through September and receive Department approval to alter their sample collection period under item (I) of this subpart must collect their next round of samples before the end of the 9-year period.

(Rule 0400-45-01-.33, continued)

(v) Any water system that demonstrates for two consecutive 6-month monitoring periods that the tap water lead level computed under part (1)(c)3 of this rule is less than or equal to 0.005 mg/L and the tap water copper level computed under part (1)(c)3 of this rule is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with subparagraph (c) of this paragraph and reduce the frequency of sampling to once every three calendar years.

(vi) (I) A small or medium-size water system subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling in accordance with part 3 of this subparagraph and collect the number of samples specified for standard monitoring under subparagraph (c) of this paragraph. Such a system shall also conduct water quality parameter monitoring in accordance with subparagraph (8)(b), (c) or (d) of this rule (as appropriate) during the monitoring period in which it exceeded the action level. Any such system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in subparagraph (c) of this paragraph after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of subpart (i) of this part and/or may resume triennial monitoring for lead and copper at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either subpart (iii) or ~~(d)4~~(v) of this part.

(II) Any water system subject to the reduced monitoring frequency that fails to meet the lead action level during any four-month monitoring period or that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the Department under subparagraph (3)(f) of this rule for more than nine days in any six-month period specified in subparagraph (8)(d) of this rule shall conduct tap water sampling for lead and copper at the frequency specified in part 3 of this subparagraph, collect the number of samples specified for standard monitoring under subparagraph (c) of this paragraph, and shall resume monitoring for water quality parameters within the distribution system in accordance with subparagraph (8)(d) of this rule. This standard tap water sampling shall begin no later than the six-month period beginning January 1 of the calendar year following the lead action level exceedance or water quality parameter excursion. Such a system may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:

I. The system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in subparagraph (c) of this paragraph after it has completed two subsequent six-month rounds of monitoring that meet the criteria of subpart (ii) of this part and the system has received written approval from the Department that it is appropriate to resume reduced monitoring on an annual frequency. This sampling shall begin during the calendar year immediately following the end of the second consecutive six month monitoring period.

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II. The system may resume triennial monitoring for lead and copper at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either subpart (iii) or (v) of this part and the system has received written approval from the Department that it is appropriate to resume triennial monitoring.

III. The system may reduce the number of water quality parameter tap water samples required in accordance with part (8)(e)1 of this rule and the frequency with which it collects such samples in accordance with part (8)(e)2 of this rule. Such a system may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of part (8)(e)2 of this rule, that it has re-qualified for triennial monitoring.

(vii) Any water system subject to a reduced monitoring frequency under this part shall notify the Department in writing in accordance with part (11)(a)3 of this rule of any upcoming long term change in treatment or addition of a new source as described in part (11)(a)3 of this rule. The Department must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The Department may require the system to resume sampling in accordance with part 3 of this subparagraph and collect the number of samples specified for standard monitoring under subparagraph (c) of this paragraph or take other appropriate steps such as increased water quality parameter monitoring or reevaluation of its corrosion control treatment given the potentially different water quality considerations.

(e) Additional monitoring by systems. The results of any monitoring conducted in addition to the minimum requirements of this paragraph shall be considered by the system and may be considered by the Department in making any determinations (i.e., calculating the 90th percentile lead or copper level) under this rule.

(f) Invalidation of lead or copper tap water samples. A sample invalidated under this subparagraph does not count toward determining lead or copper 90th percentile levels under subparagraph (1)(c) of this rule or toward meeting the minimum monitoring requirements of subparagraph (c) of this paragraph.

1. The Department may invalidate a lead or copper tap water sample at least if one of the following conditions is met.

(i) The laboratory establishes that improper sample analysis caused erroneous results.

(ii) The Department determines that the sample was taken from a site that did not meet the site selection criteria of this paragraph.

(iii) The sample container was damaged in transit.

(iv) There is substantial reason to believe that the sample was subject to tampering.

2. The system must report the results of all samples to the Department and all supporting documentation for samples the system believes should be invalidated.

3. To invalidate a sample under part 1 of this subparagraph, the decision and the rationale for the decision must be documented in writing. The Department may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.

4. The water system must collect replacement samples for any samples invalidated under this subparagraph if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of subparagraph (c) of this paragraph. Any such replacement samples must be taken as soon as possible, but no later than 20 days after the date the Department invalidates the sample or by the end of the applicable monitoring period, whichever occurs later. Replacement samples taken after the end of the applicable monitoring period shall not also be used to meet the monitoring requirements of a subsequent monitoring period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the monitoring period.

(g) Monitoring waivers for small systems. Any small system serving fewer than 3300 persons that meets the criteria of this paragraph may apply to the Department to reduce the frequency of monitoring for lead and copper under this paragraph to once every nine years (i.e., a “full waiver”) if it meets all of the materials criteria specified in part 1 of this subparagraph and all of the monitoring criteria specified in part 2 of this subparagraph. Any small system that meets the criteria in parts 1 and 2 of this subparagraph only for lead, or only for copper, may apply to the Department for a waiver to reduce the frequency of tap water monitoring to once every nine years for that contaminant only (i.e., a “partial waiver”).

1. Materials criteria. The system must demonstrate that its distribution system and service lines and all drinking water supply plumbing, including plumbing conveying drinking water within all residences and buildings connected to the system, are free of lead- containing materials and/or copper-containing materials, as those terms are defined in this rule, as follows:

(i) Lead. To qualify for a full waiver, or a waiver of the tap water monitoring requirements for lead (i.e., a “lead waiver”), the water system must provide certification and supporting documentation to the Department that the system is free of all lead-containing materials, as follows:

(I) It contains no plastic pipes which contain lead plasticizers, or plastic service lines which contain lead plasticizers; and

(II) It is free of lead service lines, lead pipes, lead soldered pipe joints, and leaded brass or bronze alloy fittings and fixtures, unless such fittings and fixtures meet the specifications of any standard established pursuant to 42 U.S.C. 300g-6(e) [SDWA section 1417(e)].

(ii) Copper. To qualify for a full waiver, or a waiver of the tap water monitoring requirements for copper (i.e., a “copper waiver”), the water system must provide certification and supporting documentation to the Department that the system contains no copper pipes or copper service lines.

2. Monitoring criteria for waiver issuance. The system must have completed at least one 6-month round of standard tap water monitoring for lead and copper at sites approved by the Department and from the number of sites required by

(Rule 0400-45-01-.33, continued)

subparagraph (c) of this paragraph and demonstrate that the 90th percentile levels for any and all rounds of monitoring conducted since the system became free of all lead-containing and/or copper-containing materials, as appropriate, meet the following criteria.

(i) Lead levels. To qualify for a full waiver, or a lead waiver, the system must demonstrate that the 90th percentile lead level does not exceed 0.005 mg/L.

(ii) Copper levels. To qualify for a full waiver, or a copper waiver, the system must demonstrate that the 90th percentile copper level does not exceed 0.65 mg/L.

3. Department approval of waiver application. The Department shall notify the system of its waiver determination, in writing, setting forth the basis of its decision and any condition of the waiver. As a condition of the waiver, the Department may require the system to perform specific activities (e.g., limited monitoring, periodic outreach to customers to remind them to avoid installation of materials that might void the waiver) to avoid the risk of lead or copper concentration of concern in tap water. The small system must continue monitoring for lead and copper at the tap as required by parts (d)1 through (d)4 of this paragraph, as appropriate, until it receives written notification from the Department that the waiver has been approved.

4. Monitoring frequency for systems with waivers.

(i) A system with a full waiver must conduct tap water monitoring for lead and copper in accordance with subpart (d)4(iv) of this paragraph at the reduced number of sampling sites identified in subparagraph (c) of this paragraph at least once every nine years and provide the materials certification specified in part 1 of this subparagraph for both lead and copper to the Department along with the monitoring results. Samples collected every nine years shall be collected no later than every ninth calendar year.

(ii) A system with a partial waiver must conduct tap water monitoring for the waived contaminant in accordance with subpart (d)4(iv) of this paragraph at the reduced number of sampling sites specified in subparagraph (c) of this paragraph at least once every nine years and provide the materials certification specified in part 1 of this subparagraph pertaining to the waived contaminant along with the monitoring results. Such a system also must continue to monitor for the non-waived contaminant in accordance with requirements of parts (d)1 through 4 of this paragraph, as appropriate.

(iii) Any water system with a full or partial waiver shall notify the Department in writing in accordance with part (11)(a)3 of this rule of any upcoming long-term change in treatment or addition of a new source, as described in that paragraph. The Department must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The Department has the authority to require the system to add or modify waiver conditions (e.g., require recertification that the system is free of lead-containing and/or copper-containing materials, require additional round(s) of monitoring), if it deems such modifications are necessary to address treatment or source water changes at the system.

(Rule 0400-45-01-.33, continued)

(iv) If a system with a full or partial waiver becomes aware that it is no longer free of lead-containing or copper-containing materials, as appropriate, (e.g., as a result of new construction or repairs), the system shall notify the Department in writing no later than 60 days after becoming aware of such a change.

5. Continued eligibility. If the system continues to satisfy the requirements of part 4 of this subparagraph, the waiver will be renewed automatically, unless any of the conditions listed in subparts (i) through (iii) of this part occurs. A system whose waiver has been revoked may re-apply for a waiver at such time as it again meets the appropriate materials and monitoring criteria of parts 1 and 2 of this subparagraph.

(i) A system with a full waiver or a lead waiver no longer satisfies the materials criteria of subpart 1(i) of this subparagraph or has a 90th percentile lead level greater than 0.005 mg/L.

(ii) A system with a full waiver or a copper waiver no longer satisfies the materials criteria of subpart 1(ii) of this subparagraph or has a 90th percentile copper level greater than 0.65 mg/L.

(iii) The Department notifies the system, in writing, that the waiver has been revoked, setting forth the basis of its decision.

6. Requirements following waiver revocation. A system whose full or partial waiver has been revoked by the Department is subject to the corrosion control treatment and lead and copper tap water monitoring requirements, as follows:

(i) If the system exceeds the lead and/or copper action level, the system must implement corrosion control treatment in accordance with the deadlines specified in subparagraph (2)(e) of this rule, and any other applicable requirements of of this rule.

(ii) If the system meets both the lead and the copper action level, the system must monitor for lead and copper at the tap no less frequently than once every three years using the reduced number of sample sites specified in subparagraph (c) of this paragraph.

7. Pre-existing waivers. Small system waivers approved by the Department in writing prior to April 11, 2000 shall remain in effect under the following conditions:

(i) If the system has demonstrated that it is both free of lead-containing and copper-containing materials, as required by part 1 of this subparagraph and that its 90th percentile lead levels and 90th percentile copper levels meet the criteria of part 2 of this subparagraph, the waiver remains in effect so long as the system continues to meet the waiver eligibility criteria of part 5 of this subparagraph. The first round of tap water monitoring conducted pursuant to part 4 of this subparagraph shall be completed no later than nine years after the last time the system has monitored for lead and copper at the tap.

(ii) If the system has met the materials criteria of part 1 of this subparagraph but has not met the monitoring criteria of part 2 of this subparagraph, the system shall conduct a round of monitoring for lead and copper at the tap demonstrating that it meets the criteria of part 2 of this subparagraph no later than September 30, 2000, or the effective date of this rule whichever

(Rule 0400-45-01-.33, continued)

is later. Thereafter, the waiver shall remain in effect as long as the system meets the continued eligibility criteria of part 5 of this subparagraph. The first round of tap water monitoring conducted pursuant to part 4 of this subparagraph shall be completed no later than nine years after the round of monitoring conducted pursuant to part 2 of this subparagraph.

(8) Monitoring requirements for water quality parameters.

All large water systems and all small and medium-size systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this paragraph. The requirements of this paragraph are summarized in the table at the end of this paragraph.

(a) General Requirements.

1. Sample Collection Methods.

(i) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system, and seasonal variability. Tap sampling under this subpart is not required to be conducted at taps targeted for lead and copper sampling pursuant to subparagraph (7)(a) of this rule. (Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for coliform sampling).

(ii) Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

2. Number of samples.

(i) Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under subparagraphs (b) through (e) of this paragraph from the following number of sites.

TABLE 0400-45-01-.33(8)(a)2(i)

| System size (No. People served) | No. of sites for water quality parameters |
|---|---|
| > 100,000…… | 25 |
| 10,001-100,000…….. | 10 |
| 3,301 to 10,000……. | 3 |
| 501 to 3,300……. | 2 |
| 101 to 500…… | 1 |
| ≤ 100…… | 1 |

(ii) Except as provided in part (c)3 of this paragraph, systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in subparagraph (b) of this paragraph.

(Rule 0400-45-01-.33, continued)

(b) Initial Sampling. All large water systems shall measure the applicable water quality parameters as specified in part 1 of this subparagraph at taps and at each entry point to the distribution system during each six-month monitoring period specified in part (7)(d)1 of this rule. All small and medium size systems shall measure the applicable water quality parameters at the locations specified in parts 1 and 2 of this subparagraph during each six-month monitoring period specified in part (7)(d)1 of this rule during which the system exceeds the lead or copper action level.

1. Water Quality Parameters for Monitoring at Taps:

(i) pH;
(ii) Alkalinity;
(iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;
(iv) Silica, when an inhibitor containing a silicate compound is used;
(v) Calcium;
(vi) Conductivity;
(vii) Water temperature; and
(viii) Other parameters as specified by the Department.

2. At each entry point to the distribution system: all of the applicable parameters listed in part 1 of this subparagraph.

(c) Monitoring after Installation of corrosion control. Any large system which installs optimal corrosion control treatment pursuant to part (2)(d)4 of this rule shall measure the water quality parameters at the locations and frequencies specified in parts 1, 2 and 3 of this subparagraph during each six-month monitoring period specified in subpart (7)(d)2(i) of this rule. Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in subpart (7)(d)2(ii) of this rule in which the system exceeds the lead or copper action level.

1. Water Quality Parameters for Monitoring at Taps, two samples for:

(i) pH;
(ii) Alkalinity;
(iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;
(iv) Silica, when an inhibitor containing a silicate compound is used;
(v) Calcium, when calcium carbonate stabilization is used as part of corrosion control; and
(vi) Other parameters as specified by the Department.

2. Except as provided in part 3 of this subparagraph, at each entry point to the distribution system, at least one sample no less frequently than every two weeks (biweekly) for:

(i) pH;

(ii) When alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and

(iii) When a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).

(iv) Other parameters as specified by the Department.

3. Any ground water system can limit entry point sampling described in part 2 of this subparagraph to those entry points that are representative of water quality and treatment conditions throughout the system. If water from untreated ground water sources mixes with water from treated ground water sources, the system must monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of any monitoring under this subparagraph, the system shall provide to the Department written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(d) Monitoring after the Department specifies water quality parameter values for optimal corrosion control. After the Department specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under subparagraph (3)(f) of this rule, all large systems shall measure the applicable water quality parameters in accordance with subparagraph (c) of this paragraph and determine compliance with the requirements of subparagraph (3)(g) of this rule every six months with the first six-month period to begin either January 1 or July 1, whichever comes first, after the Department specifies the optimal values under subparagraph (3)(f) of this rule. Any small or medium-size system shall conduct such monitoring during each six-month period specified in this subparagraph in which the system exceeds the lead or copper action level. For any such small and medium-size system that is subject to a reduced monitoring frequency pursuant to part (7)(d)4 of this rule at the time of the action level exceedance, the start of the applicable six-month period under this subparagraph shall coincide with the start of the applicable monitoring period under part (7)(d)4 of this rule. Compliance with Department-designated optimal water quality parameter values shall be determined as specified under subparagraph (3)(g) of this rule.

(e) Reduced monitoring.

1. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods under subparagraph (d) of this paragraph shall continue monitoring at the entry point(s) to the distribution system as specified in part (c)2 of this paragraph. The system may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period, if it qualifies for and requests reduced tap monitoring for water quality parameters.

TABLE 0400-45-01-.33(8)(e)1

| System size (No. People served) | No. of sites for water quality parameters |
|---|---|
| > 100,000…….. | 10 |
| 10,001-100,000…… | 7 |
| 3,301 to 10,000…… | 3 |
| 501 to 3,300…….. | 2 |
| 101 to 500…… | 1 |
| ≤ 100…… | 1 |

(Rule 0400-45-01-.33, continued)

2. (i) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Department under subparagraph (3)(f) of this rule during three consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in part 1 of this subparagraph from every six months to annually. This sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of six-month monitoring occurs. Any water system that maintains the range of values for water quality parameters reflecting optimal corrosion control treatment specified by the Department under subparagraph (3)(f) of this rule during three consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in part 1 of this subparagraph from annually to every three years. This sampling begins no later than the third calendar year following the end of the monitoring period in which the third consecutive year of monitoring occurs.

(ii) A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in part 1 of this subparagraph to every three years if it demonstrates during two consecutive monitoring periods that its tap water lead level at the 90th percentile is less than or equal to the PQL for lead specified in subparagraph (10)(e) of Rule 0400-45-01-.14, that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L for copper in part (1)(c)2 of this rule, and that it also has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Department under subparagraph (3)(f) of this rule. Monitoring conducted every three years shall be done no later than every third calendar year.

3. A water system that conducts sampling annually shall collect these samples throughout the year so as to reflect seasonal variability as per this subparagraph.

4. Any water system subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the Department in subparagraph (3)(f) for more than nine days in any six-month period specified in subparagraph (3)(g) shall resume distribution system tap water sampling in accordance with the number and frequency requirements in subparagraph (d) of this paragraph. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in part 1 of this subparagraph after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of of part 1 of this subparagraph and/or may resume triennial monitoring for water quality parameters at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either subpart 2(i) or (ii) of this subparagraph.

(f) Additional monitoring by systems. The results of any monitoring conducted in addition to the minimum requirements of this paragraph shall be considered by the system and may be considered by the Department in making any determinations (i.e., determining concentrations of water quality parameters) under this paragraph or paragraph (3) of this rule.

TABLE 0400-45-01-.33(8)(f)
SUMMARY OF MONITORING REQUIREMENTS FOR WATER QUALITY PARAMETERS[1]

(Rule 0400-45-01-.33, continued)

| Monitoring Period | Parameters[2] | Location | Frequency |
|---|---|---|---|
| Initial Monitoring | pH, alkalinity, orthophosphate, or silica[3] calcium, or conductivity, temperature | Taps and at entry point(s) to distribution system | Every 6 months |
| After Installation of Corrosion Control | pH, alkalinity, orthophosphate, or silica[3] calcium[4] | Taps | Every 6 months |
| | pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control) inhibitor dosage rate and inhibitor residual[5] | Entry point(s) to distribution system | No less frequently than every two weeks |
| After Department Specifies Parameter Values for Optimal Corrosion Control | pH, alkalinity, orthophosphate or silica[3], calcium[4] | Entry point(s) to distribution system | Every 6 months |
| | pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control) inhibitor dosage rate and inhibitor residual[5] | Entry point(s) to distribution system | No less frequently than every two weeks. |
| Reduced Monitoring | pH, alkalinity, orthophosphate or silica[3], calcium[4] | Taps | Every 6 months, annually[7],or every 3 years[8] reduced number of sites |
| | pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control) inhibitor dosage rate and inhibitor residual[5] | Entry point(s) to distribution system | No less frequently than every two weeks. |

1 Table is for illustrative purposes; consult the text of this section for precise regulatory requirements.
2 Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.
3 Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.
4 Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.
5 Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.
6 Ground water systems may limit monitoring to representative locations throughout the system.
7 Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of monitoring.
8 Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every 3 years if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of annual monitoring. Water systems may accelerate to triennial monitoring for water quality parameters at the tap if they have maintained 90th percentile lead levels less than or equal to 0.005 mg/L, 90th percentile copper levels less than or equal to 0.65 mg/L, and the range of water quality parameters designated by the Department under paragraph (3)(f) as representing optimal corrosion control during two consecutive six-month monitoring periods.

(9) Monitoring requirements for lead and copper in source water.

(Rule 0400-45-01-.33, continued)

(a) Sample location, collection methods, and number of samples.

1. A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with paragraph (7) of this rule shall collect lead and copper source water samples in accordance with the following requirements regarding sample location, number of samples, and collection methods:

(i) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). The system shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(ii) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

Note: For the purposes of this subpart, surface water systems include systems with a combination of surface and ground sources.

(iii) If a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(iv) The Department may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples must be done by certified laboratory personnel. Composite samples from a maximum of five samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 mg/L or the copper concentration is greater than or equal to 0.160 mg/L, then either:

(I) A follow-up sample shall be taken and analyzed within 14 days at each sampling point included in the composite; or

(II) If duplicates of or sufficient quantities from the original samples from each sampling point used in the composite are available, the system may use these instead of resampling.

2. Where the results of sampling indicate an exceedance of maximum permissible source water levels established under part (4)(b)4 of this rule, one confirmation sample shall be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point. If a required confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the Department-specified maximum permissible level. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit, but below the practical quantitation limit (PQL), as set forth in subparagraph (10)(d) of Rule 0400-45-01-.14, shall either be considered as the measured value or be considered one-half the PQL.

(Rule 0400-45-01-.33, continued)

(b) Monitoring frequency after system exceeds tap water action level. Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or if the Department has established an alternate monitoring period, the last day of that period.

(c) Monitoring frequency after installation of source water treatment. Any system which installs source water treatment pursuant to part (4)(a)3 of this rule shall collect an additional source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified in part (4)(a)4 of this rule.

(d) Monitoring frequency after the Department specifies maximum permissible source water levels or determines that source water treatment is not needed.

1. A system shall monitor at the frequency specified in subpart (i) or (ii) of this part in cases where the Department specifies maximum permissible source water levels pursuant to part (4)(b)4 of this rule or determines that the system is not required to install source water treatment pursuant to part (4)(b)2 of this rule.

(i) A water system using only groundwater shall collect samples once during the three-year compliance period in effect when the applicable Department determination under part 1 of this subparagraph is made. Such systems shall collect samples once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.

(ii) A water system using surface water (or a combination of surface water and ground water) shall collect samples once during each calendar year, the first annual monitoring period to begin during the year in which the applicable Department determination is made under part 1 of this subparagraph.

2. A system is not required to conduct source water sampling for lead and/or copper if the system meets the action level for the specific contaminant in tap water samples during the entire source water sampling period applicable to the system under subpart 1(i) or (ii) of this subparagraph.

(e) Reduced monitoring frequency.

1. A water system using only ground water may reduce the monitoring frequency for lead and copper in source water to once during each nine-year compliance cycle provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Department in part (4)(b)4 of this rule during at least three consecutive compliance periods under part (d)1 of this paragraph, or

(ii) The Department has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive compliance periods in which sampling was conducted under part (d)1 of

(Rule 0400-45-01-.33, continued)

this paragraph, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.

2. A water system using surface water (or a combination of surface water and ground water) may reduce the monitoring frequency in part (d)1 of this paragraph to once during each nine-year compliance cycle provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Department in part (4)(b)4 of this rule for at least three consecutive years; or

(ii) The Department has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive years, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.

3. A water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the Department in part (4)(a)5 of this rule.

(10) Reserved

(11) Reporting requirements. All water systems shall report all of the following information to the Department in accordance with this paragraph.

(a) Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.

1. Except as provided in subpart (viii) of this part, a water system shall report the information specified subparts (i) through (viii) of this part for all tap water samples specified in paragraph (7) of this rule and for all water quality parameter samples specified in paragraph (8) of this rule within the first 10 days following the end of each applicable monitoring period specified in paragraphs (7) and (8) of this rule (i.e., every six months, annually, every 3 years, or every 9 years). For monitoring periods with a duration less than six months, the end of the monitoring period is the last date samples can be collected during that period as specified in paragraphs (7) and (8) of this rule.

(i) The results of all tap samples for lead and copper including the location of each site and criteria under parts (7)(a)3, 4, 5, 6 and/or 7 of this rule, under which the site was selected for the system's sampling pool;

(ii) Documentation for each tap water lead or copper sample for which the water system requests invalidation pursuant to part (7)(f)2 of this rule;

(iii) [Reserved];

(iv) The 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring

(Rule 0400-45-01-.33, continued)

period calculated in accordance with part (1)(c)3 of this rule, unless the Department calculates the system's 90th percentile lead and copper levels under subparagraph (h) of this paragraph;

(v) With the exception of initial tap sampling conducted pursuant to part (7)(d)1 of this rule, the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

(vi) The results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected pursuant to subparagraphs (8)(b) through (e) of this rule; and

(vii) The results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under subparagraphs (8)(b) through (e) of this rule;

(viii) A water system shall report the results of all water quality parameter samples collected under subparagraphs (8)(c) through (f) of this rule during each six-month monitoring period specified in subparagraph (8)(d) of this rule within the first 10 days following the end of the monitoring period unless the Department has specified a more frequent reporting requirement.

2. For a non-transient non-community water system, or a community water system meeting the criteria of subparts (6)(c)7(i) and (ii) of this rule, that does not have enough taps that can provide first-draw samples, the system must either:

(i) Provide written documentation to the Department identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under part (7)(b)5 of this rule by the start of the first applicable monitoring period under paragraph (7)(d) of this rule that commences after April 11, 2000, unless the Department has waived prior Department approval of non-first-draw sample sites selected by the system pursuant to part (7)(b)5 of this rule; or

(ii) If the Department has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to part (7)(b)5 of this rule and include this information with the lead and copper tap sample results required to be submitted pursuant to subpart 1(i) of this subparagraph.

3. At a time specified by the Department, or if no specific time is designated by the Department then as early as possible prior to the addition of a new source or any change in water treatment, a water system deemed to have optimized corrosion control under part (2)(b)3 of this rule, a water system subject to reduced monitoring pursuant to part (7)(d)4 of this rule, or a water system subject to a monitoring waiver pursuant to subparagraph (7)(g) of this rule, shall submit written documentation to the Department describing the change or addition. The Department must review and approve the addition of a new source or long-term change in treatment before it is implemented by the water system. Examples of long-term treatment changes include the addition of a new treatment process or modification of an existing treatment process. Examples of modifications include switching secondary disinfectants, switching coagulants (e.g., alum to ferric chloride), and switching corrosion inhibitor products (e.g., orthophosphate to

(Rule 0400-45-01-.33, continued)

blended phosphate). Long-term changes can include dose changes to existing chemicals if the system is planning long-term changes to its finished water pH or residual inhibitor concentration. Long-term treatment changes would not include chemical dose fluctuations associated with daily raw water quality changes.

4. Any small system applying for a monitoring waiver under subparagraph (7)(g) of this rule, or subject to a waiver granted pursuant to part (7)(g)3 of this rule, shall provide the following information to the Department in writing by the specified deadline:

(i) By the start of the first applicable monitoring period in subparagraph (7)(d) of this rule, any small water system applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of parts (7)(g)1 and 2 of this rule.

(ii) No later than nine years after the monitoring previously conducted pursuant to part (7)(g)2 or subpart (7)(g)4(i) of this rule, each small system desiring to maintain its monitoring waiver shall provide the information required by subparts (7)(g)4(i) and (ii) of this rule.

(iii) No later than 60 days after it becomes aware that it is no longer free of lead-containing and/or copper-containing material, as appropriate, each small system with a monitoring waiver shall provide written notification to the Department, setting forth the circumstances resulting in the lead-containing and/or copper-containing materials being introduced into the system and what corrective action, if any, the system plans to remove these materials.

(iv) By October 10, 2000, any small system with a waiver granted prior to April 11, 2000 and that has not previously met the requirements of part (7)(g)2 of this rule shall provide the information required by that part.

5. Each ground water system that limits water quality parameter monitoring to a subset of entry points under part (8)(c)3 of this rule shall provide, by the commencement of such monitoring, written correspondence to the Department that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(b) Source water monitoring reporting requirements.

1. A water system shall report the sampling results for all source water samples collected in accordance with paragraph (9) of this rule within the first 10 days following the end of each source water monitoring period (i.e., annually, per compliance period, per compliance cycle) specified in paragraph (9) of this rule.

2. With the exception of the first round of source water sampling conducted pursuant to subparagraph (9)(b) of this rule, the system shall specify any entry point which was not sampled during previous monitoring periods and include an explanation of why the sampling point has changed.

(c) Corrosion control treatment reporting requirements. By the applicable dates under paragraph (2) of this rule, systems shall report the following information:

1. For systems demonstrating that they have already optimized corrosion control, information required pursuant to part (2)(b)2 or 3 of this rule;

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2. For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatments pursuant to subparagraph (3)(a) of this rule;

3. For systems required to evaluate the effectiveness of corrosion control treatments pursuant to subparagraph (3)(c) of this rule, the information required by that subparagraph; and

4. For systems required to install optimal corrosion control designated by the Department pursuant to subparagraph (3)(d) of this rule, a letter certifying that the system has completed installing that treatment.

(d) Source water treatment reporting requirements. By the applicable dates pursuant to paragraph (4) of this rule, systems shall provide the following information to the Department:

1. If required under part (4)(b)1 of this rule, their recommendation regarding source water treatment;

2. For systems required to install source water treatment pursuant to part (4)(b)2 of this rule, a letter certifying that the system has completed installing the treatment designated by the Department within 24 months after the Department designated the treatment.

(e) Lead service line replacement reporting requirements. A system shall report the following information to the Department to demonstrate compliance with the requirements of paragraph (5) of this rule:

1. No later than 12 months after the end of the monitoring period in which a system exceeds the lead action level in sampling referred to in subparagraph (5)(a) of this rule, the system must submit written documentation to the Department of the material evaluation conducted as required in subparagraph (7)(a) of this rule, identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level and provide the system's schedule for annually replacing at least 7 percent of the initial number of lead service lines in its distribution system.

2. No later than 12 months after the end of the monitoring period in which a system exceeds the lead action level in sampling pursuant to subparagraph (5)(a) of this rule, and every 12 months thereafter, the system shall demonstrate to the Department in writing that the system has either:

(i) Replaced in the previous 12 months at least 7 percent of the initial lead service lines (or a greater number of lines specified by the Department pursuant to subparagraph (5)(e) of this rule in its distribution system); or

(ii) Conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to part (7)(b)3 of this rule is less than or equal to 0.015 mg/L. In such cases, the total number of lines replaced and/or which meet the criteria in subparagraph (5)(c) of this rule shall equal at least 7 percent of the initial number of lead lines identified under part 1 of this subparagraph (or the percentage specified by the Department under subparagraph (5)(e) of this rule).

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3. The annual writing submitted to the Department under part 2 of this subparagraph shall contain the following information:

(i) The number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule;

(ii) The number and location of each lead service line replaced during the previous year of the system's replacement schedule; and

(iii) If water samples are collected, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

4. Any system which collects lead service line samples following partial lead service line replacement required by paragraph (5) of this rule shall report the results to the Department within the first ten days of the month following the month in which the system receives the laboratory results, or as specified by the Department. The Department, at its discretion, may eliminate this requirement to report these monitoring results. Systems shall also report any additional information as specified by the Department, and in a time and manner prescribed by the Department, to verify that all partial lead service line replacement activities have taken place.

(f) Public education program reporting requirements.

1. Any water system that is subject to the public education requirements in paragraph (6) of this rule shall, within ten days after the end of each period in which the system is required to perform public education tasks in accordance with subparagraph (6)(c) of this rule, send written documentation to the Department that contains:

(i) A demonstration that the system has delivered the public education materials that meet the content requirements in subparagraphs (6)(a) and (b) of this rule and the delivery requirements in subparagraph (6)(c) of this rule; and

(ii) A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the system delivered public education materials during the period in which the system was required to perform public education tasks.

2. Unless required by the Department, a system that previously has submitted the information required by subpart 1(ii) of this subparagraph need not resubmit the information required by subpart 1(ii) of this subparagraph, as long as there have been no changes in the distribution list and the system certifies that the public education materials were distributed to the same list submitted previously.

3. No later than 3 months following the end of the monitoring period, each system must mail a sample copy of the consumer notification of tap results to the Department along with a certification that the notification has been distributed in a manner consistent with the requirements of subparagraph (6)(e) of this rule.

(g) Reporting of additional monitoring data. Any system which collects sampling data in addition to that required by the lead and copper control regulations shall report the results to the Department by the end of the applicable monitoring period under paragraphs (7), (8) and (9) of this rule during which the samples are collected.

(Rule 0400-45-01-.33, continued)

(h) Reporting of 90th percentile lead and copper concentrations where the Department calculates a system's 90th percentile concentrations. A water system is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by subpart (a)1(iv) of this paragraph if:

1. The Department has previously notified the water system that it will calculate the water system's 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to subpart 2(i) of this subparagraph, and has specified a date before the end of the applicable monitoring period by which the system must provide the results of lead and copper tap water samples;

2. The system has provided the following information to the Department by the date specified in part 1 of this subparagraph:

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under parts (7)(a)3, 4, 5, 6 and/or 7 of this rule under which the site was selected for the system's sampling pool, pursuant to subpart (a)1(i) of this paragraph; and

(ii) An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed; and

3. The Department has provided the results of the 90th percentile lead and copper calculations, in writing, to the water system before the end of the monitoring period.

(12) Recordkeeping requirements. Any system subject to the requirements of this rule shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, Department determinations, and any other information required by paragraphs (2) through (9) of this rule. Each water system shall retain the records required by this paragraph for no fewer than 12 years.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.34 DRINKING WATER SOURCE PROTECTION.**

(1) General Requirements

(a) The requirements of this rule constitute Public Water System Drinking Water Source Protection Regulations, including wellhead protection regulations for public water systems utilizing ground water sources and source protection regulations for public water systems utilizing surface water sources. These regulations establish a statewide program for development and implementation of wellhead protection plans by public water systems (PWS) and source water contamination assessment and planning for surface water supplies. These regulations are intended to protect aquifers and surface water bodies used as potable water supply sources by public water systems from contamination due to hazardous and/or toxic substances entering the ground water or surface water.

1. Ground Water Source

A PWS using a ground source shall prepare a Wellhead Protection Plan which determines a wellhead protection area and identifies significant potential contaminant sources which may have any adverse effect on the health of persons and potential contaminant sources within the area. Each PWS using a ground water source must implement the approved Wellhead Protection Plan and a Wellhead Protection Program. Each PWS using a ground water source shall also develop and maintain a contingency response plan as further specified in paragraph (4) of this rule. The wellhead protection plan shall be submitted for approval by the Department and be available for inspection during subsequent sanitary surveys or other inspections.

2. Surface Water Source

A PWS using a surface water source shall prepare and annually update a contaminant source inventory of significant potential contaminant sources which may have any adverse effect on the health of persons and potential contaminant sources within the source water protection area. The contaminant source inventory and subsequent updates for surface water based systems shall include the notifications roster, response committee designees and other portions of the emergency operations plan pertaining to source water protection implementation. The contaminant source inventory with the required information from the emergency operations plan shall be submitted to the Department every three (3) years starting on December 31, 2006 and be available for inspection during subsequent sanitary surveys or other inspections.

(c) The requirements specified in this rule shall be considered minimum requirements and shall not prevent the PWS from taking additional steps as desired to protect its wells, springs, wellfields, or surface water intakes.

(d) Terms not specifically defined in this rule shall be as defined in the Tennessee Safe Drinking Act (T.C.A. §§ 68-221-701 et seq.) and the Tennessee Water Quality Control Act (T.C.A. §§ 69-3-101 et seq.). For purposes of this rule, the following terms are defined as follows:

1. “Abandoned well” means any well the use of which has been accomplished or permanently discontinued because necessary operating equipment has been removed or a well is in such a state of disrepair that continual use for the purpose for which it was constructed is impractical. A well shall be considered permanently discontinued if it has not been used for a two (2) year period and is not included as a part of the wellhead protection plan as either an emergency backup well or future growth well for the water system. Emergency backup wells and future growth wells must be properly maintained and/or secured. Emergency wells that are not in continuous use must be properly maintained, pumped and tested at least annually. Wells used for the regular, ongoing, collection of water-levels, water-quality, or other scientific measurements are not abandoned, but are considered observation wells. Observation wells must be properly maintained and have adequate protection to prevent their becoming a route for contamination.

(Rule 0400-45-01-.34, continued)

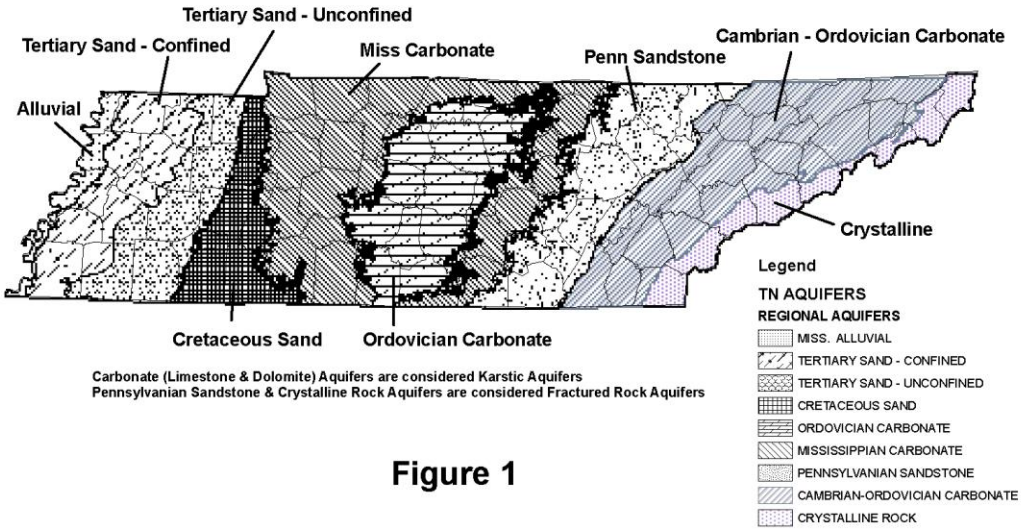


**Figure 1**

2. "Aquifer" means a geologic formation, portion thereof, or group of formations (including overlying unconsolidated material) which contains and is capable of yielding a sufficient quantity of ground water to serve as a domestic or public water supply or other use.

3. "Confined Aquifer" means an aquifer bounded above and below by layers of geologic material with sufficiently low hydraulic conductivity to hamper movement of water into and out of the aquifer.

4. "Critical Source Water Protection Zone" means the surface water body and adjacent land area from one half (1/2) mile downstream of the intake to five (5) miles upstream of the public water system intake, including a one thousand (1000) foot corridor parallel to the designated stream banks and any perennial streams which are tributaries to that stream.

5. "Ground Water" means any waters of the State as defined in T.C.A. § 69-3-103 (Tennessee Water Quality Control Act), occurring below the surface of the ground not contained by artificial barriers.

6. "Leaky Confined Aquifer" means a confined aquifer whose bounding layer of geologic material of lower hydraulic conductivity is sufficiently permeable to transmit water from the overlying unconfined aquifer into the semi-confined (leaky) aquifer.

7. "Karst" means limestone, shaley limestone, dolomite, and/or shaley dolomite rock terrain characterized by highly directional ground water flow in discrete channels or conduits in the form of solutionally enlarged fractures, faults and/or bedding planes. It is not required for karst surface features to be present in the form of sinkholes, disappearing streams, caves and springs for the karst definition to be applicable. This definition includes both conduit flow conditions and flow conditions through microfractures and along bedding planes. Areas of the State

(Rule 0400-45-01-.34, continued)

of Tennessee which are considered to meet this definition are further identified in Figure 1.

8. "Significant Potential Contaminant Source" means a facility or activity that involves the handling of materials that could readily be introduced into the water supply source via spill, leakage, intentional discharge or other release of contaminants and presents a likely threat to drinking water quality and the public health. Significant potential contaminant sources would include, but not be limited to, the following: automotive shops, service stations, automotive body shops, junkyards, salvage yards, machine shops, metal fabrication shops, chemical manufacturers, electronic and electrical equipment manufacturers, boat manufacturers, oil distributors, petroleum bulk stations and terminals, bus and truck terminals, storage or mixing areas for commercial fertilizers, pesticides and herbicides; landfills, construction debris landfills, dumps, sludge spreading or landfills; facilities that generate, treat or dispose of hazardous waste; concentrated animal feedlots, golf courses, and mining areas.

9. "Source Water Management Zone (SWMZ)" means the surface water body and adjacent area that encompasses the water body, tributaries and adjacent land area more than five (5) miles upstream of a public water system intake that includes the remainder of the appropriate watershed within that hydrologic unit.

   Zone A (Inner SWMZ) is the surface water body and adjacent area that is five (5) to fifteen (15) miles upstream of a public water system intake, including a one thousand (1000) foot corridor parallel to the designated stream banks and any perennial streams which are tributaries to that stream.

   Zone B (Outer SWMZ) is the surface water body and adjacent area that is more than fifteen (15) miles upstream of a public water system intake, including a one thousand (1000) foot corridor parallel to the designated stream banks and any perennial streams which are tributaries to that stream.

10. "Source Water Protection Area" means the area upgradient of a public water supply source through which contaminants are reasonably likely to reach such water source. "Source water protection areas" specifically include those areas defined as source water protection areas for surface water intakes and wellhead protection areas for public ground water withdrawal sources.

11. "Wellhead Protection Area" means the surface and subsurface area surrounding a waterwell, wellfield or spring supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well, wellfield or spring.

(e) Each public water system using a ground water source shall complete and maintain its Wellhead Protection Plan within the time set forth in subparagraph (g) of this paragraph. The wellhead protection plan shall include emergency backup wells and wells designated for future growth. Each ground water public water system is designated per size in categories as set forth in Table 0400-45-01-.34(1)(e). Size categories are determined by the number of connections and the amount of water produced. The designation of Public Water Supply categories for systems with ground water sources for purposes of this rule are as follows:

TABLE 0400-45-01-.34(1)(e)

Public Water System Categories
For Systems With Ground Water Sources

(Rule 0400-45-01-.34, continued)

| | | |
|---|---|---|
| Category 1: | (a) | Community PWS with less than 100 connections and less than 20,000 gallons per day (gpd) average daily production |
| | (b) | All Noncommunity PWS |
| Category 2: | (a) | Community PWS with 100 to 999 connections and less than 315,000 gpd average daily production. |
| | (b) | Community PWS with less than 100 connections and 20,000 to 314,999 gpd average daily production. |
| Category 3: | (a) | Community PWS with 1000 to 2999 connections and less than 1,000,000 gpd average daily production. |
| | (b) | Community PWS with less than 1000 connections and 315,000 to 999,999 gpd average daily production. |
| Category 4: | (a) | Community PWS with 3,000 or more connections. |
| | (b) | Community PWS with less than 3,000 connections and 1,000,000 gpd or greater average daily production. |

(f) Each PWS using a ground water source shall perform the following tasks, in accordance with their size category as further set forth in paragraph (2) of this rule and in published guidance.

1. Each PWS shall take photographs and perform field measurements, pursuant to the appropriate size category, in the delineation of their wellhead protection area (Zones 1 and 2 in part 2 of this subparagraph).

2. Each PWS shall designate two zones of protection for their ground water source:

(i) "Wellhead Protection Zone" (Zone 1) -- the zone adjacent to the well or spring where the PWS well or spring actively draws the water which supplies the well or spring, where contamination could enter the aquifer alongside the well casing or be drawn into the cone of depression of the well. The distance for this zone shall be a fixed radius set forth in part 3 of this subparagraph. This zone may be later modified by Departmental approval to reflect hydrogeologic conditions using the same methods acceptable for the Wellhead Management Zone below. Zone 1 requires the highest level of protection.

(ii) "Wellhead Management Zone" (Zone 2) -- the zone surrounding the Wellhead Protection Zone which is delineated on the basis of ground water flow direction and recharge, where contamination is reasonably likely to move toward and reach the well or spring. However, the Wellhead Management Zone for Category 1 systems shall be a fixed radius of 750 feet.

3. The Wellhead Protection Zone (Zone 1) shall be designated as the following radius:

(i) Category 1: 250 feet

(ii) Category 2: 500 feet

(iii) Category 3: 750 feet

(iv) Category 4: 750 feet

4. The Wellhead Management Zone (Zone 2) for Category 1 systems shall be designated as the area encompassed from the 250 foot radius (Zone 1) to a 750

(Rule 0400-45-01-.34, continued)

foot radius. For PWS Categories 2 through 4, Zone 2 shall be as set forth in paragraph (2) of this rule.

5. Each PWS shall notify the governing county body and county/regional planning commission of the designation of the Zones in parts 3 and 4 of this subparagraph, per the Tennessee Safe Drinking Water Act, T.C.A. §§ 68-221-701 et seq. once a wellhead protection plan has been developed and approved and at each update of the plan. The PWS shall describe the concept of Wellhead Protection and Wellhead Management Zones and provide a topographic map or other suitable map of a scale of 1:24000 (1 inch = 2000 feet) or better with the designated area marked. The PWS shall also provide a statement of the intent to pursue a Wellhead Protection Program, soliciting the governing body and planning commission's cooperation. PWS are encouraged to provide representatives for local emergency planning committees.

6. Each PWS shall perform a Potential Contaminant Source Inventory within its designated Wellhead Protection and Wellhead Management Zones to identify all potential contaminant sources located within those zones. For the purposes of this rule, a potential contaminant source shall be defined as any facility, structure, enterprise, function or activity occurring or present within a wellhead protection or management zone which may, as a result of either the normal or abnormal operation thereof, release to the ground waters any pollutant, material or contaminant substance as defined in T.C.A. §§ 69-3-101 et seq. (Tennessee Water Quality Control Act). Examples of land uses and activities which are considered to be potential contaminant sources will be further described in the guidance document to be published by the Department. The potential contaminant source inventory must be submitted to the Department by the time set forth in subparagraph (g) of this paragraph.

7. Each PWS shall submit a Wellhead Protection Plan for Department approval. Plans shall consider hazardous chemical use, storage, spill response notification and contingency planning. In addition, plans shall include public education and participation, proposed local ordinances, proposed zoning changes and other institutional controls. The Plans shall also include provisions for periodic updating. The PWS shall implement the Wellhead Protection Plan as set forth in subparagraph (g) of this paragraph.

8. As the Wellhead Protection Plan is implemented, the PWS shall document any land management strategies available to it which have been employed. Documents may include, but are not limited to the following: ordinances, codes, permits, memoranda of understanding, and public education programs.

9. A PWS may apply to the Department for an extension of the time frame to submit the wellhead protection plan to the Department. The request must be in writing and set forth the basis for the request. A system must provide the following information and data to the Department with a request for an extension:

   (i) number of wells;

   (ii) size of the wellfield;

   (iii) size of zone 1 and zone 2;

   (iv) technical data;

(Rule 0400-45-01-.34, continued)

(v) steps and procedures the PWS has implemented to achieve compliance with these rules; and

(vi) any other information required by the Department.

10. The Department shall determine whether to grant an extension of this requirement. The Department shall consider the following factors in its determination:

(i) technical determination of the zone areas; and

(ii) the activities the PWS has implemented to achieve compliance with these rules.

11. The Department shall either grant or deny a request for an extension of the timeframe to submit the wellhead protection plan. The term of the extension shall be set by the Department, however, the term of the extension shall not exceed three (3) years. A system may request, in writing, that the extension be continued for an additional three (3) years upon good cause shown. The Department shall review and, where appropriate, revise its determination when relevant data or information becomes available.

12. PWS which do not comply with this rule in the development of a Wellhead Protection Plan shall not be eligible for waivers from monitoring requirements for chemicals for which MCL's have been established as set forth in Rules 0400-45-01-.09 and 0400-45-01-.10.

13. A change within the Wellhead Protection area will require an updated Plan. A significant increase in average daily production rates (greater than 25%) and significant new potential contamination sources shall require alteration of the Plan. For purposes of this rule, a significant potential contamination source is defined as any facility, structure, enterprise, function or activity occurring or present within a wellhead protection or management zone which due to an activity or the release of contaminant substances resulting from the normal or abnormal operation of such activity, may present an immediate or increased risk of contamination of the ground waters supplying a spring, well, or wellfield. Updates regarding potential contaminant source inventories shall be performed at least every three years or when significant new potential sources are discovered. The revisions should address any changes in the hydrogeology, delineation of the protection areas, potential contamination sources, and land management strategies. The Department may request an update to the Plan due to change in hydrogeologic conditions (including increased pumping rates) or changes in potential contamination sources which may increase the risk of contamination of the PWS.

14. The PWS shall comply with the terms set forth in paragraph (2) of this rule, to delineate the Wellhead Management Zone. The Department must be notified prior to dye traces being run which may impact a public water system. A dye trace plan must be submitted to the Department for approval. The plan must include the date of the test, the duration of the test, the type and amount of the dye to be injected and any other information the Department requires for evaluation of the test. Dye trace results must also be submitted to the Department.

15. The Wellhead Protection Plan shall include a procedure for notifying the Department of any condition which may impact the provisions of the wellhead

(Rule 0400-45-01-.34, continued)

protection plan or water supply. The PWS shall establish a procedure for notifying the owner or operator of any potential contaminant source which is believed to be discharging substances which may endanger the water supply of the PWS.

This notification shall cite the provisions of the Tennessee Safe Drinking Water Act specifically including the language in T.C.A. § 68-221-711(5) (i.e., "The discharge by any person of sewage or any other waste or contaminant at such proximity to the intake, well or spring serving a public water system in such a manner or quantity that it will or will likely endanger the health or safety of customers of the system or cause damage to the system" is prohibited) and this rule, as well as any local ordinances which implement or support the wellhead protection plan. Such notification to the owner or operator shall also request the owner or operator to abate the activity or discharge. A copy of such notification shall be submitted to the Department.

(g) Public Water Systems Using a Ground Water Source

A PWS using a ground water source must make the following submissions to the Department in the development and update of a Wellhead Protection Plan within the following timeframe:

1. Water systems with new ground water supply sources shall have source approvals in writing by the Department prior to initiation of operation as a public water supply source. An existing water system that was previously not designated as a public water system shall have sixty (60) days upon notification of the determination as a public water system to submit source approval documentation for the Department's review. Source approvals shall include a one-mile radius inventory of significant potential contaminant sources for Category 2, 3 and 4 ground water supplies.

2. Category 2, 3 and 4 public water systems shall submit a wellhead protection area for Department approval within 6 months of operation of the new source. Where the source is in close proximity to an existing withdrawal source such that the wellhead protection area does not require modification, a request to include the new source in the existing wellhead protection area may be submitted. Within one (1) year after the initial operation of the new water source, a contaminant source inventory from within the wellhead protection area and a wellhead protection plan shall be submitted for Department approval. Category 1 ground water PWS shall have wellhead protection plans submitted to the Department within ninety (90) days of initial operation or notification of designation as a public water system by the Department. Each ground water PWS shall notify in writing the governing county body and county/regional planning commission of the designation of the Zones in parts (f)3 and 4 of this paragraph, under the Tennessee Safe Drinking Water Act, T.C.A. §§ 68-221-701 et seq. upon completion of the wellhead protection plan and at subsequent updates.

3. A review of the potential contaminant source inventory must be performed at minimum annually by the category 2, 3, and 4 community systems. Such review shall be documented and kept on file at the water system office. Wellhead protection plans shall be submitted to the Department on a three year cycle. Category 1 community systems shall perform the reviews as a part of their required submittals to the Department every three years with the submittal dates coinciding with the category 2, 3, and 4 community submittals.

(Rule 0400-45-01-.34, continued)

(i) Noncommunity ground water systems shall submit their plans in a format acceptable to the Department in a timeframe based on grand division. On or before June 30, 2005, noncommunity ground water systems in the Western Grand Division are required to submit their plans and every three years subsequently. On or before June 30, 2006, noncommunity ground water systems in the Central Grand Division are required to submit their plans and every three years subsequently. On or before June 30, 2007, noncommunity ground water systems in the Eastern Grand Division are required to submit their plans and every three years subsequently. A change in ownership shall require the submission of a new wellhead protection plan within ninety days of the change of ownership.

(ii) Category 1, 2, 3, and 4 community systems shall submit plans in a three year cycle. Once a plan has been submitted, the PWS shall submit a new plan three years thereafter. Complete plans to include contaminant source inventory maps and photographs shall be submitted on or before December 31, 2016, and every three years subsequently.

The addition of new significant potential contaminant sources during the annual potential contaminant source inventory review shall require an addendum to be submitted to the Department within ninety days of the review.

(h) Public Water Systems Using a Surface Water Source

A community or nontransient noncommunity PWS using a surface water source must at minimum annually perform a survey within the Critical Source Water Protection Zone for significant potential contaminant sources as well as an inventory of wastewater and stormwater discharges permitted by the Department within Zone A of the Source Water Management Zone. Source water inventory updates for community surface water systems existing at the effective date of this rule shall be submitted to the Department on or before December 31, 2006 and at three year intervals subsequently. Community and nontransient noncommunity systems using a surface water source shall submit complete contaminant source inventories, including maps, showing the potential contaminant sources at three year intervals beginning on December 31, 2015. New water supply sources shall have source approvals in writing by the Department prior to initiation of operation as a public water supply source. An existing water system that was previously not designated as a public water system shall have sixty days upon notification of the determination as a public water system to submit source approval documentation for the Department's review.

The emergency operations plan for community surface water systems shall include a procedure for notifying the Department of any condition which may impact the water source. Community PWS shall establish a procedure for notifying the owner or operator of any potential contaminant source which is believed to be discharging substances which may endanger the water supply of the community PWS.

This notification shall cite the provisions of the Tennessee Safe Drinking Water Act specifically including the language in T.C.A. § 68-221-711(5) (i.e., "The discharge by any person of sewage or any other waste or contaminant at such proximity to the intake, well or spring serving a public water system in such a manner or quantity that it will or will likely endanger the health or safety of customers of the system or cause damage to the system" is prohibited) and this rule, as well as any local ordinances which implement or support source water protection. Such notification to the owner or operator shall also request the owner or operator to abate the activity or discharge. A copy of such notification shall be submitted to the Department.

(Rule 0400-45-01-.34, continued)

(2) Category-Specific Wellhead Protection Requirements

(a) Category 1 PWS

1. Photographs: Category 1 systems are required to provide clear photographs of the spring/wellhead and photographs taken North, Northeast, East, Southeast, South, Southwest, West and Northwest from the spring/well vantage point (facing outward from the spring or well). If the well or spring is enclosed in a building, the photographs shall be taken at a point as near as possible to the well/spring that allows a view of the surrounding property.

2. Area Delineation: The minimum Zone 1 area for Category 1 PWS shall be set as a 250 foot radius of the well or spring. The minimum Zone 2 area shall be set as the area from the 250 foot radius to a 750 foot radius of the well or spring. If the Department determines these radii do not provide sufficient protection for a specific PWS, these zones may be enlarged or modified.

3. Contaminant Source Inventory: Category 1 PWS are required to perform a potential contaminant source inventory within Zones 1 and 2. These sources are to be indicated on a topographic map or other suitable map with a scale of 1:24000 (1 inch = 2000 feet) or better. The wellhead/spring and Zones 1 and 2 must be clearly marked, along with an inventory of sources in tabular form. Guidelines for performing a contaminant source inventory will be included in the published guidance.

4. Wellhead Protection Plan: The Plan to be provided by Category 1 PWS shall consist of the required photographs, Zone 1 and 2 marked on the topographic map, the contaminant source inventory, and the steps the PWS is taking to protect the area within Zone 1. The steps must include plans for hazardous chemical storage on the property, hazardous chemical use within Zone 1, plans for spill response and may include posting as a wellhead protection area in the immediate vicinity of the well or spring. Other provisions may also be included. Two copies of the Plan shall be provided to the Division of Water Supply.

5. Wellhead Protection Program: Once the Wellhead Protection Plan has been approved by the Department, the PWS shall notify the governing county body and county/regional planning commission that a Wellhead Protection Program is in place and deliver copies of the Plan to such bodies. The PWS shall then implement the Plan and document progress. As a part of wellhead protection, the PWS shall maintain proper management of potential contaminant sources under its control and the proper construction of the spring or well and associated devices as specified in Design Criteria for Community Water Systems as developed under paragraph (3) of Rule 0400-45-01-.05 and in compliance with the provisions of the Water Well Act, T.C.A. § 69-11-106(10).

(b) Category 2 PWS

1. Field Measurements/Photographs: Category 2 systems are required to collect water level elevation data from area wells to determine local ground water flow directions, water table slope (hydrologic gradient) and local ground water recharge basins. Category 2 PWS's are also required to provide the same photographs specified for Category 1 in part (2)(a)1 of this rule.

2. Area Delineation: The minimum Zone 1 area for Category 2 shall be set as a 500 foot radius of the well or spring.

(Rule 0400-45-01-.34, continued)

(i) For a PWS in counties west of the western extension of the Tennessee River, defined for purposes of this rule as West Tennessee (Figure 1); Zone 2 shall be set as the 10 year Time-of-Travel (TOT). This area shall be calculated with the Environmental Protection Agency's WHPA 2.0 Model, RESSQC Module using the mode which considers well interference. USGS MODFLOW shall be an acceptable alternative. Other modeling techniques must be approved in writing by the Department.

The PWS may perform the modeling of the Wellhead Protection area or may deliver the necessary information to the Department for the modeling of the wellhead protection area. The PWS shall use the generated model to determine the Wellhead Management Zone (Zone 2).

(ii) For Category 2 PWS in West Tennessee using aquifers under confined conditions, the PWS's may use the leaky aquifer scenario in the GPTRAC or Monte Carlo module of WHPA 2.0 or the MODFLOW leaky aquifer scenario. For purposes of this rule, all confined aquifers in West Tennessee shall be considered to be leaking.

(iii) For Category 2 PWS east of the Tennessee River in karst and fractured rock areas (Figure 1), the collected hydrogeologic information shall be used to delineate the upgradient portion of the ground water recharge basin. The PWS may determine the upgradient portion of the recharge basin; or may deliver the information to the Department for assistance in delineating the basin. The delineated basin shall include direct recharge points to the aquifer such as sinkholes and stormwater runoff wells. All of Zone 1 shall be considered to lie within Zone 2.

3. Contaminant Source Inventory: Category 2 PWS are required to perform a potential contaminant source inventory within the Zones 1 and 2 as further specified in part (a)3 of this paragraph. The Wellhead Protection Plan should establish procedures to eliminate or minimize the risk to the PWS from potential contamination sources.

4. Wellhead Protection Plan:

(i) The Plan to be provided by Category 2 PWS shall consist of the required photographs, zones 1 and 2 marked on a topographic map, the contaminant source inventory and the steps the PWS is taking to protect/manage the wellhead protection area. The steps must include plans for hazardous chemical storage on the property, hazardous chemical use within Zones 1 and 2 and spill response notification in Zone 1. Other steps may be included such as proposed local ordinances. Two copies of the Plan shall be provided to the Division of Water Supply.

(ii) The Plan shall also include procedures for reviewing, modifying, and updating the Plan.

(iii) The existence of the Plan shall be included in the public water system's consumer confidence report.

5. Wellhead Protection Program: Once the Wellhead Protection Plan has been approved by the Department, the PWS shall notify the governing county body and county/regional planning commission that a Wellhead Protection Program is in place and deliver copies of the Plan to such bodies. If the Wellhead Protection Zones cross county lines, that adjacent county must be notified. The PWS shall

(Rule 0400-45-01-.34, continued)

then implement the Plan and document progress. As a part of wellhead protection, the PWS shall maintain proper management of potential contaminant sources under its control. The PWS shall request that it be allowed to review and comment on land management issues in Zones 1 and 2 which may impact the ground water quality from all appropriate local governing bodies.

(i) The PWS shall submit to the Division of Water Supply copies of the letters and other documentation to verify and document the compliance with part 5 of this subparagraph.

(c) Category 3 PWS

1. Field Measurements/Photographs: Category 3 systems are required to collect water level elevation data from area wells to determine local ground water flow directions, water table slope (hydrologic gradient) and local ground water recharge basins. This information shall be used by the PWS to generate a model of the wellhead protection area. Category 3 PWS are required to provide the same photographs as set forth for Category 1 in part (a)1 of this paragraph. In addition, Category 3 PWS are required to provide aerial photographs of the well/wellfield or spring for Zones 1 and 2.

2. Area Delineation: The minimum Wellhead Protection Zone for Category 3 shall be set as a 750 foot radius of the well or spring.

(i) For PWS in counties west of the western extension of the Tennessee River defined for purposes of this rule as West Tennessee, the Wellhead Management Zone shall be set as the 10 year Time-of-Travel (TOT).

This area shall be calculated with the Environmental Protection Agency's WHPA 2.0 Model, RESSQC Module using the mode which considers well interference. MODFLOW shall be an acceptable alternative. Other modeling techniques must be approved in writing by the Department.

(ii) For Category 3 PWS in West Tennessee (Figure 1) using aquifers under confined conditions, the PWS may use the leaky aquifer scenario in the GPTRAC or Monte Carlo module of WHPA 2.0 or the MODFLOW leaky aquifer scenario. For purposes of this rule, all confined aquifers in West Tennessee shall be considered to be leaking.

(iii) For closely spaced wells where zones overlap, the zones may be combined for a composite wellhead protection/management zone. The zone cannot be downgraded to lesser protection (Zone 1 areas override Zone 2 areas).

(iv) For Category 3 PWS east of the Tennessee River in karst and fractured rock areas (Figure 1), the collected hydrogeologic information shall be used to delineate the upgradient portion of the ground water recharge basin. Zone 2 shall describe the area (inclusive of Zone 1) that takes in the recharge basin upgradient of the wellhead/spring and shall include direct recharge points to the aquifer such as sinkholes and stormwater runoff wells.

3. Contaminant Source Inventory: Category 3 PWS are required to perform a potential contaminant source inventory within the Wellhead Management (Zone 2) and Wellhead Protection Zones (Zone 1) as set forth in part (a)3 of this

(Rule 0400-45-01-.34, continued)

paragraph. The Wellhead Protection Plan should establish procedures to eliminate or minimize the risk to the PWS from potential contamination sources.

4. Wellhead Protection Plan:

(i) The Plan to be provided by Category 3 PWS shall consist of the required photographs, Zones 1 and 2 marked on a topographic map, the contaminant source inventory, and the steps the PWS is taking to protect/manage the wellhead protection area. The steps must at least include plans for hazardous chemical storage on the property, hazardous chemical use within Zones 1 and 2, spill response notification in Zone 1 and proposed local ordinances in cooperation with the city or county government or county/ regional planning commission. Two copies of the Plan must be provided to the Division of Water Supply.

(ii) The Plan shall also include procedures for reviewing, modifying, and updating the Plan.

(iii) The existence of the Plan shall be included in the public water system's consumer confidence report.

5. Wellhead Protection Program: Once the Wellhead Protection Plan has been approved by the Department, the PWS shall notify the governing county body and county/regional planning commission that a Wellhead Protection Program is in place and deliver copies of the Plan to such bodies. If the Wellhead Protection Zones cross county lines, that adjacent county must be notified. The PWS shall then implement the Plan and document progress. As a part of wellhead protection, the PWS shall maintain proper management of potential contaminant sources under its control. The PWS shall request that it be allowed to review and comment on land management issues in Zones 1 and 2 which may impact the ground water quality from all appropriate local governing bodies.

(d) Category 4 PWS

1. Field Measurements/Photographs: Category 4 systems are required to collect water level elevation data from area wells to determine local ground water flow directions, water table slope (hydrologic gradient) and local ground water recharge basins. Category 4 PWS are required to provide the same photographs as set forth for Category 1 in part (a)1 of this paragraph. In addition, Category 4 PWS are required to provide aerial photographs of the well/wellfield or spring for Zones 1 and 2.

2. Area Delineation: The minimum Zone 1 area for Category 4 PWS shall be set as a 750 foot radius of the well or spring.

(i) For PWS in counties west of the western extension of the Tennessee River, defined for purposes of this rule as West Tennessee (Figure 1), Zone 2 shall be set as the 10 year Time-of-Travel (TOT). This area shall be calculated with the Environmental Protection Agency's WHPA 2.0 Model, RESSQC Module using the mode which considers well interference. MODFLOW shall be an acceptable alternative. Other modeling techniques must be approved in writing by the Department.

(ii) For Category 4 PWS in West Tennessee using aquifers under confined conditions, the PWS's may use the leaky aquifer scenario in the GPTRAC or Monte Carlo module of WHPA 2.0 or the MODFLOW leaky aquifer

(Rule 0400-45-01-.34, continued)

scenario. For purposes of this rule, all confined aquifers in West Tennessee shall be considered to be leaking.

(iii) For closely spaced wells where zones overlap, the zones may be combined for a composite wellhead protection/management zone. The zone cannot be downgraded to lesser protection (Zone 1 areas override Zone 2 areas).

(iv) For Category 4 PWS east of the Tennessee River in karst and fractured rock areas (Figure 1), the collected hydrogeologic information shall be used to delineate the upgradient portion of the ground water recharge basin. The Wellhead Management Zone (Zone 2) shall describe the area (inclusive of the Wellhead Protection Zone) that takes in the recharge basin upgradient of the wellhead/spring. Zone 2 shall describe the area (inclusive of the Zone 1) that takes in the recharge basin upgradient of the wellhead/spring and shall include direct recharge points to the aquifer such as sinkholes and stormwater runoff wells. All of Zone 1 shall be considered to lie within Zone 2.

3. Contaminant Source Inventory: Category 4 PWS are required to perform a potential contaminant source inventory within the Wellhead Management (Zone 2) and Wellhead Protection Zones (Zone 1) as set forth in part (a)3 of this paragraph. The plan should establish procedures to eliminate or minimize the risk to the PWS from potential contaminant sources.

4. Wellhead Protection Plan:

(i) The Plan to be provided by Category 4 PWS shall consist of the required photographs, Zones 1 and 2 marked on a topographic map, the contaminant source inventory, and the steps the PWS is taking to protect/manage the wellhead protection area. The steps must, at least, include plans for hazardous chemical storage on the property, hazardous chemical use within Zones 1 and 2, spill response notification in Zone 1 and proposed local ordinances in cooperation with the city or county government or county/regional planning commission. Two copies of the Plan shall be provided to the Division of Water Supply.

(ii) The Plan shall also include procedures for reviewing, modifying, and updating the Plan.

(iii) The existence of the Plan shall be included in the public water system's consumer confidence report.

5. Wellhead Protection Program: Once the Wellhead Protection Plan has been approved by the Department, the PWS shall notify the governing county body and county/regional planning commission that a Wellhead Protection Program is in place and deliver copies of the Plan to such bodies. If the Wellhead Protection Zones cross county lines, that adjacent county must be notified. The PWS shall then implement the Plan and document progress. As a part of wellhead protection, the PWS shall maintain proper management of potential contaminant sources under its control. The PWS shall request that it be allowed to review and comment on land management issues in Zones 1 and 2 which may impact the ground water quality from all appropriate local governing bodies.

(3) Requirements for New Water Sources

(Rule 0400-45-01-.34, continued)

(a) Prior to the construction of a new water source, each PWS shall develop a Preliminary Evaluation Report (PER).

1. For a ground water source, the PER must include significant potential contaminant sources within a one-mile radius. The PWS shall submit the PER with the Engineering Plans and Specification to the Department for approval. After a new ground water source is constructed, a Wellhead Protection Plan shall be developed pursuant to these rules. The PWS shall implement the Wellhead Protection Plan within twelve (12) months of completion of construction of the new source.

   New ground water supply sources shall have source approvals in writing by the Department prior to initiation of operation as a public water supply source. An existing water system that was previously not designated as a public water system shall have sixty (60) days upon notification of the determination as a public water system to submit source approval documentation for the Department's review. Source approvals shall include a one-mile radius inventory of significant potential contaminant sources for Category 2, 3 and 4 ground water supplies.

2. For a surface water source, the PER must include significant potential contaminant sources within the Critical Source Water Protection Zone five miles upstream of the surface water source and tributaries to that stream as well as an inventory of wastewater and stormwater discharges permitted by the Department within Zone A of the Source Water Management Zone, which is five to fifteen miles upstream of the surface water source and tributaries to that stream. The PWS shall submit the PER with the Engineering Plans and Specification to the Department for approval. After a new surface water source is developed, the PWS shall establish and maintain a potential contaminant source inventory and the source water provisions of the emergency operations plan. The potential contaminant source inventory and the source water protection provisions of the emergency operations plan shall be submitted to the Department within twelve (12) months of completion of construction of the new source. Each PWS shall notify the governing county body and county/regional planning commission in writing of the intake, critical source water protection zone and source water management zone in parts (1)(d)4 and 8 of this rule, per the Tennessee Safe Drinking Water Act, T.C.A. §§ 68-221-701 et seq.

   New surface water supply sources shall have source approvals in writing by the Department prior to initiation of operation as a public water supply source. An existing water system that was previously not designated as a public water system shall have sixty (60) days upon notification of the determination as a public water system to submit source approval documentation for the Department's review. Surface water intake inventories shall include significant potential contaminant sources within the Critical Source Water Protection Zone and an inventory of wastewater and stormwater discharges permitted by the Department within Zone A of the Source Water Management Zone.

(b) 1. Public Water Systems Using a Ground Water Source

   A PWS using a ground water source shall consider potential contamination sources in determining the location of the new source. The PER shall include a list of significant potential contamination sources within the potential Zone 1 area for new ground water sources. Additionally, the PWS will work with appropriate local governing bodies to limit the future location of any potential contamination source or activity within Zone 1.

(Rule 0400-45-01-.34, continued)

2. Public Water Systems Using a Surface Water Source

A PWS using a surface water source shall consider potential contamination sources in determining the location of the new source. The PER shall include a list of significant potential contamination sources within the Critical Source Water Protection Zone. Additionally, the PWS will work with appropriate local governing bodies to limit the future location of any potential contamination source or activity within the Critical Source Water Protection Zone.

(c) New PWS wells must receive site approval from the Department before drilling. New well approval is conditioned upon the PWS complying with all applicable Drinking Water Source Regulations. Approval of new wells by the Division of Water Supply will depend on the ability of the PWS to provide the highest degree of reliable control of the area. The Department may deny its approval for new wells to be put into service if these requirements cannot be met.

(4) Contingency Planning

(a) Public water systems as a part of their emergency operation plans shall keep up to date the planned contingency procedures to include the notifications roster, response committee designees and other portions of the emergency operations plan pertaining to the contamination of or loss of the existing water sources.

(5) Prohibitions in Source Water Protection Areas

(a) The discharge by any person of sewage or any other waste or contaminant at such a proximity to the intake, well or spring serving a public water system in such a manner or quantity that it will or will likely endanger the health or safety of customers of the system or cause damage to the system shall be prohibited.

1. Owners or operators of facilities or properties with potential or actual contaminant sources within close proximity to a public water supply intake, well or spring or its source water protection area so as to cause a threat to the water supply may be required by the Department to develop and implement a pollution prevention plan or implement best management practices appropriate for the activity. The pollution prevention plan shall be prepared in accordance with good engineering practices and shall identify potential sources of contamination at the facility that may reasonably be expected to affect the water quality. The plan shall be updated annually and submitted to the Department at no more than 3 year intervals. The plan shall describe and ensure implementation of practices including, but not limited to: diking, liners, covering, containment, relocation of the contaminant source or other actions that are to be used to reduce the likelihood of the contaminants entering the drinking water source. A copy of the pollution prevention plan shall be maintained onsite. A pollution prevention plan developed as a part of storm water management activities under Rule 1200-04-10-.04, T.C.A. §§ 69-3-101 et seq. shall be considered as fulfilling this requirement provided that potential ground water contaminant sources are also addressed within the plan.

2. The Department may require onsite or offsite water quality monitoring, removal or remediation of the contaminant source by the property owner or other responsible party for contaminant sources within source water protection areas which have caused contamination of the ground water or surface water at levels that have adversely impacted the public water source to the point that additional monitoring and treatment are required for the public water system. Sites

(Rule 0400-45-01-.34, continued)

undergoing active investigation pursuant to remediation under the Hazardous Waste Management Act Parts 1 and 2, T.C.A. §§ 68-212-101 et seq. and §§ 68-212-201 et seq., respectively or the Voluntary Cleanup, Oversight and Assistance Program Act, T.C.A. § 68-212-224 shall be considered as fulfilling this requirement for remediation activities to protect the impacted public water system.

3. Abandoned wells within wellhead protection areas which are a potential threat to contamination of the public water supply shall be properly plugged and closed in compliance with provisions in the Water Well Act, T.C.A. § 69-11-106 (11) by the property owner or other responsible party. A well that has not been in use for a period of more than two (2) years shall be considered abandoned unless the owner of the well can demonstrate a need for the well and provide adequate protection to ensure the well will not be a discharge point for contamination. Wells used for the regular, ongoing, collection of water-levels, water-quality, or other scientific measurements are not abandoned, but are considered observation wells. Observation wells must be properly maintained and have adequate protection to prevent their becoming a route for contamination.

(b) The heavy pumping or other heavy withdrawal of water from a public water system or its water supply source in a manner that would interfere with existing customers' normal and reasonable needs or threaten existing customers' health and safety shall be prohibited.

1. New water withdrawal sources within source water protection areas, including those that are required to register under the Water Resources Information Act, T.C.A. § 69-8-103, shall be required to demonstrate through modeling, testing or other hydrologic means that the public water supply will not be adversely impacted by the withdrawal. Existing water withdrawal sources within source water protection areas, including those that are required to register under the Water Resources Information Act may be required to perform modeling, testing or other hydrologic investigations to determine any adverse impact on a specific public water supply.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.35 CONSUMER CONFIDENCE REPORTS.**

(1) Purpose and Applicability

(a) This rule establishes the minimum requirements for the content of annual reports that community water systems must deliver to their customers. These reports must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner.

(b) This rule applies only to community water systems.

(c) For the purpose of this rule, customers are defined as billing units or service connections to which water is delivered by a community water system.

(d) For the purpose of this rule, detected means: at or above the levels prescribed by Table 0400-45-01-.14(10)(d) for inorganic contaminants, at or above the levels prescribed by Rule 0400-45-01-.26 for volatile organic chemicals, at or above by Table

(Rule 0400-45-01-.35, continued)

0400-45-01-.10(1)(r) for other organic chemicals, at or above the DBP levels prescribed by subparagraph (10)(d) of Rule 0400-45-01-.14 and at or above the levels prescribed by paragraph (1) of Rule 0400-45-01-.11 for radioactive contaminants.

(2) Effective Dates.

(a) The regulations in this rule shall become effective April 1, 1999, or the effective date of the rule whichever is later.

(b) Each existing community water system must deliver its first report by October 19, 1999, its second report by July 1, 2000, and subsequent reports by July 1 annually thereafter. The first report must contain data collected during, or prior to, calendar year 1998 as prescribed in paragraph (3) of this rule. Each report thereafter must contain data collected during, or prior to, the previous calendar year.

(c) A new community water system must deliver its first report by July 1 of the year after its first full calendar year in operation and annually thereafter.

(d) A community water system that sells water to another community water system must deliver the applicable information required in paragraph (3) of this rule to the buyer system:

1. No later than April 19, 1999, by April 1, 2000, and by April 1 annually thereafter or

2. On a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

(3) Contents of the Report

(a) Each community water system must provide to its customers an annual report that contains the information specified in this paragraph and paragraph (4) of this rule.

(b) Information on the source of the water delivered:

1. Each report must identify the source(s) of the water delivered by the community water system by providing information on:

(i) The type of the water: e.g., surface water, ground water; and

(ii) The commonly used name (if any) and location of the body (or bodies) of water.

2. If a source water assessment has been completed, the report must notify consumers of the availability of this information and the means to obtain it. In addition, systems are encouraged to highlight in the report significant sources of contamination in the source water area if they have readily available information. Where a system has received a source water assessment from the Department, the report must include a brief summary of the system's susceptibility to potential sources of contamination, using language provided by the primacy agency or written by the operator.

(c) Definitions.

1. Each report must include the following definitions:

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(i) Maximum Contaminant Level Goal or MCLG: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

(ii) Maximum Contaminant Level or MCL: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

2. A report for a community water system operating under a variance or an exemption must include the following definition: Variances and Exemptions: Department or EPA permission not to meet an MCL or a treatment technique under certain conditions.

3. A report that contains data on contaminants that EPA regulates using any of the following terms must include the applicable definitions:

(i) Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.

(ii) Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

(iii) Maximum residual disinfectant level goal or MRDLG: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

(iv) Maximun Residual Disinfectant Level or MRDL: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for the control of microbial contaminants.

4. A report that contains information regarding a Level 1 or Level 2 Assessment required under Rule 0400-45-01-.41 must include the applicable definitions:

(i) Level 1 Assessment: A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.

(ii) Level 2 Assessment: A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

(d) Information on Detected Contaminants.

1. The reports shall specify the following report for contaminants subject to mandatory monitoring (except Cryptosporidium):

(i) Contaminants subject to a MCL, action level, maximum residual disinfectant level, or treatment technique (regulated contaminants).

(ii) Contaminants for which monitoring is required for unregulated contaminant monitoring by the Environmental Protection Agency and,

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(iii) Disinfection by-products or microbial contaminants for which monitoring is required by the Information Collection Rule except as provided under part (e)1 of this paragraph and which are detected in the finished water.

2. The data relating to these contaminants must be displayed in one table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report must be displayed separately.

3. The data must be derived from data collected to comply with EPA and Department monitoring and analytical requirements during calendar year 1998 for the first report and subsequent calendar years thereafter except that:

(i) If a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) must include the date and results of the most recent sampling and the report must include a brief statement indicating that the data presented in the report are from the most recent testing done in accordance with the regulations. No data older than 5 years need be included.

(ii) Results of monitoring in compliance with the Information Collection Rule need only be included for 5 years from the date of last sample or until any of the detected contaminants becomes regulated and subject to routine monitoring requirements, whichever comes first.

4. For detected regulated contaminants (listed in Appendix A to this rule), the table(s) must contain:

(i) The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in Appendix A of this rule);

(ii) The MCLG for that contaminant expressed in the same units as the MCL;

(iii) If there is no MCL for a detected contaminant, the table must indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the report must include the definitions for treatment technique and/or action level, as appropriate, specified in part (c)3 of this paragraph;

(iv) For contaminants subject to an MCL, except turbidity total coliform, fecal coliform, and E. coli, the highest contaminant level used to determine compliance with an NPDWR and the range of detected levels, as follows:

(I) If compliance with the MCL is determined annually or less frequently: The highest detected level at any sampling point and the range of detected levels expressed in the same units as the MCL;

(II) When compliance with the MCL is determined by calculating a running annual average of all samples taken at a monitoring location: the highest average of any of the monitoring locations and the range of all monitoring locations expressed in the same units as the MCL. For the MCLs for TTHM and HAA5 in paragraph (6) of Rule 0400-45-01-.06, systems must include the highest locational running annual average for TTHM and HAA5 and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5

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MCL, the system must include the locational running annual averages for all locations that exceed the MCL.

(III) When compliance with the MCL is determined on a system-wide basis by calculating a running annual average of all samples at all monitoring locations: the average and range of detection expressed in the same units as the MCL. The system is required to include individual sample results for the IDSE conducted under Rule 0400-45-01-.37 when determining the range of TTHM and HAA5 results to be reported in the annual consumer confidence report for the calendar year that the IDSE samples were taken.

(v) For turbidity.

(I) If it is reported pursuant to paragraph (3) of Rule 0400-45-01-.06: The highest average monthly value.

(II) If it is reported pursuant to the requirements of paragraph (2) of Rule 0400-45-01-.31: the highest monthly value. The report should include an explanation of the reasons for measuring turbidity.

(III) If it is reported pursuant to paragraph (4) of Rule 0400-45-01-.31: The highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in paragraph (4) of Rule 040-45-01-.31 for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity;

(vi) For lead and copper: the 90th percentile value of the most recent round of sampling and the number of sampling sites exceeding the action level;

(vii) For total coliform analytical results until March 31, 2016:

(I) The highest monthly number of positive samples for systems collecting fewer than 40 samples per month; or

(II) The highest monthly percentage of positive samples for systems collecting at least 40 samples per month;

(viii) For fecal coliform and E. coli until March 31, 2016: The total number of positive samples;

(ix) The likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report must include one or more of the typical sources for that contaminant listed in Appendix A to this rule, which are most applicable to the system; and

(x) For E. coli analytical results under Rule 0400-45-01-.41: The total number of positive samples.

5. If a community water system distributes water to its customers from multiple hydraulically independent distribution systems that are fed by different raw water sources, the table shall contain a separate column for each service area and the

(Rule 0400-45-01-.35, continued)

report shall identify each separate distribution system, unless such systems produce and deliver separate reports to the customers of each service area tailored to include data for that service area.

6. The table(s) must clearly identify any data indicating violations of MCLs, MRDLs, or treatment techniques and the report must contain a clear and readily understandable explanation of the violation including: the length of the violation, the potential adverse health effects, and actions taken by the system to address the violation. To describe the potential health effects, the system must use the relevant language of Appendix A to this rule.

7. For detected unregulated contaminants for which monitoring is required (except Cryptosporidium), the table(s) must contain the average and range at which the contaminant was detected. The report may include a brief explanation of the reasons for monitoring for unregulated contaminants.

(e) Information on Cryptosporidium, radon, and other contaminants:

1. If the system has performed any monitoring for Cryptosporidium, including monitoring performed to satisfy the requirements of the information collection rule, which indicates that Cryptosporidium may be present in the source water or the finished water, the report must include:

(i) A summary of the results of the monitoring; and

(ii) An explanation of the significance of the results.

2. If the system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report must include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results.

3. If the system has performed additional monitoring which indicates the presence of other contaminants in the finished water, systems are strongly encouraged to report any results which may indicate a health concern. To determine if results may indicate a health concern, it is recommended that systems find out if EPA has proposed a national primary drinking water regulation (NPDWR) or issued a health advisory for that contaminant by calling the Safe Drinking Water Hotline (800-426-4791). Detections above a proposed MCL or health advisory level indicate possible health concerns. For such contaminants, it is recommended that the report include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results noting the existence of a health advisory or a proposed regulation.

(f) Compliance with NPDWR. In addition to the requirements of part (d)7 of this paragraph, the report must note any violation that occurred during the year covered by the report of a requirement listed in parts 1 through 7 of this subparagraph, and include a clear and readily understandable explanation of the violation, any potential adverse health effects, and the steps the system has taken to correct the violation.

1. A monitoring and reporting requirement.

(Rule 0400-45-01-.35, continued)

2. Filtration and disinfection prescribed by Rules 0400-45-01-.17 and 0400-45-01-.31. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report must include the following language as part of the explanation of potential adverse health effects: Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches;

3. Lead and copper control requirements prescribed by Rule 0400-45-01-.33. For systems which fail to take one or more actions prescribed by subparagraph (1)(d), paragraph (2), (3), (4) or (5) of Rule 0400-45-01-.33, the report must include the applicable language of Appendix A to this rule for lead, copper or both;

4. Treatment techniques for Acrylamide and Epichlorohydrin prescribed by paragraph (31) of Rule 0400-45-01-.17. For systems which violate the requirements of paragraph (31) of Rule 0400-45-01-.17, the report must include the relevant language from Appendix A to this rule;

5. Requirements to keep records documenting compliance for specified periods;

6. Special monitoring requirements prescribed by unregulated contaminant monitoring by the Environmental Protection Agency and Rule 0400-45-01-.24; and,

7. Violation of the terms of a variance, an exemption, or an administrative or judicial order.

(g) Variances and Exemptions. If a system is operating under the terms of a variance or an exemption issued under Federal Safe Drinking Water Act the report must contain:

1. An explanation of the reasons for the variance or exemption;

2. The date on which the variance or exemption was issued;

3. A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

4. A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

(h) Additional information:

1. The report must contain a brief explanation regarding contaminants which may reasonably be expected to be found in drinking water including bottled water. This explanation may include the language of subparts (i) through (iii) of this part or systems may use their own comparable language. The report also must include the language of subpart (iv) of this part.

(i) The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and

(Rule 0400-45-01-.35, continued)

can pick up substances resulting from the presence of animals or from human activity.

(ii) Contaminants that may be present in source water include:

(I) Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

(II) Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

(III) Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

(IV) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

(V) Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

(iii) In order to ensure that tap water is safe to drink, EPA and the Tennessee Department of Environment and Conservation prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

(iv) Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

2. The report must include the telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report.

3. In communities with a large proportion of non-English speaking residents, as determined by the Department, the report must contain information in the appropriate language(s) regarding the importance of the report or contain a telephone number or address where such residents may contact the system to obtain a translated copy of the report or assistance in the appropriate language.

4. The report must include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.

5. The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.

(Rule 0400-45-01-.35, continued)

6. A public water system's report must include a statement that the wellhead protection plan and source water assessment are available for public review and identify the contact person, location, and time available for review of the plan.

7. Systems required to comply with Rule 0400-45-01-.41.

(i) Any system required to comply with the Level 1 assessment requirement or a Level 2 assessment requirement that is not due to an E. coli MCL violation must include in the report the text found in items (I), (II), and (III) of this subpart as appropriate, filling in the blanks accordingly, and the text found in subitems (IV)I and II of this subpart if appropriate.

(I) Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

(II) During the past year we were required to conduct [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s). [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s) were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(III) During the past year [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were required to be completed for our water system. [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(IV) Any system that has failed to complete all the required assessments or correct all identified sanitary defects is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:

I. During the past year we failed to conduct all of the required assessment(s).

II. During the past year we failed to correct all identified defects that were found during the assessment.

(ii) Any system required to conduct a Level 2 assessment due to an E. coli MCL violation must include in the report the text found in items (I) and (II) of this subpart, filling in the blanks accordingly, and the text found in subitems (III)I and II of this subpart, if appropriate.

(I) E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in

(Rule 0400-45-01-.35, continued)

these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We found E. coli bacteria, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

(II) We were required to complete a Level 2 assessment because we found E.coli in our water system. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(III) Any system that has failed to complete the required assessment or correct all identified sanitary defects is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:

I. We failed to conduct the required assessment.

II. We failed to correct all sanitary defects that were identified during the assessment that we conducted.

(iii) If a system detects E. coli and has violated the E. coli MCL, in addition to completing the table as required in part (d)4 of this paragraph, the system must include one or more of the following statements to describe any noncompliance, as applicable:

(I) We had an E. coli-positive repeat sample following a total coliform-positive routine sample.

(II) We had a total coliform-positive repeat sample following an E. coli-positive routine sample.

(III) We failed to take all required repeat samples following an E. coli-positive routine sample.

(IV) We failed to test for E. coli when any repeat sample tests positive for total coliform.

(iv) If a system detects E. coli and has not violated the E. coli MCL, in addition to completing the table as required in part (d)4 of this paragraph, the system may include a statement that explains that although they have detected E. coli, they are not in violation of the E. coli MCL.

(4) Required additional health information.

(a) All reports must prominently display the following language: “Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of

(Rule 0400-45-01-.35, continued)

infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791)."

(b) A system that detects arsenic above 0.005 mg/L and up to and including 0.01 mg/l:

1. Must include in its report a short informational statement about arsenic, using language such as: "While your drinking water meets EPA's standards for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

2. May write its own educational statement, but only in consultation with the Department.

(c) A system which detects nitrate at levels above 5 mg/l, but below the MCL:

1. Must include a short informational statement about the impacts of nitrate on children using language such as: Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant you should ask advice from your health care provider.

2. May write its own educational statement, but must obtain approval from the Department for it.

(d) Every report must include the following lead-specific information:

1. A short informational statement about lead in drinking water and its effects on children. The statement must include the following information:

   If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. [Name of Utility] is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using the water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

2. A system may write its own educational statement, but only in consultation with the Department.

(e) Community water systems that detect TTHM above 0.08 mg/L, but below the MCL as an annual average, must include the health effects language for TTHMs prescribed in Appendix A to this rule.

(f) Beginning in the report due by July 1, 2002, and ending January 22, 2006, a community water system that detects arsenic above 0.01 mg/L and up to and including

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0.05 mg/L must include the arsenic health effects language prescribed by Appendix A to this rule.

(g) Any ground water system that receives notice from the Department of a significant deficiency or notice from the laboratory of a fecal indicator-positive ground water source sample that is not invalidated by the Department under subparagraph (3)(h) of Rule 0400-45-01-.40 must inform its customers of any significant deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive ground water source sample in the next report. The system must continue to inform the public annually until the Department determines that a particular significant deficiency is corrected or the fecal contamination in the ground water is addressed under paragraph (4) of Rule 0400-45-01-.40. Each report must include the following elements:

1. The nature of the particular significant deficiency or the source of the fecal contamination (if known) and the date the significant deficiency was identified by the Department or the dates of the fecal indicator-positive ground water source samples;

2. If the fecal contamination in the ground water source has been addressed under Rule paragraph (4) of Rule 0400-45-01-.40 and the date of such action;

3. For each significant deficiency or fecal contamination in the ground water source that has not been addressed under paragraph (4) of Rule 0400-45-01-.40, the Department-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed;

4. If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the Department under subparagraph (3)(h) of Rule 0400-45-01-.40, the potential health effects using the health effects language of Appendix A of this rule.

(h) If directed by the Department, a system with significant deficiencies that have been corrected before the next report is issued must inform its customers of the significant deficiency, how the deficiency was corrected, and the date of correction under subparagraph (g) of this paragraph.

(5) Report delivery and recordkeeping.

(a) Except as provided in subparagraph (g) of this paragraph, each community water system shall mail or otherwise directly deliver one copy of the report to each customer.

(b) The system shall make a good faith effort to reach consumers who do not get water bills, using means recommended by the Department. EPA expects that an adequate good faith effort will be tailored to the consumers who are served by the system but are not bill-paying customers, such as renters or workers. A good faith effort to reach consumers would include a mix of methods appropriate to the particular system such as: posting the reports on the Internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings or large private employers; delivery to community organizations.

(c) No later than the date the system is required to distribute the report to its customers, each community water system must mail a copy of the report to the Department, followed within 3 months by a certification that the report has been distributed to

(Rule 0400-45-01-.35, continued)

customers, and that the information is correct and consistent with the compliance monitoring data previously submitted to the Department.

(d) No later than the date the system is required to distribute the report to its customers, each community water system must deliver the report to any other agency or clearinghouse identified by the Department.

(e) Each community water system must make its reports available to the public upon request.

(f) Each community water system serving 100,000 or more persons must make its current year's report available for reading and downloading on the Internet.

(g) The Governor of a State or his designee can waive the requirement of subparagraph (a) of this paragraph for community water systems serving fewer than 10,000 persons.

1. Such systems must:

(i) Publish the reports in one or more local newspapers serving the area in which the system is located;

(ii) Inform the customers that the reports will not be mailed, either in the newspapers in which the reports are published or by other means approved by the Department; and

(iii) Make the reports available to the public upon request.

2. Systems serving 500 or fewer persons may forego the requirements of subparts 1(i) and (ii) of this subparagraph if they provide notice at least once per year to their customers by mail, door-to-door delivery or by posting in an appropriate location that the report is available upon request.

(h) Systems shall retain copies of its consumer confidence reports for no less than 3 years.

APPENDIX A TO Rule 0400-45-01-.35

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| Microbiological contaminants: Total Coliform Bacteria † | MCL (systems that collect > 40 samples/month) 5% of monthly samples are positive; (systems that collect < 40 samples/month) 1 positive monthly sample. | | MCL (systems that collect > 40 samples/month) 5% of monthly samples are positive; (systems that collect < 40 samples/month) 1 positive monthly sample. | 0 | Naturally present in the environment | Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems. |
| Total Coliform Bacteria ‡ | TT | | TT | N/A | Naturally present in the environment. | Use language found in 0400-45-01-.35 (3)(h)7(i)I |
| Fecal Coliform and E. coli † | 0 | | 0 | 0 | Human and animal fecal waste. | Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special risk for infants, young children, some of the elderly, and people with severely compromised immune systems. |
| E. coli ‡ | Routine and repeat samples are total coliform-positive and either is E. coli-positive or system fails to take | | Routine and repeat samples are total coliform-positive and either is E. coli-positive or system fails to take repeat samples | 0 | Human and animal fecal waste. | E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | repeat samples following E. coli-positive routine sample or system fails to analyze total coliform-positive repeat sample for E. coli. | | following E. coli-positive routine sample or system fails to analyze total coliform-positive repeat sample for E. coli. | | | nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. |
| Total organic carbon (ppm) | TT | | TT | N/A | Naturally present in the environment. | Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection by-products. These by-products include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these by-products in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer. |
| Fecal Indicators (enterococci) | TT | | TT | N/A | Human and animal fecal waste | Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | young children, some of the elderly, and people with severely compromised immune systems. |
| Turbidity (NTU) | TT | | TT | N/A | Soil runoff | Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches. |
| Radioactive contaminants: Beta/photon emitters (mrem/yr) | 4 mrem/yr | | 4 | 0 | Decay of natural and man-made deposits. | Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water contaiing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer. |
| Alpha emitters (pCi/l) | 15 pCi/l | | 15 | 0 | Erosion of natural deposits | Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer. |
| Combined radium (pCi/l) | 5 pCi/l | | 5 | 0 | Erosion of natural deposits | Some people who drink water containing radium 226 or 228 in excess of |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | the MCL over many years may have an increased risk of getting cancer. |
| Uranium (pCi/L) | 30 ug/L | | 30 | 0 | Erosion of natural deposits | Some people who drink water con containing uranium in excess of the MCL over many years may have an risk of getting cancer and kidney toxicity |
| Inorganic contaminants: Antimony (ppb) | .006 | 1000 | 6 | 6 | Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder. | Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar. |
| Arsenic (ppb) | .01[1] | 1000 | 10[1] | 0 | Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronic production wastes. | Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer. |
| Asbestos (MFL) | 7 MFL | | 7 | 7 | Decay of asbestos cement water mains; Erosion of natural deposits | Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps. |
| Barium (ppm) | 2 | 2 | 2 | | Discharge of drilling wastes; Discharge from metal refineries; Erosion from natural deposits | Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure. |
| Beryllium (ppb) | .004 | 1000 | 4 | 4 | Discharge from metal refineries and coal burning factories; Discharge from | Some people who drink water containing beryllium well in excess |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | electrical, aerospace and defense industries. | of the MCL over many years could develop intestinal lesions. |
| Cadmium (ppb) | .005 | 1000 | 5 | 5 | Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints. | Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage. |
| Chromium (ppb) | .1 | 1000 | 100 | 100 | Discharge from steel and pulp mills; Erosion of natural deposits | Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis. |
| Copper (ppm) | AL=1.3 | | AL=1.3 | 1.3 | Corrosion of household plumbing systems; Erosion of natural de posits; Leaching from wood preservatives | Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor. |
| Cyanide (ppb) | .2 | 1000 | 200 | 200 | Discharge from steel/metal factories; Discharge from plastic and fertilizer factories. | Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid. |
| Fluoride (ppm) | 4 | | 4 | 4 | Erosion of natural deposits; Water additive which | Some people who drink water containing fluoride |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | promotes strong teeth; Discharge from fertilizer and aluminum factories. | in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums. |
| Lead (ppb) | AL=.015 | 1000 | AL=15 | 0 | Corrosion of household plumbing systems; Erosion of natural deposits. | Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure. |
| Mercury [inorganic] (ppb) | .002 | 1000 | 2 | 2 | Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Run off from cropland. | Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage. |
| Nitrate (ppm) | 10 | | 10 | 10 | Runoff from fertilizer use; Leaching from septic tanks; sewage; Erosion of natural deposits | Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | if un treated, may die. Symptoms include shortness of breath and blue baby syndrome. |
| Nitrite (ppm) | 1 | 1000 | 1 | 1 | Runoff from fertilizer use; Leaching from septic tanks; sewage; Erosion of natural deposits | Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if un treated, may die. Symptoms include shortness of breath and blue baby syndrome. |
| Selenium (ppb) | .05 | 1000 | 50 | 50 | Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines.- | Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation. |
| Thallium (ppb) | .002 | | 2 | 0.5 | Leaching from ore-processing sites; Discharge from electronics Glass, and drug factories. | Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver. |
| Synthetic organic contaminants including pesticides and herbicides: 2,4-D (ppb) | .07 | 1000 | 70 | 70 | Runoff from herbicide used on row crops. | Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands. |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| 2,4,5-TP [Silvex](ppb) | .05 | 1000 | 50 | 50 | Residue of banned herbicide. | Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems. |
| Acrylamide | TT | | TT | 0 | Added to water during sewage/ wastewater treatment. | Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer. |
| Alachlor (ppb) | .002 | 1000 | 2 | 0 | Runoff from herbicide used on row crops. | Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer. |
| Atrazine (ppb) | .003 | 1000 | 3 | 3 | Runoff from herbicide used on row crops. | Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties. |
| Benzo(a)pyrene (ppt) [PAH] | .0002 | 1,000,000 | 200 | 0 | Leaching from linings of water storage tanks and distribution lines. | Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer. |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| Carbofuran (ppb) | .04 | 1000 | 40 | 40 | Leaching of soil fumigant used on rice and alfalfa. | Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems. |
| Chlordane (ppb) | .002 | 1000 | 2 | 0 | Residue of banned termiticide. | Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer. |
| Dalapon (ppb) | .2 | 1000 | 200 | 200 | Runoff from herbicide used on rights of way. | Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes. |
| Di(2-ethylhexyl) adipate (ppb) | .4 | 1000 | 400 | 400 | Discharge from chemical factories. | Some people who drink water containing di(2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties. |
| Di(2-ethylhexyl) phthalate (ppb) | .006 | 1000 | 6 | 0 | Discharge from rubber and chemical factories. | Some people who drink water containing di(2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer. |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| Dibromochloropropane (ppt) | .0002 | 1,000,000 | 200 | 0 | Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards | Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer. |
| Dinoseb (ppb) | .007 | 1000 | 7 | 7 | Runoff from herbicide used on soy- beans and vegetables. | Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties. |
| Diquat (ppb) | .02 | 1000 | 20 | 20 | Runoff from herbicide use. | Some people who drink water containing diquat in excess of the MCL over many years could get cataracts. |
| Dioxin [2,3,7,8-TCDD] (ppq) | .00000003 | 1,000,000,000 | 30 | 0 | Emissions from waste incineration and other combustion; Discharge from chemical factories. | Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer. |
| Endothall (ppb) | .1 | 1000 | 100 | 100 | Runoff from herbicide use. | Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines. |
| Endrin (ppb) | .002 | 1000 | 2 | 2 | Residue of banned insecticide. | Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems. |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| Epichlorohydrin | TT | | TT | 0 | Discharge from industrial chemical factories; An impurity of some water treatment chemicals. | Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer. |
| Ethylene dibromide (ppt) | .00005 | 1,000,000 | 50 | 0 | Discharge from petroleum refineries | Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and - may have an increased risk of getting cancer. |
| Glyphospate (ppb) | .7 | 1000 | 700 | 700 | Runoff from herbicide use. | Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties |
| Heptachlor (ppt) | .0004 | 1,000,000 | 400 | 0 | Residue of banned pesticide. | Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer. |
| Heptachlor Epoxide (ppt) | .0002 | 1,000,000 | 200 | 0 | Breakdown of heptachlor. | Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer. |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| Hexachlorobenzene (ppb) | .001 | 1000 | 1 | 0 | Discharge from metal refineries and agricultural chemical factories. | Some people who drink water containing hexachloronbenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer. |
| Hexachlorcyclopentadiene (ppb) | .05 | 1000 | 50 | 50 | Discharge from chemical factories. | Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach. |
| Lindane (ppt) | .0002 | 1,000,000 | 200 | 200 | Runoff/leaching from insecticide used on cattle, lumber, gardens. | Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver. |
| Methoxychlor (ppb) | .04 | 1000 | 40 | 40 | Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock. | Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties. |
| Oxamyl [Vydate] (ppb) | .2 | 1000 | 200 | 200 | Runoff/leaching from insecticide used on apples, potatoes, and tomatoes. | Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects. |
| PCBs [Polychlorinated Biphenyls] (ppt) | .0005 | 1,000,000 | 500 | 0 | Runoff from landfills; Discharge of waste chemicals. | Some people who drink water containing PCBs in excess of the MCL over many years could |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer. |
| Pentachlorophenol (ppb) | .001 | 1000 | 1 | 0 | Discharge from wood preserving factories. | Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer. |
| Picloram (ppb) | .5 | 1000 | 500 | 500 | Herbicide runoff. | Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver. |
| Simazine (ppb) | .004 | 1000 | 4 | 4 | Herbicide runoff. | Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood. |
| Toxaphene (ppb) | .003 | 1000 | 3 | 0 | Runoff/leaching from insecticide used on cotton and cattle. | Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer. |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| Volatile organic contaminants: Benzene (ppb) | .005 | 1000 | 5 | 0 | Discharge from factories; Leaching from gas storage tanks and landfills. | Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer. |
| Bromate (ppb) | .010 | 1000 | 10 | 0 | By-product of drinking water chlorination. | Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer. |
| Carbon tetrachloride (ppb) | .005 | 1000 | 5 | 0 | Discharge from chemical plants and other industrial activities. | Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer. |
| Chloramines (ppm) | MRDL=4 | | MRDL=4 | MRDLG=4 | Water additive used to control microbes. | Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people chloramines who drink water containing well in excess of the MRDL could experience stomach discomfort or anemia. |
| Chlorine (ppm) | MRDL=4 | | MRDL=4 | MRDLG=4 | Water additive used to control microbes. | Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort. |
| Chlorite (ppm) | 1 | | 1 | 0.8 | By-product of drinking water chlorination. | Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia. |
| Chloride dioxide (ppb) | MRDL=.8 | 1000 | MRDL=800 | MRDLG= 800. | Water additive used to control microbes. | Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. |
| Chlorobenzene (ppb) | .1 | 1000 | 100 | 100 | Discharge from chemical and agri cultural chemical factories. | Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys. |
| o-Dichlorobenzene (ppb) | .6 | 1000 | 600 | 600 | Discharge from industrial chemical factories. | Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | experience problems with their liver, kidneys, or circulatory systems. |
| p-Dichlorobenzene (ppb) | .075 | 1000 | 75 | 75 | Discharge from industrial chemical factories. | Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys or spleen, or changes in their blood. |
| 1,2-Dichloroethane (ppb) | .005 | 1000 | 5 | 0 | Discharge from industrial chemical factories. | Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer. |
| 1,1-Dichloroethylene (ppb) | .007 | 1000 | 7 | 7 | Discharge from industrial chemical factories. | Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver. |
| cis-1,2-Dichloroethylene (ppb) | .07 | 1000 | 70 | 70 | Discharge from industrial chemical factories. | Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver. |
| trans-1,2-Dichloroethylene (ppb) | .1 | 1000 | 100 | 100 | Discharge from industrial chemical factories. | Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their livers. |
| Dichloromethane (ppb) | .005 | 1000 | 5 | 0 | Discharge from | Some people who drink |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | pharmaceutical and chemical factories. | water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer. |
| Ethylbenzene (ppb) | .7 | 1000 | 700 | 700 | Discharge from petroleum refineries. | Some people who drink water containing ethylbenzene well in excess of the MCL over many could experience problems with their liver or kidneys. |
| Haloacetic Acids (HAA) (ppb) | .060 | 1000 | 60 | N/A | By-product of drinking water disinfection. | Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer. |
| Styrene (ppb) | .1 | 1000 | 100 | 100 | Discharge from rubber and plastic factories; Leaching from landfills. | Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system. |
| Tetrachloroethylene (ppb) | .005 | 1000 | 5 | 0 | Discharge from factories and dry cleaners. | Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer. |
| 1,2,4-Trichlorobenzene (ppb) | .07 | 1000 | 70 | 70 | Discharge from textile-finishing factories. | Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | experience changes in their adrenal glands. |
| 1,1,1-Trichlorethane (ppb) | .2 | 1000 | 200 | 200 | Discharge from metal degreasing sites and other factories. | Some people who drink water containing 1,1,1-trichloroethane well in excess of the MCL over many years could have problems with their liver, nervous system, or circulatory system. |
| 1,1,2-Trichloroethane (ppb) | .005 | 1000 | 5 | 3 | Discharge from industrial and chemical factories | Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys or immune system. |
| Trichloroethylene (ppb) | .005 | 1000 | 5 | 0 | Discharge from metal degreasing sites and other factories. | Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer. |
| TTHMs [Total trihalomethanes] (ppb) | 0.10/0.080 | 1000 | 100/80 | N/A | By-product of drinking water chlorination. | Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer. |
| Toluene (ppm) | 1 | | 1 | 1 | Discharge from petroleum factories. | Some people who drink water containing toluene well in excess of the MCL over many years could |

(Rule 0400-45-01-.35, continued)

| Contaminant (units) | Traditional MCL in mg/L | To convert for CCR, multiply by units | MCL in CCR | MCLG | Major sources in drinking water | Health effects language |
|---|---|---|---|---|---|---|
| | | | | | | have problems with their nervous system, kidneys, or liver. |
| Vinyl Chloride (ppb) | .002 | 1000 | 2 | 0 | Leaching from PVC piping; Discharge from plastics factories. | Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer. |
| Xylenes (ppm) | 10 | | 10 | 10 | Discharge from petroleum factories. Discharge from chemical factories. | Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system. |

Footnote:
† Until March 31, 2016

‡ Beginning April 1, 2016

[1] These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.

*Key:*
AL = Action Level

(Rule 0400-45-01-.35, continued)

MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MFL = million fibers per liter
MRDL = Maximum Residual Disinfectant Level
MRDLG = Maximum Residual Disinfectant Level Goal
mrem/year = millirems per year (a measure of radiation absorbed by the body)
N/A = Not applicable
NTU = Nephelometric Turbidity Unit (a measure of water clarity)
pCi/l = picocuries per liter (a measure of radioactivity
ppm = parts per million, or milligrans per liter (mg/l)
ppb = parts per billion, or micrograms per liter (μg/l)
ppt = parts per trillion, or nanograms per liter
ppq = parts per quadrillion, or picograms per liter
TT = Treatment Technique

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.36 DISINFECTANT RESIDUALS, DISINFECTION BYPRODUCTS, AND DISINFECTION BYPRODUCT PRECURSORS.**

(1) The requirements of this rule constitute national primary drinking water regulations.

General Requirements.

(a) The regulations in this rule establish criteria under which community water systems (CWSs) and non-transient, non-community water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process or which provide water that contains a chemical disinfectant, must modify their practices to meet MCLs and MRDLs in Rule 0400-45-01-.06 and must meet the treatment technique requirements for disinfection byproduct precursors in this rule.

(b) The regulations in this rule establish criteria under which transient NCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in Rule 0400-45-01-.06.

(c) EPA has established MCLs for TTHM and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform; bromodichloromethane; dibromochloromethane; bromoform; dichloroacetic acid; and trichloroacetic acid.

(2) Compliance dates.

(a) CWSs and NTNCWSs. Unless otherwise noted, systems must comply with the requirements of this rule as follows: Subpart H systems serving 10,000 or more persons must comply with this rule beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this rule beginning January 1, 2004.

(b) Transient NCWSs. Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the requirements for chlorine dioxide and chlorite in this rule beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the requirements for chlorine dioxide and chlorite beginning January 1, 2004.

(3) Each CWS and NTNCWS regulated under subparagraph (1)(a) of this rule must be operated by qualified personnel who meet the requirements specified by the Department.

(4) Control of disinfectant residuals. Notwithstanding the MRDLs in Rule 0400-45-01-.06, systems may increase residual disinfectant levels of chlorine and chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

(5) Reserved

(6) Monitoring Requirements

(a) General requirements.

(Rule 0400-45-01-.36, continued)

1. Systems must take all samples during normal operating conditions.

2. Systems after obtaining Department approval may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required.

3. Failure to monitor in accordance with the monitoring plan required by this rule is a monitoring violation.

4. Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.

5. Systems may use only data collected under the provisions of this rule to qualify for reduced monitoring.

(b) Monitoring requirements for disinfection byproducts.

1. TTHMs and HAA5.

(i) Routine monitoring. Systems must monitor at the frequency indicated in the following table:

Routine Monitoring Frequency for TTHM and HAA5

| Type of System | Minimum Monitoring Frequency | Sample location in the distribution system |
|---|---|---|
| Subpart H system serving at least 10,000 persons | Four water samples per quarter per treatment plant | At least 25 percent of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of persons served, different sources of water and different treatment methods.[1] |
| Subpart H systems serving 500 to 9,999 persons. | One water sample per quarter per treatment plant | Locations representing the maximum residence time.[1] |

(Rule 0400-45-01-.36, continued)

| | | |
|---|---|---|
| Subpart H systems serving fewer than 500 persons. | One sample per year per treatment plant during month of warmest water temperature | Locations representing maximum residence time.[1] If the sample (or average of annual samples, if more than one sample is taken) exceeds MCL, the system must increase monitoring to one sample per quarter, taken at a point reflecting the maximum residence time in the distribution system, until system meets reduced monitoring criteria in subpart (iv) of this part for reduced monitoring.. |
| System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons | One water sample per quarter per treatment plant.[2] | Locations representing maximum residence time.[1] |
| Systems using only ground water not under the direct influence of surface water using a chemical disinfectant and serving fewer than 10,000 persons | One sample per year per treatment plant[2] during month of the warmest water temperature. | Locations representing maximum residence time.[1] If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until system meets criteria for reduced monitoring described in subpart (iv) of this part for reduced monitoring. |

[1] If a system elects to sample more frequently than the minimum required, at least 25 percent of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

[2] Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with Department approval in accordance with criteria approved by the Department.

(ii) Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

(Rule 0400-45-01-.36, continued)

Reduced Monitoring Frequency for TTHM and HAA5

| If you are a ... | You may reduce monitoring if you have monitored at least one year and your ... | To this level |
|---|---|---|
| Subpart H systems serving at least 10,000 persons which has a source water annual average TOC level before any treatment, 4.0mg/L. | TTHM annual average 0.040 mg/L and HAA5 annual average 0.030 mg/L. | One sample per treatment plant per quarter at distribution system location reflecting maximum residence time. |
| Subpart H system serving from 500 to 9,999 persons which has a source water annual average TOC level before any treatment. 4.0 mg/L. | TTHM annual average 0.040 mg/L and HAA5 annual average 0.030 mg/L. | One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. |
| Subpart H system serving fewer than 500 persons | | Subpart H systems serving fewer than 500 persons may not reduce its monitoring to less than one sample per treatment plant per year. |
| System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons. | TTHM annual average 0.040 mg/L and HAA5 annual average 0.030 mg/L | One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. |
| System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons | TTHM annual average 0.040 mg/L and HAA5 annual average 0.030 mg/L for two consecutive years OR TTHM annual average of 0.020 mg/L and HAA5 annual average 0.015 mg/L for one year. | One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring. |

(iii) Monitoring requirements for source water TOC. In order to qualify for reduced monitoring for TTHM and HAA5 under subpart (ii) of this part, subpart H systems not monitoring under the provisions of subparagraph (d) of this paragraph must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the Department. In addition to meeting other criteria for reduced monitoring in subpart (ii) of this part, the source water TOC running annual average must be less than or equal to 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. Once qualified for reduced monitoring for TTHM and HAA5 under subpart (ii) of this part, a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

(iv) Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more

(Rule 0400-45-01-.36, continued)

than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (b)(1)(i) of this section (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L or 0.045 mg/L for TTHMs and HAA5, respectively. For systems using only ground water not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to the increased monitoring identified in subpart (i) of this part (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5 respectively.

(v) Systems on increased monitoring may return to routine monitoring if TTHM annual average is equal to or less than 0.040 mg/L and HAA5 is less than or equal to 0.030 mg/L.

(vi) The Department may return a system to routine monitoring at the Department's discretion.

2. Chlorite. Community and nontransient noncommunity water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.

(i) Routine Monitoring

(I) Daily monitoring. Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by subpart (ii) of this part, in addition to the sample required at the entrance to the distribution system.

(II) Monthly monitoring. Systems must take a three-sample set each month in the distribution system. The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under subpart (ii) of this part to meet the requirement for monitoring in this paragraph.

(ii) Additional monitoring. On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) Reduced monitoring.

(I) Chlorite monitoring at the entrance to the distribution system required by item (i)(I) of this part may not be reduced.

(II) Chlorite monitoring in the distribution system required by item (i)(II) of this part may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under item (i)(II) of this part has exceeded the chlorite MCL and the system has not been required to conduct monitoring under subpart (ii) of this part. The system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under item (i)(II) of this part exceeds the chlorite MCL or the system is required to conduct monitoring under subpart (ii) of this part, at which time the system must revert to routine monitoring.

3. Bromate

(i) Routine monitoring. Community and nontransient noncommunity systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.

(ii) Reduced monitoring.

(I) Until March 31, 2009, systems required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's average source water bromide concentration is less than 0.05 mg/L based on representative monthly bromide measurements for one year. The system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/L based on representative monthly measurements. If the running annual average source water bromide concentration is greater than or equal to 0.05 mg/L, the system must resume routine monitoring required by subpart (i) of this part in the following month.

(II) Beginning April 1, 2009, systems may no longer use the provisions of item (I) of this subpart to qualify for reduced monitoring. A system required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's running annual average bromate concentration is less than or equal to 0.0025 mg/L based on monthly bromate measurements under subpart (i) of this part for the most recent four quarters, with samples analyzed using Method 317.0 Revision 2.0, 326.0 or 321.8. If a system has qualified for reduced bromate monitoring under item (I) of this subpart, that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples is less than or equal to 0.0025 mg/L based on samples analyzed using Method 317.0 Revision 2.0, 326.0, or 321.8. If the running annual average bromate concentration is >0.0025 mg/L, the system must resume routine monitoring required by subpart (i) of this part.

(c) Monitoring requirements for disinfectant residuals.

1. Chlorine and chloramines.

(Rule 0400-45-01-.36, continued)

(i) Routine monitoring. Until March 31, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in Rule 0400-45-01-.07. Beginning April 1, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified paragraphs (4) through (8) of Rule 0400-45-01-.41. Subpart H systems may use the results of residual disinfectant concentration sampling conducted under part 6 of subparagraph (b) of paragraph (5) of Rule 0400-45-01-.31 for unfiltered systems or part 3 of subparagraph (c) of paragraph (5) of Rule 0400-45-01-.31 for systems which filter, in lieu of taking separate samples.

(ii) Reduced monitoring. Monitoring may not be reduced.

2. Chlorine dioxide.

(i) Routine monitoring. Community, nontransient noncommunity, and transient noncommunity water systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by subpart (ii) of this part, in addition to the sample required at the entrance to the distribution system.

(ii) Additional monitoring. On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system, (i.e., booster chlorination), the system must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) Reduced monitoring. Chlorine dioxide monitoring may not be reduced.

(d) Monitoring requirements for disinfection byproduct precursors DBPP).

1. Routine monitoring. Subpart H systems which use conventional filtration treatment (as defined in Rule 0400-45-01-.04) must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this part must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the

(Rule 0400-45-01-.36, continued)

source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

2. Reduced monitoring. Subpart H systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC is greater than or equal to 2.0 mg/L.

(e) Bromide. Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

(f) Monitoring plans. Each system required to monitor under this paragraph must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Department and the general public no later than 30 days following the applicable compliance dates in paragraph (2) of this rule. All Subpart H systems serving more than 3300 people must submit a copy of the monitoring plan to the Department no later than the date of the first report required under paragraph (8) of this rule. The Department may also require the plan to be submitted by any other system. After review, the Department may require changes in any plan elements. The plan must include at least the following elements.

1. Specific locations and schedules for collecting samples for any parameters included in this rule.

2. How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

3. If approved for monitoring as a consecutive system, or if providing water to a consecutive system, the sampling plan must reflect the entire distribution system.

(7) Compliance requirements.

(a) General requirements.

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHM, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.

2. All samples taken and analyzed under the provisions of this paragraph must be included in determining compliance, even if that number is greater than the minimum required.

3. If, during the first year of monitoring under paragraph (6) of this rule, any individual quarter's average will cause the running annual average of that system to exceed the MCL for total trihalomethanes, haloacetic acids (five) or bromate;

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or the MRDL for chlorine or chloramines, the system is out of compliance at the end of that quarter.

(b) Disinfection byproducts.

1. TTHMs and HAA5.

(i) For systems monitoring quarterly, compliance with MCLs in Rule 0400-45-01-.06 must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by part (6)(b)1 of this rule.

(ii) For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of part (6)(b)1 of this rule does not exceed the MCLs in Rule 0400-45-01-.06. If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant and is not in violation of the MCL until it has completed one year of quarterly monitoring, unless the result of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring results.

(iii) If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to Rule 0400-45-01-.19 and report to the Department pursuant to paragraph (8) of this rule.

(iv) If a public water system fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

2. Bromate. Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average of all samples taken during the month) collected by the system as prescribed by part (6)(b)3 of this rule. If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule. If a PWS fails to complete 12 consecutive months of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

3. Chlorite. Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by item (6)(b)2(i)(II) and subpart (6)(b)2(ii) of this rule. If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule.

(c) Disinfectant residuals.

1. Chlorine and chloramines.

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(i) Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under part (6)(c)1 of this rule. If the average of quarterly averages covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule.

(ii) In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to paragraph (8) of this rule must clearly indicate which residual disinfectant was analyzed for each sample.

2. Chlorine dioxide.

(i) Acute violations. Compliance must be based on consecutive daily samples collected by the system under this rule. If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and must notify the public pursuant to the procedures for acute health risks in Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule.

(ii) Nonacute violations. Compliance must be based on consecutive daily samples collected by the system under part (6)(c)2 of this rule. If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule.

(d) Disinfection byproduct precursors (DBPP). Compliance must be determined as specified by subparagraph (9)(b) of this rule. Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in subparagraph (9)(b) of this rule and must

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therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to subparagraph (9)(c) of this rule and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under paragraph (9) of this rule is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to Rule 0400-45-01-.19, in addition to reporting to the Department pursuant to paragraph (8) of this rule.

(8) Reporting and recordkeeping requirements.

(a) Systems required to sample quarterly or more frequently must report to the Department within 10 days after the end of each quarter in which samples were collected, notwithstanding the provisions of Rule 0400-45-01-.18. Systems required to sample less frequently than quarterly must report to the Department within 10 days after the end of each monitoring period in which samples were collected.

(b) Disinfection byproducts. Systems must report the information specified in the following table:

| If you are a | You must report[1] |
|---|---|
| System monitoring for TTHM and HAA5 under the requirements of subparagraph (6)(b) of this rule on a quarterly or more frequent basis. | (1) The number of samples taken during the last quarter.<br>(2) The location, date, result of each sample taken during the last quarter.<br>(3) The arithmetic average of all samples taken in the last quarter.<br>(4) The annual arithmetic average of the quarterly arithmetic averages for the last four quarters.<br>(5) Whether the MCL was exceeded. |
| System monitoring for TTHMs and HAA5 under the requirements of subparagraph (6)(b) of this rule less frequently than quarterly (but at least annually). | (1) The number of samples taken during the last year.<br>(2) The location, date and result of each sample taken during the last monitoring period.<br>(3) The arithmetic average of all samples taken during the last year.<br>(4) Whether the MCL was exceeded.. |
| System monitoring for TTHMs and HAA5 under the requirements of subparagraph (6)(b) of this rule less frequently than annually. | (1) The location, date, and result of the last sample taken.<br>(2) Whether the MCL was exceeded. |
| Systems monitoring for Chlorite under subparagraph (6)(b) of this rule. | (1) The number of samples taken the last quarter.<br>(2) The location, date and result of each sample taken during the last quarter.<br>(3) For each month in the reporting period, the arithmetic average of all samples taken in the month.<br>(4) Whether the MCL was exceeded and in which month it was exceeded. |
| Systems monitoring for Bromate under the requirements of subparagraph (6)(b) of this rule. | (1) The number of samples taken during the last quarter.<br>(2) The location, date and result of each sample taken during the last quarter.<br>(3) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year.<br>(4) Whether the MCL was exceeded. |

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(c) Disinfectants. Systems must report the following information specified in the following table:

| If you are a | You must report |
|---|---|
| System monitoring for chlorine or chloramines under the requirements of subparagraph (6)(c) of this rule. | (1) The number of samples taken during each month of the last quarter.<br>(2) The monthly arithmetic average of all samples taken in each month for the last twelve months.<br>(3) The arithmetic average of all monthly averages for the last twelve months.<br>(4) Whether the MRDL was exceeded. |
| System monitoring for chlorine dioxide under the requirements of subparagraph (6)(c) of this rule. | (1) The dates, results, and locations of samples taken during the last quarter.<br>(2) Whether the MRDL was exceeded.<br>(3) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute. |

(d) Disinfection byproduct precursors and enhanced coagulation or enhanced softening. System must report the information specified in the following table:

| **If you are a** | **You must report** |
|---|---|
| System monitoring monthly or quarterly for TOC under the requirements of subparagraph (6)(d) of this rule and required to meet the enhanced coagulation or enhanced softening requirements in part (9)(b)2 or 3 of this rule. | (1) The number of paired (source and treated water, prior to continuous disinfection) samples taken during the last quarter.<br>(2) The location, date and results of each paired sample and associated alkalinity taken during the last quarter.<br>(3) For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal.<br>(4) Calculations for determining compliance with the TOC percent removal requirements as provided in part (9)(c)1 of this rule.<br>(5) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in subparagraph (9)(b) of this rule for the last four quarters. |

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| | |
|---|---|
| System monitoring monthly or quarterly for TOC under the requirements of subparagraph (6)(d) of this rule and meeting one or more of the alternative compliance criteria in part (9)(a)2 or 3 of this rule. | (1) The alternate compliance criteria the system is using.<br>(2) The number of paired samples taken during the last quarter.<br>(3) The location, date, and results of each paired sample and association alkalinity taken during the last quarter.<br>(4) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in subpart (9)(a)2(i) or (iii) of this rule or of treated water TOC for system meeting the criterion in subpart (9)(a)2(ii) of this rule.<br>(5) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in subpart (9)(a)2(v) of this rule or of treated water SUVA for system meeting the criterion in subpart (9)(a)2(vi) of this rule.<br>(6) The running annual average of source water alkalinity for systems meeting the criterion in subpart (9)(a)2(iii) of this rule and of treated water alkalinity for systems meeting the criterion in subpart (9)(a)3(i) of this rule.<br>(7) The running annual average for both TTHM and HAA5 for systems meeting the criterion in subpart (9)(a)2(iii) or (iv) of this rule.<br>(8) The running annual average of the amount of magnesium hardness removal (as $CaCO_3$, in mg/L) for systems meeting the criterion in subpart (9)(a)3(ii) of this rule.<br>(9) Whether the system is in compliance with the particular alternative compliance criterion in part (9)(a)2 or 3 of this rule. |

(9) Treatment technique for control of disinfection byproduct (DBP) precursors.

(a) Applicability.

1. Subpart H systems using conventional filtration treatment (as defined in Rule 0400-45-01-.04) must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in subparagraph (b) of this paragraph unless the system meets at least one of the alternative compliance criteria listed in part 2 or 3 of this subparagraph.

2. Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Subpart H systems using conventional filtration treatment may use the alternative compliance criteria in subparts (i) through (vi) of this part to comply with this subparagraph in lieu of complying with subparagraph (b) of this paragraph. Systems must still comply with monitoring requirements in subparagraph (6)(d) of this rule.

(i) The system's source water TOC level, measured according to part (5)(d)3 of this rule, is less than 2.0 mg/L, calculated quarterly as a running annual average.

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(ii) The system's treated water TOC level, measured according to part (5)(d)3 of this rule, is less than 2.0 mg/L, calculated quarterly as a running annual average.

(iii) The system's source water TOC level, measured according to part (5)(d)3 of this rule, is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to part (5)(d)1 of this rule, is greater than 60 mg/L (as $CaCO_3$), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in paragraph (2) of this rule, the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in paragraph (2) of this rule to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Department for approval not later than the effective date for compliance in paragraph (2) of this rule. These technologies must be installed and operating not later than June 16, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of National Primary Drinking Water Regulations.

(iv) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(v) The system's source water SUVA, prior to any treatment and measured monthly according to part (5)(d)4 of this rule, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(vi) The system's finished water SUVA, measured monthly according to part (5)(d)4 of this rule, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

3. Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by part (9)(b)2 of this rule may use the alternative compliance criteria in subparts (9)(a)3(i) and (ii) of this rule in lieu of complying with subparagraph (9)(b) of this rule. Systems must still comply with monitoring requirements in subparagraph (6)(d) of this rule.

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as $CaCO_3$), measured monthly according to part (5)(d)1 of this rule, and calculated quarterly as a running annual average.

Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO3), measured monthly according to part (5)(d)6 of this rule and calculated quarterly as a running annual average.

(b) Enhanced coagulation and enhanced softening performance requirements.

1. Systems must achieve the percent reduction of TOC specified in part (9)(b)2 of this rule between the source water and the combined filter effluent, unless the

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Department approves a system's request for alternate minimum TOC removal (Step 2) requirements under part (9)(b)3 of this rule.

2. Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with subparagraph (5)(d) of this rule. Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

Step 1 Required Removal of TOC in Percent Removal by Enhanced Coagulation and Enhanced Softening for Subpart H Systems Using Conventional Treatment[1,2]

| **Source Water TOC, mg/L** | **Source Water Alkalinity,mg/L as $CaCO_3$** | | |
|---|---|---|---|
| | 0-60 | >60-120 | 120[3] |
| 2.0-4.0 | 35.0% | 25.0% | 15.0% |
| 4.0-8.0 | 45.0% | 35.0% | 25.0% |
| 8.0 | 50.0% | 40.0% | 30.0% |

[1] Systems meeting at least one of the conditions in subparts (9)(a)(2)(i) through (vi) of this rule are not required to operate with enhanced coagulation.

[2] Softening systems meeting one of the alternative compliance criteria in part (9)(a)3 of this rule are not required to operate with enhanced softening.

[3] Systems practicing softening must meet the TOC removal requirements in this column.

3. Subpart H conventional treatment systems that cannot achieve the Step 1 TOC removals required by part (9)(b)2 of this rule due to water quality parameters or operational constraints must apply to the Department, within three months of failure to achieve the TOC removals required by part 2 of this subparagraph, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Department approves the alternative minimum TOC removal (Step 2) requirements, the Department may make those requirements retroactive for the purposes of determining compliance. Until the Department approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in part 2 of this subparagraph.

4. Alternate minimum TOC removal (Step 2) requirements. Applications made to the Department by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under part (9)(b)3 of this rule must include, as a minimum, results of bench- or pilot-scale testing conducted under subpart (9)(b)4(i) of this rule and used to determine the alternate enhanced coagulation level. The submitted bench or pilot scale testing must be used to determine the alternate enhanced coagulation level.

(i) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in subpart (9)(b)4(i) through (v) of this rule such that an incremental addition of 10 mg/L of alum (as aluminum) (or equivalent amount of ferric salt) results in a TOC removal of 0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Department, this minimum requirement supersedes the minimum TOC

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removal required by the table in part 2 of this subparagraph. This requirement will be effective until such time as the Department approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve Department-set alternative minimum TOC removal levels is a violation of National Primary Drinking Water Regulations.

(ii) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (as aluminum) (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

Enhanced Coagulation Step 2
Target pH

| Alkalinity (mg/L as $CaCO_3$) | Target pH |
|---|---|
| 0-60 | 5.5 |
| >60-120 | 6.3 |
| >120-240 | 7.0 |
| >240 | 7.5 |

(iii) For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (as aluminum) (or equivalent addition of iron coagulant) is reached.

(iv) The system may operate at any coagulant dose or pH necessary (consistent with other NPDWRs) to achieve the minimum TOC percent removal approved under part (9)(b)3 of this rule.

(v) If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose (as aluminum) at all dosages of alum (or equivalant addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the Department for a waiver of enhanced coagulation requirements.

(c) Compliance calculations.

1. Subpart H systems other than those identified in part (9)(a)2 or 3 of this rule must comply with requirements contained in part (9)(b)2 or 3 of this rule. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) Determine actual monthly TOC percent removal, equal to:

(1- (treated water TOC/source water TOC)) x 100

(ii) Determine the required monthly TOC percent removal (from either the table in (b)2 of this paragraph or from part (9)(b)3 of this rule).

(iii) Divide the value in subpart (9)(c)1(i) of this rule by the value in subpart (9)(c)1(ii) of this rule.

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(iv) Add together the results of subpart (9)(c)1(iii) of this rule for the last 12 months and divide by 12.

(v) If the value calculated in subpart (9)(c)1(iv) of this rule is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

2. Systems may use the provisions in subparts (9)(c)2(i) through (v) of this rule in lieu of the calculations in subparts (9)(c)1(i) through (v) of this rule to determine compliance with TOC percent removal requirements.

(i) In any month that the system's treated or source water TOC level, measured according to part (5)(d)3 of this rule, is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subpart (9)(c)1(iii) of this rule) when calculating compliance under the provisions of part (9)(c)1 of this rule.

(ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in subpart (9)(c)1(iii) of this rule) when calculating compliance under the provisions of part (9)(c)1 of this rule.

(iii) In any month that the system's source water SUVA, prior to any treatment and measured according to part (5)(d)4 of this rule, is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subpart (9)(c)1(iii) of this rule) when calculating compliance under the provisions of part (9)(c)1 of this rule.

(iv) In any month that the system's finished water SUVA, measured according to part (5)(d)4 of this rule, is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in subpart (9)(c)1(iii) of this rule) when calculating compliance under the provisions of part (9)(c)1 of this rule.

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in subpart (9)(c)1(iii) of this rule) when calculating compliance under the provisions of part (9)(c)1 of this rule.

3. Subpart H systems using conventional treatment may also comply with the requirements of this paragraph by meeting the criteria in part (9)(a)2 or 3 of this rule.

(d) Treatment technique requirements for DBP precursors. The Administrator identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For Subpart H systems using conventional treatment, enhanced coagulation or enhanced softening.

(10) For purposes of determining enhanced coagulation notwithstanding the provisions of paragraph (9) of this rule the following procedure shall be in force for parent and consecutive systems:

(a) In addition to other prescribed monitoring, all parent (water wholesalers) and consecutive systems using surface water or ground water that has experienced noncompliance with the maximum contaminant levels or exceedances of operational

(Rule 0400-45-01-.36, continued)

evaluation levels for disinfection byproducts or other systems designated by the Department shall conduct quarterly monitoring for chlorine, pH, disinfection byproducts and other water quality indicators as necessary at or near the master meter having the highest annual arithmetic mean concentration for THMs or HAA5s with all systems reporting their test results to each other. Parent and consecutive systems shall coordinate sampling activities so that samples are collected on the same date or a date prescribed by the department. This paragraph does not apply to emergency or temporary connections.

(b) Based on paragraph (7) of Rule 0400-45-01-.38; upon determination of an exceedance of the maximum, contaminant level or operational evaluation level trend calculated by the method described in paragraph (7) of Rule 0400-45-01-.38 in the consecutive system the following measures shall be required:

1. If the parent system TTHM or HAA5 analytical results at or near the master meter are 60% or less of the maximum contaminant limit for THMs and HAA5, no action is required by the parent system. The consecutive system(s) must submit an operational evaluation report to the Department within 90 days of the end of the quarter the operational evaluation calculation is made.

2. If the parent system and/or consecutive system TTHM or HAA5 test results are greater than 60% of the maximum contaminant limit for THMs or HAA5s at the master meter, both the parent system and consecutive system(s) are required to jointly submit the required operational evaluation report including the steps to be implemented to eliminate future exceedances and a schedule for implementation for Department approval.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.37 STAGE 2 INITIAL DISTRIBUTION SYSTEM EVALUATION FOR DISINFECTION BYPRODUCTS.**

(1) General Requirements: The requirements of this rule constitute national primary drinking water regulations.

(a) The requirements of this rule constitute national primary drinking water regulations. The regulations in this rule establish monitoring and other requirements for identifying compliance monitoring locations to be used for determining compliance with maximum contaminant levels for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5) in Rule 0400-45-01-.38 Locational Running Annual Average (LRAA) through the use of an Initial Distribution System Evaluation (IDSE). IDSEs are studies, used in conjunction with, but separate from, compliance monitoring in Rule 0400-45-01-.36, to identify and select LRAA compliance monitoring sites that represent high TTHM and HAA5 levels throughout the distribution system. The studies will be based on system-specific monitoring. As an alternative, you may use other system-specific data that provide equivalent or better information on site selection for monitoring to demonstrate compliance with the LRAAs as provided for in the 40/30 portion of this rule.

(b) Applicability. You are subject to these requirements if your system is a community water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light or if your system is a nontransient noncommunity water system that serves at least 10,000 people and adds a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual

(Rule 0400-45-01-.37, continued)

disinfectant other than ultraviolet light. You must conduct an Initial Distribution System Evaluation (IDSE), unless you meet the 40/30 certification criteria or the Department has granted a very small system waiver for the IDSE or you meet the criteria defined by the Department for a very small system waiver. If you have a very small system waiver for the IDSE under subparagraph (4)(c) of this rule, you are not required to submit an IDSE report. All other systems must submit an IDSE report, even if you meet the 40/30 certification criteria in subparagraph (4)(c) of this rule.

(c) Schedule.

1. You must comply with the Initial Distribution System Evaluation (IDSE) on the schedule in the following table, based on your system type.

| If you serve this population | You must submit your standard monitoring plan or system specific study plan[1] or 40/30 certification[2] to the Department by or receive a very small system waiver from the Department by | You must complete your standard monitoring or system specific study by | You must submit your IDSE report to the Department by[3] |
|---|---|---|---|
| Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system | | | |
| (i) 100,000 or more<br>(ii) 50,000-99,999<br>(iii) 10,000-49,999<br>(iv) <10.000 (CWS only) | October 1, 2006<br>April 1, 2007<br>October 1, 2007<br>April 1, 2008 | September 30, 2008<br>March 31, 2009<br>September 30, 2009<br>March 31, 2010 | January 1, 2009<br>July 1, 2009<br>January 1, 2010<br>July 1, 2010 |
| Other systems that are part of a combined distribution system | | | |
| (v) Wholesale system or consecutive system | At the same time as the system with the earliest compliance date in the combined distribution system. | At the same time as the system with the earliest compliance date in the combined distribution system | At the same time as the system with the earliest compliance date in the combined distribution system |

[1] If, within 12 months after the date identified in this column, the Department does not approve your plan or notify you that it has not yet completed its review, you may consider the plan that you submitted as approved. You must implement that plan and you must complete standard monitoring or a system specific study no later than the date identified in the third column.

[2] You must submit your 40/30 certification by the date indicated.

[3] If, within three months after the date identified in this column (nine months after the date identified in this column if you must comply on the schedule in subpart (c)(1)(iii) of this paragraph, the Department does not approve your IDSE report or notify you that it has not yet completed its review, you may consider the report that you submitted as approved and you must implement the recommended monitoring as required.

2. For the purpose of the schedule in part 1 of this subparagraph the Department may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The Department may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive

(Rule 0400-45-01-.37, continued)

system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) You must conduct standard monitoring that meets the requirements in paragraph (2) of this rule, or a system specific study that meets the requirements in paragraph (3) of this rule, or certify to the Department that you meet 40/30 certification criteria under paragraph (4) of this rule, or qualify for a very small system waiver under paragraph (5) of this rule.

1. You must have taken the full complement of routine TTHM and HAA5 compliance samples required of a system with your population and source water under Rule 0400-45-01-.36 (or you must have taken the full complement of reduced TTHM and HAA5 compliance samples required of a system with your population and source water under Rule 0400-45-01-.36 if you meet reduced monitoring criteria under Rule 0400-45-01-.36) during the period specified in paragraph (4) of this rule to meet the 40/30 certification criteria in paragraph (4) of this rule. You must have taken TTHM and HAA5 samples under Rule 0400-45-01-.36 to be eligible for the very small system waiver in paragraph (5) of this rule.

2. If you have not taken the required samples, you must conduct standard monitoring that meets the requirements in paragraph (2) of this rule, or a system specific study that meets the requirements in paragraph (3) of this rule.

(e) You must use only the analytical methods specified in Rule 0400-45-01-.14, or otherwise approved by the Department or the EPA for monitoring under the provisions of Rule 0400-45-01-.36, this rule and Rule 0400-45-01-.38.

(f) IDSE results will not be used for the purpose of determining compliance with MCLs in Rule 0400-45-01-.06.

(2) Standard Monitoring

(a) Standard monitoring plan. Your standard monitoring plan must comply with parts 1 through 4 of this subparagraph. You must prepare and submit your standard monitoring plan to the Department according to the schedule in subparagraph (1)(c) of this rule.

1. Your standard monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating locations and dates of all projected standard monitoring, and all projected Rule 0400-45-01-.36 compliance monitoring.

2. Your standard monitoring plan must include justification of standard monitoring location selection and a summary of data you relied on to justify standard monitoring location selection.

3. Your standard monitoring plan must specify the population served and system type (subpart H or ground water).

4 You must retain a complete copy of your standard monitoring plan submitted under this subparagraph, including any Department modification of your standard monitoring plan, for as long as you are required to retain your IDSE report under (c)4 of this paragraph.

(b) Standard monitoring.

(Rule 0400-45-01-.37, continued)

1. You must monitor as indicated in the table in this part. You must collect dual sample sets at each monitoring location. One sample in the dual sample set must be analyzed for TTHM. The other sample in the dual sample set must be analyzed for HAA5. You must conduct one monitoring period during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature. You must review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature.

| Source Water Type | Population Size Category | Monitoring periods and frequency of sampling | Distribution system monitoring locations [1] | | | | |
|---|---|---|---|---|---|---|---|
| | | | Total per monitoring period | Near entry points | Average residence time | High TTHM locations | High HAA5 locations |
| Subpart H | <500 consecutive systems | One (during peak historical month) [2] | 2 | 1 | | 1 | |
| | <500 non-consecutive systems | | 2 | | | 1 | 1 |
| | 500-3300 consecutive systems | 4 (every 90 days) | 2 | 1 | | 1 | |
| | 500-3300 non-consecutive systems | | 2 | | | 1 | 1 |
| | 3,301-9,999 | | 4 | | 1 | 2 | 1 |
| | 10,000-49,999 | Six ( every sixty days) | 8 | 1 | 2 | 3 | 2 |
| | 50,000-249,999 | | 16 | 3 | 4 | 5 | 4 |
| | 250,000-999,999 | | 24 | 4 | 6 | 8 | 6 |
| | 1,000,000-4,999,999 | | 32 | 6 | 8 | 10 | 8 |
| | >5,000,000 | | 40 | 8 | 10 | 12 | 10 |
| Ground Water | | | | | | | |
| | <500 consecutive systems | One (during peak historical month) [2] | 2 | 1 | | 1 | |
| | <500 non-consecutive systems | | 2 | | | 1 | 1 |
| | 500-9,999 | Four (every 90 days) | 2 | | | 1 | 1 |
| | 10,000-99,999 | | 6 | 1 | 1 | 2 | 2 |
| | 100,000-499,999 | | 8 | 1 | 1 | 3 | 3 |
| | >5,000,000 | | 12 | 2 | 2 | 4 | 4 |

[1] A dual sample set (i.e. a TTHM and an HAA5 sample) must be taken at each monitoring location during each monitoring period.

[2] The peak historical month is the month with the highest TTHM or HAA5 levels or the warmest water temperature.

2. You must take samples at locations other than the existing monitoring locations required by Rule 0400-45-01-.36. Monitoring locations must be distributed throughout the distribution system.

3. If the number of entry points to the distribution system is fewer than the specified number of entry point monitoring locations, excess entry point samples must be replaced equally at high TTHM and HAA5 locations. If there is an odd extra location number, you must take a sample at a high TTHM location. If the number of entry points to the distribution system is more than the specified number of entry point monitoring locations, you must take samples at entry points to the distribution system having the highest annual water flows.

4. Your monitoring under this subparagraph may not be reduced under the provisions of Rule 0400-45-01-.15 and the Department may not reduce your monitoring using the provisions of 40 CFR 142.16(m).

(Rule 0400-45-01-.37, continued)

(c) IDSE report. Your IDSE report must include the elements required in parts 1 through 4 of this subparagraph. You must submit your IDSE report to the Department according to the schedule in subparagraph (1)(c) of this rule.

1. Your IDSE report must include all TTHM and HAA5 analytical results from Rule 0400-45-01-.36 compliance monitoring and all standard monitoring conducted during the period of the IDSE as individual analytical results and LRAAs presented in a tabular or spreadsheet format acceptable to the Department. If changed from your standard monitoring plan submitted under subparagraph (a) of this paragraph, your report must also include a schematic of your distribution system, the population served, and system type (subpart H or ground water).

2. Your IDSE report must include an explanation of any deviations from your approved standard monitoring plan.

3. You must recommend and justify Locational Running Annual Average compliance monitoring locations and timing based on the protocol in paragraph (6) of this rule.

4. You must retain a complete copy of your IDSE report for 10 years after the date that you submitted your report. If the Department modifies the LRAA monitoring requirements that you recommended in your IDSE report or if the Department approves alternative monitoring locations, you must keep a copy of the Department's notification on file for 10 years after the date of the Department's notification. You must make the IDSE report and any Department notification available for review by the Department or the public.

(3) System Specific Studies

(a) System specific study plan. Your system specific study plan must be based on either existing monitoring results as required under part 1 of this subparagraph or modeling as required under part 2 of this subparagraph. You must prepare and submit your system specific study plan to the Department according to the schedule in subparagraph (1)(c) of this rule.

1. Existing monitoring results. You may comply by submitting monitoring results collected before you are required to begin monitoring under subparagraph (1)(c) of this rule. The monitoring results and analysis must meet the criteria in subparts (i) and (ii) of this part.

(i) Minimum requirements.

(I) TTHM and HAA5 results must be based on samples collected and analyzed in accordance with subparagraph (10)(k) of Rule 0400-45-01-.14. TTHM and HAA5 results must be based on samples collected no earlier than five years prior to the study plan submission date.

(II) The monitoring location and frequency must meet the conditions identified in this item. Each location must be sampled once during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature for every 12 months of data submitted for that location. Monitoring results must include all compliance samples collected in accordance with Rule 0400-45-01-.36 plus additional monitoring results as necessary to meet minimum sample requirements.

(Rule 0400-45-01-.37, continued)

| System Type | Population Size Category | Number of monitoring locations | Number of samples | |
|---|---|---|---|---|
| Subpart H | <500 | 3 | 3 | 3 |
| | 500-3,300 | 3 | 9 | 9 |
| | 3,301-9,999 | 6 | 36 | 36 |
| | 10,000-49,999 | 12 | 72 | 72 |
| | 50,000-249,999 | 24 | 144 | 144 |
| | 250,000-999,999 | 36 | 216 | 216 |
| | 1,000,000-4,999,999 | 48 | 288 | 288 |
| | >5,000,000 | 60 | 360 | 360 |
| Ground Water | <500 | 3 | 3 | 3 |
| | 500-9,999 | 3 | 9 | 9 |
| | 10,000-99,999 | 12 | 48 | 48 |
| | 100,000-499,999 | 18 | 72 | 72 |
| | >500,000 | 24 | 96 | 96 |

(ii) Reporting Monitoring Results. You must report the information in this subpart.

(I) You must report previously collected monitoring results and certify that the reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent results from monitoring for compliance with Rule 0400-45-01-.36.

(II) You must certify that the samples were representative of the entire distribution system and that treatment and distribution system have not changed significantly since the samples were collected.

(III) Your study monitoring plan musts include a schematic of your distribution systems (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed or planned system specific study monitoring.

(IV) Your system specific study plan must specify the population served and system type (subpart H or ground water).

(V) You must retain a complete copy of your system specific study plan submitted under this part, including any Department modification of your system specific study plan, for as long as you are required to retain your IDSE report under part (b)5 of this paragraph.

(VI) If you submit previously collected data that fully meets the number of samples required under item (i)(II) of this part and the Department rejects some of the data, you must either conduct additional monitoring to replace rejected data on a schedule the Department approves or conduct standard monitoring under paragraph (2) of this rule.

2. Modeling. You may comply through analysis of an extended period simulation hydraulic model. The extended period simulation hydraulic model and analysis must meet the criteria in part (a)2 of this paragraph.

(i) Minimum requirements

(Rule 0400-45-01-.37, continued)

(I) The model must simulate 24-hour variation in demand and show a consistently repeating 24-hour pattern of residence time.

(II) The model must represent the criteria listed in items I through IX of this subpart.

I. 75% of pipe volume;

II. 50% of pipe length;

III. All pressure zones;

IV. All 12-inch diameter and larger pipes;

V. All 8-inch and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps and control valves, or are known or expected to be significant conveyors of water;

VI. All 6-inch and larger pipes that connects remote areas of a distribution system to the main portion of the system;

VII. All storage facilities with standard operations represented in the model;

VIII. All active pump stations with controls represented in the model; and

IX. All active control valves.

(III) The model must be calibrated, or have calibration plans, for the current configuration of the distribution system during the period of high TTHM formation potential. All storage facilities must be evaluated as part of the calibration process. All required calibration must be completed no later than 12-months after plan submission.

(ii) Reporting modeling. Your system specific study plan must include the information in this subpart.

(I) Tabular or spreadsheet data demonstrating that the model meets requirements in item (i)(II) of this part.

(II) A description of all calibration activities undertaken, and if calibration is complete, a graph of predicted tank levels versus measured tank levels for the storage facility with the highest residence time in each pressure zone, and a time series graph of the residence time at the longest residence time storage facility in the distribution system showing the prediction for the entire simulation period (i.e. from time zero until the time it takes for the model to reach a consistently repeating pattern of residence time).

(III) Model input showing preliminary 24-hour average residence time predictions throughout the distribution system.

(IV) Timing and number of samples representative of the distribution systems planned for at least one monitoring period of TTHM and

(Rule 0400-45-01-.37, continued)

HAA5 dual sample monitoring at a number of locations no less than would be required for the system under standard monitoring in paragraph (2) of this rule during the historical month of high TTHM. These samples must be taken at locations other than existing compliance monitoring locations required by Rule 0400-45-01-.36.

(V) Description of how all requirements will be completed no later than 12 months after you submit your system specific study plan.

(VI) Schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed system specific study monitoring (if calibration is complete) and all compliance monitoring results collected in accordance with Rule 0400-45-01-.36.

(VII) Population served and system type (subpart H or ground water).

(VIII) You must retain a complete copy of your system specific study plan submitted under this part, including any Department modification of your system specific study plan, for as long as you are required to retain your IDSE report under part (b)7 of this paragraph.

(iii) If you submit a model that does not fully meet the requirements under this part, you must correct the deficiencies and respond to Department inquiries concerning the model. If you fail to correct deficiencies or respond to inquiries to the Department's satisfaction, you must conduct standard monitoring under paragraph (2) of this rule.

(b) IDSE report. Your IDSE report must include the elements required in parts 1 through 6 of this subparagraph. You must submit your IDSE report according to the schedule in subparagraph (1)(c) of this paragraph.

1. Your IDSE report must include all TTHM and HAA5 analytical results from Rule 0400-45-01-.36 compliance monitoring and all system specific study monitoring conducted during the period of the system specific study presented in a tabular or spreadsheet format acceptable to the Department. If changed from your system specific study plan submitted under subparagraph (a) of this paragraph, your IDSE report must also include a schematic of your distribution system, the population served, and system type (subpart H or ground water).

2. If you used the modeling provision under part (a)2 of this paragraph, you must include final information for the elements described in subpart (a)2(ii) of this paragraph, and a 24-hour time series graph of residence time for each Rule 0400-45-01-.38 compliance monitoring location selected.

3 You must recommend and justify Rule 0400-45-01-.38 compliance monitoring locations and timing based on the protocol in part (6) of this rule.

4. Your IDSE report must include an explanation of any deviations from your approved system specific study plan.

5. Your IDSE report must include the basis (analytical and modeling results) and justification you used to select the recommended Rule 0400-45-01-.38 monitoring locations.

(Rule 0400-45-01-.37, continued)

6. You may submit your IDSE report in lieu of your system specific study plan on the schedule identified in subparagraph (1)(c) of this rule for submission of the system specific study plan if you believe that you have the necessary information by the time that the system specific study plan is due. If you elect this approach, your IDSE report must also include all information required under subparagraph (a) of this paragraph.

7. You must retain a complete copy of your IDSE report submitted under this subparagraph for 10 years after the date that you submitted your IDSE report. If the Department modifies the Rule 0400-45-01-.38 monitoring requirements that you recommended in your IDSE report or if the Department approves alternative monitoring locations, you must keep a copy of the Department's notification on file for 10 years after the date of the Department's notification. You must make the IDSE report and any Department notification available for review by the Department or the public.

(4) 40/30 certification

(a) Eligibility. You are eligible for 40/30 certification if you had no TTHM or HAA5 monitoring violations under Rule 0400-45-01-.36 and no individual sample exceeded 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 during an eight consecutive calendar quarter period beginning no earlier than the date specified below:

| If your 40/30 certification is due | Then your eligibility for 40/30 certification is based on eight consecutive calendar quarters of compliance monitoring required by Rule 0400-45-01-.36 beginning no earlier than [1] |
|---|---|
| (1) October 1, 2006 | January 2004 |
| (2) April 1, 2007 | January 2004 |
| (3) October 1, 2007 | January 2005 |
| (4) April 1, 2008 | January 2005 |

[1] Unless you are on reduced monitoring under Rule 0400-45-01-.36 and were not required to monitor during the specified period. If you did not monitor during the specified period, you must base your eligibility on compliance samples taken during the 12 months preceding the specified period.

(b) 40/30 certification.

1. You must certify to the Department that every individual compliance sample taken under Rule 0400-45-01-.36 during the period specified in subparagraph (a) of this paragraph was less than or equal to 0.040 mg/L for TTHM and 0.030mg/L for HAA5, and that you have not had any TTHM or HAA5 monitoring violations during the period specified in subparagraph (a) of this paragraph.

2. The Department may require you to submit compliance monitoring results, distribution system schematics and/or recommended LRAA compliance monitoring locations in addition to your certification. If you fail to submit the requested information, the Department may require standard monitoring under paragraph (2) of this rule or a system specific study under paragraph (3) of this rule.

3. The Department may still require standard monitoring under paragraph (2) of this rule or a system specific study under paragraph (3) of this rule even if you meet the criteria in subparagraph (a) of this paragraph.

(Rule 0400-45-01-.37, continued)

4. You must retain a complete copy of your certification submitted for 10 years after the date that you submitted your certification. You must make the certification, all data upon which the certification is based, and any Department notification available for review by the Department or the public.

(5) Very small system waivers

(a) If you serve fewer than 500 people and you have taken TTHM and HAA5 samples under Rule 0400-45-01-.36, you are not required to comply with this rule unless the Department notifies you that you must conduct standard monitoring under paragraph (2) of this rule or a system specific study under paragraph (3) of this rule.

(b) If you have not taken TTHM and HAA5 samples under Rule 0400-45-01-.36 or if the Department notifies you that you must comply with this rule, you must conduct standard monitoring under paragraph (2) of this rule or a system specific study under paragraph (3) of this rule.

(6) LRAA compliance monitoring location recommendations

(a) Your IDSE report must include your recommendations and justification for where and during what month(s) TTHM and HAA5 monitoring for LRAA should be conducted. You must base your recommendations on the criteria in subparagraphs (b) through (e) of this paragraph.

(b) You must select the number of monitoring locations specific in the table in this subparagraph. You will use these recommended locations as LRAA compliance monitoring locations unless the Department requires different or additional locations. You should distribute locations throughout the distribution system to the extent possible.

| Source water type | Population size category | Monitoring frequency[1] | Distribution system monitoring location | | | |
|---|---|---|---|---|---|---|
| | | | Total per monitoring period[2] | Highest TTHM locations | Highest HAA5 locations | Existing compliance locations |
| Subpart H | <500 | Per year | 2 | 1 | 1 | |
| | 500-3,300 | Per quarter | 2 | 1 | 1 | |
| | 3,301-9,999 | Per quarter | 2 | 1 | 1 | |
| | 10,000-49,999 | Per quarter | 4 | 2 | 1 | 1 |
| | 50,000-249,999 | Per quarter | 8 | 3 | 3 | 2 |
| | 250,000-999,999 | Per quarter | 12 | 5 | 4 | 3 |
| | 1,000,000-499,000 | Per quarter | 16 | 6 | 6 | 4 |
| | >5,000,000 | Per quarter | 20 | 8 | 7 | 5 |
| Ground Water | <500 | Per year | 2 | 1 | 1 | |
| | 500-9,999 | Per year | 2 | 1 | 1 | |
| | 10,000-99,999 | Per quarter | 4 | 2 | 1 | 1 |
| | 100,000-499,999 | Per quarter | 6 | 3 | 2 | 1 |
| | >5,000,000 | Per quarter | 8 | 3 | 3 | 2 |

[1] All systems must monitor during month of highest DBP concentrations.

[2] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location and month if monitored annually.

(Rule 0400-45-01-.37, continued)

(c) You must recommend LRAA compliance monitoring locations based on standard monitoring results, system specific study results, and compliance monitoring results collected under Rule 0400-45-01-.36. You must follow the protocol in parts 1 through 8 of this subparagraph. If required to monitor at more than eight locations, you must repeat the protocol as necessary. If you do not have existing compliance monitoring results collected under Rule 0400-45-01-.36 or if you do not have enough existing compliance monitoring results taken under Rule 0400-45-01-.36, you must repeat the protocol, skipping the provisions of parts 3 and 7 of this subparagraph as necessary, until you have identified the required total number of monitoring locations.

1. Location with the highest TTHM LRAA not previously selected as a LRAA monitoring location.

2. Location with the highest HAA5 LRAA not previously selected as a LRAA monitoring location.

3. Existing Rule 0400-45-01-.36 average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water system) with the highest HAA5 LRAA not previously selected as a LRAA monitoring location.

4. Location with the highest TTHM LRAA not previously selected as a LRAA monitoring location.

5. Location with the highest TTHM LRAA not previously selected as a LRAA monitoring location.

6. Location with the highest HAA5 LRAA not previously selected as a LRAA monitoring location.

7. Existing Rule 0400-45-01-.36 average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest TTHM LRAA not previously selected as a LRAA monitoring location.

8. Location with the highest HAA5 LRAA not previously selected as a LRAA monitoring location.

(d) You may recommend locations other than those specified in subparagraph (c) of this paragraph if you include a rationale for selecting other locations. If the Department approves the alternate locations, you must monitor at these locations to determine compliance under Rule 0400-45-01-.38.

(e) Your recommended schedule must include LRAA monitoring during the peak historical month for TTHM and HAA5 concentration, unless the Department approves another month. Once you have identified the peak historical month, and if you are required to conduct routine monitoring at least quarterly, you must schedule LRAA compliance monitoring at a regular frequency of every 90 days or fewer.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.38 STAGE 2 DISINFECTION BYPRODUCTS REQUIREMENTS (LRAA).**

(1) General Requirements

(Rule 0400-45-01-.38, continued)

(a) The requirements of this rule constitute national primary drinking water regulations. This rule establishes monitoring and other requirements for achieving compliance with maximum contaminant levels based on locational running annual averages (LRAA) for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5), and for achieving compliance with maximum residual disinfectant residuals for chlorine and chloramine for certain consecutive systems.

(b) Applicability. You are subject to these requirements if your system is a community water system or a nontransient noncommunity water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.

(c) You must comply with the requirements in this rule on the schedule in the following table based on your system type.

| If you are this type of system | You must comply with monitoring under this rule by: [1] |
|---|---|
| Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system | |
| System serving 100,000 or more | April 1, 2012 |
| System serving 50,000–99,999 | October 1, 2012 |
| System serving 10,000–49,999 | October 1, 2013. |
| System serving less than 10,000 | October1, 2013 if no Cryptosporidium monitoring is required under part (2)(a)4 of Rule 0400-45-01-.39 or October 1, 2014 if Cryptosporidium monitoring is required under part (2)(a)4 or (2)(a)6. |
| Other systems that are part of a combined distribution system | |
| Consecutive system or wholesale system | —at the same time as the system with the earliest compliance date in the combined distribution system |

[1]The Department may grant up to an additional 24 months for compliance with MCLs and operational evaluaton levels if you require capital improvements to comply with an MCL.

1. Your monitoring frequency is specified in part (2)(a)2 of this rule.

   (i) If you are required to conduct quarterly monitoring, you must begin monitoring in the first full calendar quarter that includes the compliance date in the table in this subparagraph.

   (ii) If you are required to conduct monitoring at a frequency that is less than quarterly, you must begin monitoring in the calendar month recommended in the IDSE report prepared under paragraph (2) or (3) of Rule 0400-45-01-.37 or the calendar month identified in the (LRAA) monitoring plan developed under paragraph (3) of this rule no later than 12 months after the compliance date in this table.

2. If you are required to conduct quarterly monitoring, you must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters). If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date.

3. For the purpose of the schedule in this subparagraph, the Department may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale

(Rule 0400-45-01-.38, continued)

system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The Department may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) Monitoring and compliance.

1. Systems required to monitor quarterly. To comply with LRAA MCLs, you must calculate LRAAs for TTHM and HAA5 using monitoring results collected under this rule and determine that each LRAA does not exceed the MCL. If you fail to complete four consecutive quarters of monitoring, you must calculate compliance with the MCL based on the average of the available data from the most recent four quarters. If you take more than one sample per quarter at a monitoring location, you must average all samples taken in the quarter at that location to determine a quarterly average to be used in the LRAA calculation.

2. Systems required to monitor yearly or less frequently. To determine compliance with LRAAs, you must determine that each sample taken is less than the MCL. If any sample exceeds the MCL, you must comply with the requirements of paragraph (6) of this rule. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.

(e) Violation. You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

(2) Routine Monitoring

(a) Monitoring.

1. If you submitted an IDSE report, you must begin monitoring at the locations and months you have recommended in your IDSE report submitted under paragraph (6) of Rule 0400-45-01-.37 following the schedule in subparagraph (1)(c) of this rule, unless the Department requires other locations or additional locations after its review. If you submitted a 40/30 certification under paragraph (4) of Rule 0400-45-01-.37 or you qualified for a very small system waiver under paragraph (5) of Rule 0400-45-01-.37 or you are a nontransient noncommunity water system serving <10,000, you must monitor at the location(s) and dates identified in your monitoring plan in Rule 0400-45-01-.36, updated as required by paragraph (3) of this rule.

2. You must monitor at no fewer than the number of locations identified in this part.

| Source water type | Population size category | Monitoring Frequency [1] | Distribution system monitoring location total per monitoring period[2] |
|---|---|---|---|
| Subpart H | <500 | per year ..... | 2 |
| | 500–3,300 | per quarter ..... | 2 |
| | 3,301–9,999 | per quarter ..... | 2 |
| | 10,000–49,999 | per quarter ..... | 4 |
| | 50,000– 249,999 | per quarter ..... | 8 |
| | 250,000–999,999 | per quarter ..... | 12 |
| | 1,000,000– 4,999,999 | per quarter ..... | 16 |
| | >5,000,000 | per quarter | 20 |
| | | | |
| Ground Water | <500 | per year | 2 |
| | 500–9,999 | per year | 2 |

(Rule 0400-45-01-.38, continued)

| | | | |
|---|---|---|---|
| | 10,000–99,999 | per quarter | 4 |
| | 100,000– 499,999 | per quarter | 6 |
| | >500,000 | per quarter | 8 |

[1] All systems must monitor during month of highest DBP concentrations.

[2] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500–3,300. Systems on annual monitoring and subpart H systems serving 500–3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

3. If you are an undisinfected system that begins using a disinfectant other than UV light after the dates in Rule 0400-45-01-.37 for complying with the Initial Distribution System Evaluation requirements, you must consult with the Department to identify compliance monitoring locations for LRAAs. You must then develop a monitoring plan under paragraph (3) of this rule that includes those monitoring locations.

(b) Analytical methods. You must use an approved method listed in Rule 0400-45-01-.14 for TTHM and HAA5 analyses. Analyses must be conducted by laboratories that have received certification by EPA or the Department as specified in Rule 0400-45-01-.14.

(3) LRAA monitoring plan.

(a) 1. You must develop and implement a monitoring plan to be kept on file for Department and public review. The monitoring plan must contain the elements in subpart (i) through (iv) of this part and be complete no later than the date you conduct your initial monitoring under this rule.

(i) Monitoring locations;

(ii) Monitoring dates;

(iii) Compliance calculation procedures; and

(iv) Monitoring plans for any other systems in the combined distribution system if the Department has reduced monitoring requirements under the State authority in 40 CFR 142.16(m).

2. If you were not required to submit an IDSE report under either paragraph (2) or (3) of Rule 0400-45-01-.37, and you do not have sufficient compliance monitoring locations under Rule 0400-45-01-.36 to identify the required number of LRAA compliance monitoring locations indicated in subparagraph (6)(b) of Rule 0400-45-01-.37, you must identify additional locations by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. You must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If you have more Rule 0400-45-01-.36 monitoring locations than required for LRAA compliance monitoring in subparagraph (6)(b) of Rule 0400-45-01-.37, you must identify which locations you will use for LRAA compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of LRAA compliance monitoring locations have been identified.

(b) If you are a subpart H system serving > 3,300 people, you must submit a copy of your monitoring plan to the Department prior to the date you conduct your initial LRAA

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monitoring, unless your IDSE report submitted under Rule 0400-45-01-.37 contains all the information required by this paragraph.

(c) You may revise your monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for Department-approved reasons, after consultation with the Department regarding the need for changes and the appropriateness of changes. If you change monitoring locations, you must replace existing compliance monitoring locations with the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The Department may also require modifications in your monitoring plan. If you are a subpart H system serving > 3,300 people, you must submit a copy of your modified monitoring plan to the Department prior to the date you are required to comply with the revised monitoring plan.

(4) Reduced monitoring.

(a) You may reduce monitoring to the level specified in the table in this subparagraph any time the LRAA is less than or equal to 0.040 mg/L for TTHM and less than or equal to 0.030 mg/L for HAA5 at all monitoring locations. You may only use data collected under the provisions Rule 0400-45-01-.37 or this rule to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be less than or equal to 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either subpart (6)(b)1(iii) or subparagraph (6)(d) of Rule 0400-45-01-.36.

| Source water type | Population size category | Monitoring Frequency [1] | Distribution system monitoring location per monitoring period |
|---|---|---|---|
| | | | |
| Subpart H | <500 | per year . | monitoring may not be reduced |
| | 500–3,300 | per year | 1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter. |
| | 3,301–9,999 | per year | 2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement. |
| | 10,000–49,999 | per quarter | 2 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs |
| | 50,000–249,999 | per quarter | 4 dual sample sets—at the locations with the two highest TTHM and two highest HAA5 LRAAs |
| | 250,000–999,999 | per quarter | 6 dual sample sets—at the locations with the three highest TTHM and three highest HAA5 LRAAs |
| | 1,000,000–4,999,999 | per quarter | 8 dual sample sets—at the locations with the four highest TTHM and four highest HAA5 LRAAs. |
| | >5,000,000 | per quarter | 10 dual sample sets—at the locations with the five highest TTHM and five highest HAA5 LRAAs |
| | | | |
| Ground Water | <500 | every third year | 1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter. |
| | 500–9,999 | per year | 1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and |

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| | | | |
|---|---|---|---|
| | | | quarter |
| | 10,000–99,999 | per year | 2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement. |
| | 100,000–499,999 | per quarter | 2 dual sample sets; at the locations with the highest TTHM and highest HAA5 LRAAs. |
| | >500,000 | per quarter | 4 dual sample sets at the locations with the two highest TTHM and two highest HAA5 LRAAs. |

[1] Systems on quarterly monitoring must take dual sample sets every 90 days.

(b) You may remain on reduced monitoring as long as the TTHM LRAA is less than or equal to 0.040 mg/L and the HAA5 LRAA less than or equal to 0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample is less than or equal to 0.060 mg/L and each HAA5 sample is less than or equal to 0.045 mg/L (for systems with annual or less frequent monitoring). In addition, the source water annual average TOC level, before any treatment, must be less than or equal to 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either subpart (6)(b)1(iii) or subparagraph (6)(d) of Rule 0400-45-01-.36.

(c) If the LRAA based on quarterly monitoring at any monitoring location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 or if the annual (or less frequent) sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5, or if the source water annual average TOC level, before any treatment, is >4.0 mg/L at any treatment plant treating surface water or ground water under the direct influence of surface water, you must resume routine monitoring under paragraph (2) of this rule or begin increased monitoring if paragraph (6) of this rule applies.

(d) The Department may return your system to routine monitoring at the Department's discretion.

(5) Additional requirements for consecutive systems.

(a) If you are a consecutive system that does not add a disinfectant but delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light, you must comply with analytical and monitoring requirements for chlorine and chloramines in subparagraphs (5)(c) and (6)(c) of Rule 0400-45-01-.36 and the compliance requirements in part (7)(c)1 of Rule 0400-45-01-.36 beginning April 1, 2009, unless required earlier by the Department, and report monitoring results under subparagraph (8)(c) of Rule 0400-45-01-.36.

(6) Conditions requiring increased monitoring.

(a) If you are required to monitor at a particular location annually or less frequently than annually under paragraph (2) or (3) of this rule, you must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations if a TTHM sample is >0.080 mg/L or a HAA5 sample is >0.060 mg/L at any location.

(b) You are in violation of the MCL when the LRAA exceeds the MCLs in paragraph (6) of Rule 0400-45-01-.06, calculated based on four consecutive quarters of monitoring (or the LRAA calculated based on fewer than four quarters of data if the MCL would be exceeded regardless of the monitoring results of subsequent quarters). You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

(Rule 0400-45-01-.38, continued)

(c) You may return to routine monitoring once you have conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is less than or equal to 0.060 mg/L for TTHM and less than or equal to 0.045 mg/L for HAA5.

(7) Operational evaluation levels.

(a) You have exceeded the operational evaluation level at any monitoring location where the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by 4 to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average, exceeds 0.060 mg/L.

(b) 1. If you exceed the operational evaluation level, you must conduct an operational evaluation and submit a written report of the evaluation to the Department no later than 90 days after being notified of the analytical result that causes you to exceed the operational evaluation level. The written report must be made available to the public upon request.

2. Your operational evaluation must include an examination of system treatment and distribution operational practices, including storage tank operations, excess storage capacity, distribution system flushing, changes in sources or source water quality, and treatment changes or problems that may contribute to TTHM and HAA5 formation and what steps could be considered to minimize future exceedances.

(i) You may request and the Department may allow you to limit the scope of your evaluation if you are able to identify the cause of the operational evaluation level exceedance.

(ii) Your request to limit the scope of the evaluation does not extend the schedule in part 1 of this subparagraph for submitting the written report. The Department must approve this limited scope of evaluation in writing and you must keep that approval with the completed report.

(8) Requirements for remaining on reduced TTHM and HAA5 monitoring based on Rule 0400-45-01-.36 results.

(a) You may remain on reduced monitoring after the dates identified in subparagraph (1)(c) of this rule for compliance with this rule only if you qualify for a 40/30 certification under paragraph (4) of Rule 0400-45-01-.37 or have received a very small system waiver under paragraph (5) of Rule 0400-45-01-.37, plus you meet the reduced monitoring criteria in subparagraph (4)(a) of this rule, and you do not change or add monitoring locations from those used for compliance monitoring under Rule 0400-45-01-.36. If your monitoring locations under this rule differ from your monitoring locations under Rule 0400-45-01-.36 (subpart L), you may not remain on reduced monitoring after the dates identified in subparagraph (1)(c) of this rule for compliance with this rule.

(9) Requirements for remaining on increased TTHM and HAA5 monitoring based on Rule 0400-45-01-.36 results.

(a) If you were on increased monitoring under part (6)(b)1 of Rule 0400-45-01-.36, you must remain on increased monitoring until you qualify for a return to routine monitoring under subparagraph (6)(c) of this rule. You must conduct increased monitoring under paragraph (6) of this rule at the monitoring locations in the monitoring plan developed under paragraph (3) of this rule beginning at the date identified in subparagraph (1)(c)

(Rule 0400-45-01-.38, continued)

of this rule for compliance with this rule and remain on increased monitoring until you qualify for a return to routine monitoring under subparagraph (6)(c) of this rule.

(10) Reporting and Recordkeeping Requirements

(a) Reporting.

1. You must report the following information for each monitoring location to the Department within 10 days of the end of any quarter in which monitoring is required:

(i) Number of samples taken during the last quarter.

(ii) Date and results of each sample taken during the last quarter.

(iii) Arithmetic average of quarterly results for the last four quarters for each monitoring location (LRAA), beginning at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter. If the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, you must report this information to the Department as part of the first report due following the compliance date or anytime thereafter that this determination is made. If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date, unless you are required to conduct increased monitoring under paragraph (6) of this rule.

(iv) Whether, based on paragraph (6) of Rule 0400-45-01-.06 and this rule, the MCL was violated at any monitoring location.

(v) Any operational evaluation levels that were exceeded during the quarter and, if so, the location and date, and the calculated TTHM and HAA5 levels.

2. If you are a subpart H system seeking to qualify for or remain on reduced TTHM/HAA5 monitoring, you must report the following source water TOC information for each treatment plant that treats surface water or ground water under the direct influence of surface water to the Department within 10 days of the end of any quarter in which monitoring is required:

(i) The number of source water TOC samples taken each month during last quarter.

(ii) The date and result of each sample taken during last quarter.

(iii) The quarterly average of monthly samples taken during last quarter or the result of the quarterly sample.

(iv) The running annual average (RAA) of quarterly averages from the past four quarters.

(v) Whether the RAA exceeded 4.0 mg/L.

(Rule 0400-45-01-.38, continued)

3. The Department may choose to perform calculations and determine whether the MCL was exceeded or the system is eligible for reduced monitoring in lieu of having the system report that information.

(b) Recordkeeping. You must retain any LRAA monitoring plans and your LRAA monitoring results as required by Rule 0400-45-01-.20.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.39 ENHANCED TREATMENT FOR CRYPTOSPORIDIUM.**

(1) General requirements.

(a) The requirements of this rule are national primary drinking water regulations. The regulations establish or extend treatment technique requirements in lieu of maximum contaminant levels for Cryptosporidium. These requirements are in addition to requirements for filtration and disinfection in Rule 0400-45-01-.31.

(b) Applicability. The requirements of this rule apply to all subpart H systems, which are public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water (GWUDI).

1. Wholesale systems, as defined in Rule 0400-45-01-.04, must comply with the requirements of this rule based on the population of the largest system in the combined distribution system.

2. The requirements of this rule for filtered systems apply to systems required by National Primary Drinking Water Regulations to provide filtration treatment, whether or not the system is currently operating a filtration system.

3. The requirements of this rule for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in Rule 0400-45-01-.31, as applicable.

(c) Requirements. Systems subject to this rule must comply with the following requirements:

1. Systems must conduct an initial and a second round of source water monitoring for each plant that treats a surface water or GWUDI source. This monitoring may include sampling for Cryptosporidium, E. coli, and turbidity as described in paragraphs (2) through (7) of this rule, to determine what level, if any, of additional Cryptosporidium treatment they must provide.

2. Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in paragraphs (9) through (10) of this rule.

3. Filtered systems must determine their Cryptosporidium treatment bin classification as described in paragraph (11) of this rule and provide additional treatment for Cryptosporidium, if required, as described in paragraph (12) of this rule. All unfiltered systems must provide treatment for Cryptosporidium as described in paragraph (13) of this rule. Filtered and unfiltered systems must implement Cryptosporidium treatment according to the schedule in paragraph (14) of this rule.

(Rule 0400-45-01-.39, continued)

4. Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility or treat the discharge from the facility as described in paragraph (15) of this rule.

5. Systems required to provide additional treatment for Cryptosporidium must implement microbial toolbox options that are designed and operated as described in paragraphs (16) through (21) of this rule.

6. Systems must comply with the applicable recordkeeping and reporting requirements described in paragraphs (22) through (23) of this rule.

7. Systems must address significant deficiencies identified in sanitary surveys performed by the Department or EPA as described in paragraph (24) of this rule.

(2) Source water monitoring.

(a) Initial round of source water monitoring. Systems must conduct the following monitoring on the schedule in subparagraph (c) of this paragraph unless they meet the monitoring exemption criteria in subparagraph (d) of this paragraph.

1. Filtered systems serving at least 10,000 people must sample their source water for Cryptosporidium, E. coli, and turbidity at least monthly for 24 months.

2. Unfiltered systems serving at least 10,000 people must sample their source water for Cryptosporidium at least monthly for 24 months.

3. (i) Filtered systems serving fewer than 10,000 people must sample their source water for E. coli at least once every two weeks for 12 months.

(ii) A filtered system serving fewer than 10,000 people may avoid E. coli monitoring if the system notifies the Department that it will monitor for Cryptosporidium as described in part 4 of this subparagraph. The system must notify the Department no later than 3 months prior to the date the system is otherwise required to start E. coli monitoring under subparagraph (c) of this paragraph.

4. Filtered systems serving fewer than 10,000 people must sample their source water for Cryptosporidium at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under part 3 of this subparagraph:

(i) For systems using lake/reservoir sources, the annual mean E. coli concentration is greater than 10 E. coli/ 100 mL.

(ii) For systems using flowing stream sources, the annual mean E. coli concentration is greater than 50 E. coli/ 100 mL.

(iii) The system does not conduct E. coli monitoring as described in part 3 of this subparagraph.

(iv) Systems using ground water under the direct influence of surface water (GWUDI) must comply with the requirements of this part based on the E. coli level that applies to the nearest surface water body. If no surface water body is nearby, the system must comply based on the requirements that apply to systems using lake/reservoir sources.

(Rule 0400-45-01-.39, continued)

5. For filtered systems serving fewer than 10,000 people, the Department may approve monitoring for an indicator other than E. coli under part 3 of this subparagraph. The Department also may approve an alternative to the E. coli concentration in subpart 4(i), (ii) or (iv) of this subparagraph to trigger Cryptosporidium monitoring. This approval by the Department must be provided to the system in writing and must include the basis for the Department's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 Cryptosporidium level in paragraph (11) of this rule.

6. Unfiltered systems serving fewer than 10,000 people must sample their source water for Cryptosporidium at least twice per month for 12 months or at least monthly for 24 months.

7. Systems may sample more frequently than required if the sampling frequency is evenly spaced throughout the monitoring period.

(b) Second round of source water monitoring. Systems must conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in subparagraph (a) of this paragraph, unless they meet the monitoring exemption criteria in subparagraph (d) of this paragraph. Systems must conduct this monitoring on the schedule in subparagraph (c) of this paragraph.

(c) Monitoring schedule. Systems must begin the monitoring required in subparagraphs (a) and (b) of this paragraph no later than the month beginning with the date listed in this table:

SOURCE WATER MONITORING STARTING DATES TABLE

| Systems that serve | Must begin the first round of source water monitoring no later than the month beginning . . . | And must begin the second round of source water monitoring no later than the month beginning . . . |
|---|---|---|
| (1) At least 100,000 people | (i) October 1, 2006 | (ii) April 1, 2015. |
| (2) From 50,000 to 99,999 people | (i) April 1, 2007 | (ii) October 1, 2015 |
| (3) From 10,000 to 49,999 people | (i) April 1, 2008 | (ii) October 1, 2016. |
| (4) Fewer than 10,000 and monitor for E. coli[a] | (i) October 1, 2008 | (ii) October 1, 2017. |
| (5) Fewer than 10,000 and monitor for Cryptosporidium [b] | (i) April 1, 2010 | (ii) April 1, 2019 |

a Applies only to filtered systems.

b Applies to filtered systems that meet the conditions of paragraph (a)4 and unfiltered systems.

(d) Monitoring avoidance.

1. Filtered system are not required to conduct source water monitoring under this rule if the system will provide a total of at least 5.5-log of treatment for Cryptosporidium, equivalent to meeting the treatment requirements of Bin 4 in paragraph (12) of this rule.

2. Unfiltered systems are not required to conduct source water monitoring under this rule if the system will provide a total of at least 3-log Cryptosporidium inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean Cryptosporidium concentration of greater than 0.01 oocysts/L in paragraph (13) of this rule.

(Rule 0400-45-01-.39, continued)

3. If a system chooses to provide the level of treatment in part 1 or 2 of this subparagraph, as applicable, rather than start source water monitoring, the system must notify the Department in writing no later than the date the system is scheduled for monitoring under paragraph (3) of this rule. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the Department in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in paragraph (14) of this rule.

(e) Plants operating only part of the year. Systems with subpart H plants that operate for only part of the year must conduct source water monitoring in accordance with this rule, but with the following modifications:

1. Systems must sample their source water only during the months that the plant operates unless the Department specifies another monitoring period based on plant operating practices.

2. Systems with plants that operate less than six months per year and that monitor for Cryptosporidium must collect at least six Cryptosporidium samples per year during each of two years of monitoring. Samples must be evenly spaced throughout the period the plant operates.

(f) 1. New sources. A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under subparagraph (c) of this paragraph must monitor the new source on a schedule the Department approves. Source water monitoring must meet the requirements of this rule. The system must also meet the bin classification and Cryptosporidium treatment requirements of paragraphs (11) and (12) or (13) of this rule, as applicable, for the new source on a schedule the Department approves.

2. The requirements of this paragraph apply to subpart H systems that begin operation after the monitoring start date applicable to the system's size under subparagraph (c) of this paragraph.

3. The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under paragraph (11) of this rule or determination of the mean Cryptosporidium level under paragraph (13) of this rule, as applicable.

(g) Failure to collect any source water sample required under this paragraph in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of paragraphs (3) through (7) of this rule is a monitoring violation.

(h) Grandfathering monitoring data. Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in subparagraph (c) of this paragraph to meet the initial source water monitoring requirements in subparagraph (a) of this paragraph. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in paragraph (8) of this rule.

(3) Sampling schedules.

(a) Systems required to conduct source water monitoring under paragraph (2) of this rule must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

(Rule 0400-45-01-.39, continued)

1. Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in subparagraph (2)(c) of this rule for each round of required monitoring.

2. (i) Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under subparagraph (2)(a) of this rule to the Department and to the EPA electronically at https://intranet.epa.gov/lt2/.

   (ii) If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that EPA approves.

3. Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring under subparagraph (2)(a) of this rule to the Department.

4. Systems must submit sampling schedules for the second round of source water monitoring under subparagraph (2)(b) of this rule to the Department.

5. If EPA or the Department does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.

(b) Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (i.e., within a five-day period around the schedule date) unless one of the conditions of part 1 or 2 of this subparagraph applies.

1. If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample in the scheduled five-day period, the system must sample as close to the scheduled date as is feasible unless the Department approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the Department concurrent with the shipment of the sample to the laboratory.

2 (i) If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in paragraph (5) of this rule, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

   (ii) The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the Department approves an alternative resampling date. The system must submit an explanation for the delayed sampling date to the Department concurrent with the shipment of the sample to the laboratory.

(c) Systems that fail to meet the criteria of subparagraph (b) of this paragraph for any source water sample required under paragraph (2) of this rule must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the Department for approval prior to when the system begins collecting the missed samples.

(Rule 0400-45-01-.39, continued)

(4) Sampling locations.

(a) Systems required to conduct source water monitoring under paragraph (2) of this rule must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the Department may approve one set of monitoring results to be used to satisfy the requirements of paragraph (2) of this rule for all plants.

(b) 1. Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of part 2 of this subparagraph.

2. The Department may approve a system to collect a source water sample after chemical treatment. To grant this approval, the Department must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

(c) Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.

(d) Bank filtration.

1. Systems that receive Cryptosporidium treatment credit for bank filtration under subparagraph (4)(b) or (d) of Rule 0400-45-01-.31, as applicable, must collect source water samples in the surface water prior to bank filtration.

2. Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (i.e., after bank filtration). Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under subparagraph (18)(c) of this rule.

(e) Multiple sources. Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in part 1 or 2 of this subparagraph. The use of multiple sources during monitoring must be consistent with routine operational practice.

1. If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.

2. If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either subpart (i) or (ii) of this part for sample analysis.

(i) Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.

(ii) Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

(f) Additional Requirements. Systems must submit a description of their sampling location(s) to the Department at the same time as the sampling schedule required under paragraph (3) of this rule. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the Department does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).

(5) Reserved

(6) Approved laboratories.

(a) Cryptosporidium. Systems must have Cryptosporidium samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of Cryptosporidium in Water or a laboratory that has been certified for Cryptosporidium analysis by an equivalent State laboratory certification program.

(b) E. coli. Any laboratory certified by the EPA, the National Environmental Laboratory Accreditation Conference or the Department for total coliform or fecal coliform analysis under Rule 0400-45-01-.31 is approved for E. coli analysis under this rule when the laboratory uses the same technique for E. coli that the laboratory uses to count the number of e-coli colonies under Rule 0400-45-01-.31. The alternative testing method of E. coli under this rule is Standard Method 9222 D/9222 G. Membrane Filtration, Two Step Methodology from Standard Method 20th edition.

(c) Turbidity. Measurements of turbidity must be made by a party approved by the Department.

(7) Reporting source water monitoring results.

(a) Systems must report results from the source water monitoring required under paragraph (2) of this rule no later than 10 days after the end of the first month following the month when the sample is collected.

(b) 1. All systems serving at least 10,000 people must report the results from the initial source water monitoring required under subparagraph (2)(a) of this rule to EPA electronically at https://intranet.epa.gov/lt2/.

2. If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that EPA approves.

(c) Systems serving fewer than 10,000 people must report results from the initial source water monitoring required under subparagraph (2)(a) of this rule to the Department.

(d) All systems must report results from the second round of source water monitoring required under paragraph (2) of this rule to the Department.

(e) Systems must report the applicable information in parts 1 and 2 of this subparagraph for the source water monitoring required under paragraph (2) of this rule.

1. Systems must report the following data elements for each Cryptosporidium analysis: PWSID, Facility ID, Sample collection date, Sample type (field or matrix spike), Sample volume filtered (L), to nearest 0.25 L. Was 100% of filtered volume examined, Number of oocysts counted.

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

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

(iii) For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.

2. Systems must report the following data elements for each E. coli analysis: PWSID, Facility ID, Sample collection date, Analytical method number, Method type, Source type (flowing stream, lake/reservoir, GWUDI), E. coli/100 mL, Turbidity. Systems serving fewer than 10,000 people that are not required to monitor for turbidity under paragraph (2) of this rule are not required to report turbidity with their E. coli results.

(8) Grandfathering previously collected data.

(a) 1. Systems may comply with the initial source water monitoring requirements of subparagraph (2)(a) of this rule by grandfathering sample results collected before the system is required to begin monitoring (i.e., previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in this paragraph and the Department must approve.

2. A filtered system may grandfather Cryptosporidium samples to meet the requirements of subparagraph (2)(a) of this rule when the system does not have corresponding E. coli and turbidity samples. A system that grandfathers Cryptosporidium samples without E. coli and turbidity samples is not required to collect E. coli and turbidity samples when the system completes the requirements for Cryptosporidium monitoring under subparagraph (2)(a) of this rule.

(b) E. coli sample analysis. The analysis of E. coli samples must meet the analytical method and approved laboratory requirements of paragraphs (5) through (6) of this rule.

(c) Cryptosporidium sample analysis. The analysis of Cryptosporidium samples must meet the criteria in this subparagraph.

1. Laboratories analyzed Cryptosporidium samples using one of the analytical methods in subparts (i) through (vi) of this part, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods on-line from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave, NW, Washington, DC 20460 (Telephone: 800-426-4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202-566- 2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to:

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http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(i) Method 1623*:* Cryptosporidium and Giardia in Water by Filtration/IMS/ *FA,* 2005, United States Environmental Protection Agency, EPA–815–R–05–002.

(ii) Method 1622*:* Cryptosporidium in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA–815–R–05–001.

(iii) Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/ FA, 2001, United States Environmental Protection Agency, EPA–821–R–01–025.

(iv) Method 1622*:* Cryptosporidium in Water by Filtration/IMS/FA, 2001, United States Environmental Protection Agency, EPA–821–-R–01–026.

(v) Method 1623*:* Cryptosporidium and Giardia in Water by Filtration/IMS/ FA, 1999, United States Environmental Protection Agency, EPA–821–R–99–006.

(vi) Method 1622*:* Cryptosporidium in Water by Filtration/IMS/FA, 1999, United States Environmental Protection Agency, EPA–821–R–99–001.

2. For each Cryptosporidium sample, the laboratory analyzed at least 10 L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods listed in part 1 of this subparagraph.

(d) Sampling location. The sampling location must meet the conditions in paragraph (4) of this rule.

(e) Sampling frequency. Cryptosporidium samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in parts (3)(b)1 and 2 of this rule if the system provides documentation of the condition when reporting monitoring results.

1. The Department may approve grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the Department specifies to ensure that the data used to comply with the initial source water monitoring requirements of subparagraph (2)(a) of this rule are seasonally representative and unbiased.

2. Systems may grandfather previously collected data where the sampling frequency within each month varied. If the Cryptosporidium sampling frequency varied, systems must follow the monthly averaging procedure in part (11)(b)5 or (13)(a)3 of this rule, as applicable, when calculating the bin classification for filtered systems or the mean Cryptosporidium concentration for unfiltered systems.

(f) Reporting monitoring results for grandfathering. Systems that request to grandfather previously collected monitoring results must report the following information by the applicable dates listed in this subparagraph. Systems serving at least 10,000 people must report this information to EPA unless the Department approves reporting to the

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Department rather than EPA. Systems serving fewer than 10,000 people must report this information to the Department.

1. Systems must report that they intend to submit previously collected monitoring results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of subparagraph (2)(a) of this rule. Systems must report this information no later than the date the sampling schedule under paragraph (3) of this rule is required.

2. Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in subparts (i) through (iv) of this part, no later than two months after the applicable date listed in subparagraph (2)(c) of this rule.

   (i) For each sample result, systems must report the applicable data elements in paragraph (7) of this rule.

   (ii) Systems must certify that the reported monitoring results include all results the system generated during the time period beginning with the first reported result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring under this rule, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in this paragraph.

   (iii) Systems must certify that the samples were representative of a plant's source water(s) and the source water(s) have not changed. Systems must report a description of the sampling location(s), which must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.

   (iv) For Cryptosporidium samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in part (c)1 of this paragraph were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.

(g) If the Department determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the Department may disapprove the data. Alternatively, the Department may approve the previously collected data if the system reports additional source water monitoring data, as determined by the Department, to ensure that the data set used under paragraph (11) or (13) of this rule represents average source water conditions for the system.

(h) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring under subparagraph (2)(a) of this rule and some of the data are rejected due to not meeting the requirements of this paragraph, systems must conduct additional monitoring to replace rejected data on a schedule the Department approves. Systems are not required to begin this additional monitoring until

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two months after notification that data have been rejected and additional monitoring is necessary.

(9) Requirements when making a significant change in disinfection practice.

(a) Following the completion of initial source water monitoring under subparagraph (2)(a) of this rule, a system that plans to make a significant change to its disinfection practice, as defined in subparagraph (b) of this paragraph, must develop disinfection profiles and calculate disinfection benchmarks for Giardia lamblia and viruses as described in paragraph (10) of this rule. Prior to changing the disinfection practice, the system must notify the Department and must include in this notice the information in parts 1 through 3 of this subparagraph.

1. A completed disinfection profile and disinfection benchmark for Giardia lamblia and viruses as described in paragraph (10) of this rule.

2. A description of the proposed change in disinfection practice.

3. An analysis of how the proposed change will affect the current level of disinfection.

(b) Significant changes to disinfection practice are defined as follows:

1. Changes to the point of disinfection;

2. Changes to the disinfectant(s) used in the treatment plant;

3. Changes to the disinfection process; or

4. Any other modification identified by the Department as a significant change to disinfection practice.

(10) Developing the disinfection profile and benchmark.

(a) Systems required to develop disinfection profiles under paragraph (9) of this rule must follow the requirements of this paragraph. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for Giardia lamblia and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for Giardia lamblia through the entire plant, based on $CT_{99.9}$ values in Tables 1.1 through 1.6, 2.1 and 3.1 of subparagraph (5)(b) of Rule 0400-45-01-.31 as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the Department.

(b) Systems with a single point of disinfection application prior to the entrance to the distribution system must conduct the monitoring in parts 1 through 4 of this subparagraph. Systems with more than one point of disinfection application must conduct the monitoring in parts 1 through 4 of this subparagraph for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ration, using analytical methods in paragraph (10) of Rule 0400-45-01-.14.

1. For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the Department.

2. For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the Department.

3. The disinfectant contact time(s) (T) must be determined during peak hourly flow.

4. The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.

(c) In lieu of conducting new monitoring under subparagraph (b) of this paragraph, systems may elect to meet the requirements of part 1 or 2 of this subparagraph.

1. Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of subparagraph (b) of this paragraph may use these data to develop disinfection profiles as specified in this paragraph if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

2. Systems may use disinfection profile(s) developed under Rule 0400-45-01-.31 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under Rule 0400-45-01-.31 must develop a virus profile using the same monitoring data on which the Giardia lamblia profile is based.

(d) Systems must calculate the total inactivation ratio for Giardia lamblia as specified in parts 1 through 3 of this subparagraph.

1. Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the methods in subpart (i) or (ii) of this part.

(i) Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.

(ii) Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/ CT_{99.9}$) values together to determine ($\Sigma$ ($CTcalc/CT_{99.9}$)).

2. Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and ($\Sigma$ ($CTcalc/CT_{99.9}$)) must be calculated using the method in subpart 1(ii) of this subparagraph.

3. The system must determine the total logs of inactivation by multiplying the value calculated in part 1 or 2 of this subparagraph by 3.0.

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4. Systems must calculate the log of inactivation for viruses using a protocol approved by the Department.

(e) Systems must use the procedures specified in parts 1 and 2 of this subparagraph to calculate a disinfection benchmark.

1. For each year of profiling data collected and calculated under subparagraphs (a) through (d) of this paragraph, systems must determine the lowest mean monthly level of both Giardia lamblia and virus inactivation. Systems must determine the mean Giardia lamblia and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly Giardia lamblia and virus log inactivation by the number of values calculated for that month.

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

(11) Bin classification for filtered systems.

(a) Following completion of the initial round of source water monitoring required under subparagraph (2)(a) of this rule, filtered systems must calculate an initial Cryptosporidium bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the Cryptosporidium results reported under subparagraph (2)(a) of this rule and must follow the procedures in parts (b)1 through 5 of this paragraph.

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

2. For systems that collect a total of at least 24 samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which Cryptosporidium samples were collected.

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

4. For systems with plants operating only part of the year that monitor fewer than 12 months per year under subparagraph (2)(e) of this rule, the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of Cryptosporidium monitoring.

5. If the monthly Cryptosporidium sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in parts 1 through 4 of this subparagraph.

(c) Filtered systems must determine their initial bin classification from the following table and using the Cryptosporidium bin concentration calculated under subparagraphs (a) and (b) of this paragraph:

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BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS

| For systems that are: | With a Cryptosporidium bin concentration of [1] | The bin classification is |
|---|---|---|
| required to monitor for Cryptosporidium under paragraph (2) of this rule. | Cryptosporidium <0.075 oocysts/L | Bin 1 |
| | 0.075 oocysts/L <1.0 oocysts/L | Bin 2. |
| | 1.0 oocysts/L <3.0 oocysts/L | Bin 3. |
| | Greater than or equal to 3.0 oocysts/L | Bin 4. |
| serving fewer than 10,000 people and NOT required to monitor for Cryptosporidium under part (2)(a)4 of this rule. | NA | Bin 1 |

[1] Based on calculations in subparagraph (a) or (d) of this paragraph, as applicable.

(d) Following completion of the second round of source water monitoring required under subparagraph (2)(b) of this rule, filtered systems must recalculate their Cryptosporidium bin concentration using the Cryptosporidium results reported under subparagraph (2)(b) of this rule and following the procedures in parts (b)1 through 4 of this paragraph. Systems must then redetermine their bin classification using this bin concentration and the table in subparagraph (c) of this paragraph.

(e) 1. Filtered systems must report their initial bin classification under subparagraph (c) of this paragraph to the Department for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in subparagraph (2)(c) of this rule.

2. Systems must report their bin classification under subparagraph (d) of this paragraph to the Department for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in subparagraph (2)(c) of this rule.

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

(f) Failure to comply with the conditions of subparagraph (e) of this paragraph is a violation of the treatment technique requirement.

(12) Filtered system additional Cryptosporidium treatment requirements.

(a) Filtered systems must provide the level of additional treatment for Cryptosporidium specified in this paragraph based on their bin classification as determined under paragraph (11) of this rule and according to the schedule in paragraph (14) of this rule.

| If the system bin classification is | And the system uses the following filtration treatment in full compliance with Rule 0400-45-01-.31 (as applicable), then the additional Cryptosporidium treatment requirements are . . . | | | |
|---|---|---|---|---|
| | Conventional filtration treatment (including softening) | Direct filtration | Slow sand or diatomaceous earth filtration | Alternative filtration technologies |
| Bin 1 | No additional treatment | No additional treatment | No additional treatment | No additional treatment. |

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| | | | | |
|---|---|---|---|---|
| Bin 2 | 1-log treatment | 1.5-log treatment | 1-log treatment | ([1]) |
| Bin 3 | 2-log treatment | 2.5-log treatment | 2-log treatment | ([2]) |
| Bin 4 | 2.5-log treatment | 3-log treatment | 2.5-log treatment | ([3]) |

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

(b) 1. Filtered systems must use one or more of the treatment and management options listed in paragraph (16) of this rule, termed the microbial toolbox, to comply with the additional Cryptosporidium treatment required in subparagraph (a) of this paragraph.

2. Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional Cryptosporidium treatment required under subparagraph (a) of this paragraph using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in paragraphs (17) through (21) of this rule.

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in paragraphs (17) through (21) of this rule for microbial toolbox options that is at least equal to the level of treatment required in subparagraph (a) of this paragraph is a violation of the treatment technique requirement.

(d) If the Department determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under subparagraph (2)(a) or (b) of this rule, significant changes occurred in the system's watershed that could lead to increased contamination of the source water by Cryptosporidium, the system must take actions specified by the Department to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in paragraph (16) of this rule.

(13) Unfiltered system Cryptosporidium treatment requirements.

(a) Determination of mean Cryptosporidium level.

1. Following completion of the initial source water monitoring required under subparagraph (2)(a) of this rule, unfiltered systems must calculate the arithmetic mean of all Cryptosporidium sample concentrations reported under subparagraph (2)(a) of this rule. Systems must report this value to the Department for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in subparagraph (2)(c) of this rule.

2. Following completion of the second round of source water monitoring required under subparagraph (2)(b) of this rule, unfiltered systems must calculate the arithmetic mean of all Cryptosporidium sample concentrations reported under subparagraph (2)(b) of this rule. Systems must report this value to the Department for approval no later than 6 months after the month the system is required to complete the second round of source water monitoring based on the schedule in subparagraph (2)(c) of this rule.

3. If the monthly Cryptosporidium sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then

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use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean Cryptosporidium level in part 1 or 2 of this subparagraph.

4. The report to the Department of the mean Cryptosporidium levels calculated under parts 1 and 2 of this subparagraph must include a summary of the source water monitoring data used for the calculation.

5. Failure to comply with the conditions of this subparagraph is a violation of the treatment technique requirement.

(b) Cryptosporidium inactivation requirements. Unfiltered systems must provide the level of inactivation for Cryptosporidium specified in this paragraph, based on their mean Cryptosporidium levels as determined under subparagraph (a) of this paragraph and according to the schedule in paragraph (14) of this rule.

1. Unfiltered systems with a mean Cryptosporidium level of 0.01 oocysts/L or less must provide at least 2-log Cryptosporidium inactivation.

2. Unfiltered systems with a mean Cryptosporidium level of greater than 0.01 oocysts/L must provide at least 3-log Cryptosporidium inactivation.

(c) Inactivation treatment technology requirements. Unfiltered systems must use chlorine dioxide, ozone, or UV as described in paragraph (21) of this rule to meet the Cryptosporidium inactivation requirements of this paragraph.

1. Systems that use chlorine dioxide or ozone and fail to achieve the Cryptosporidium inactivation required in subparagraph (b) of this paragraph on more than one day in the calendar month are in violation of the treatment technique requirement.

2. Systems that use UV light and fail to achieve the Cryptosporidium inactivation required in subparagraph (b) of this paragraph by meeting the criteria in subpart (21)(d)3(ii) of this rule are in violation of the treatment technique requirement.

(d) Use of two disinfectants. Unfiltered systems must meet the combined Cryptosporidium inactivation requirements of this paragraph and Giardia lamblia and virus inactivation requirements of Rule 0400-45-01-.31 using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either Cryptosporidium, Giardia lamblia, or viruses.

(14) Schedule for compliance with Cryptosporidium treatment requirements.

(a) Following initial bin classification under subparagraph (11)(c) of this rule, filtered systems must provide the level of treatment for Cryptosporidium required under paragraph (12) of this rule according to the schedule in subparagraph (c) of this paragraph.

(b) Following initial determination of the mean Cryptosporidium level under part (13)(a)1 of this rule, unfiltered systems must provide the level of treatment for Cryptosporidium required under paragraph (13) of this rule according to the schedule in subparagraph (c) of this paragraph.

(c) Cryptosporidium treatment compliance dates.

CRYPTOSPORIDIUM TREATMENT COMPLIANCE DATES TABLE

| | Must comply with Systems that serve Cryptosporidium treatment requirements no later than [a] |
|---|---|
| (1) At least 100,000 | (i) April 1, 2012 |
| (2) From 50,000 to 99,999 people | (i) October 1, 2012 |
| (3) From 10,000 to 49,999 people | (i) October 1, 2013 |
| (4). Fewer than 10,000 people | (i) October 1, 2014 |

[a] The Department may allow up to an additional two years for complying with the treatment requirement for systems making capital improvements.

(d) If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under subparagraph (11)(d) of this rule, the system must provide the level of treatment for Cryptosporidium required under paragraph (12) of this rule on a schedule the Department approves.

(e) If the mean Cryptosporidium level for an unfiltered system changes following the second round of monitoring, as determined under part (13)(a)2 of this rule, and if the system must provide a different level of Cryptosporidium treatment under paragraph (13) of this rule due to this change, the system must meet this treatment requirement on a schedule the Department approves.

(15) Requirements for uncovered finished water storage facilities.

(a) Systems using uncovered finished water storage facilities must comply with the conditions of this paragraph.

(b) Systems must notify the Department of the use of each uncovered finished water storage facility no later than April 1, 2008.

(c) Systems must meet the conditions of part 1 or 2 of this subparagraph for each uncovered finished water storage facility or be in compliance with a Department-approved schedule to meet these conditions no later than April 1, 2009.

1. Systems must cover any uncovered finished water storage facility.

2. Systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log Giardia lamblia, and 2-log Cryptosporidium using a protocol approved by the Department.

(d) Failure to comply with the requirements of this paragraph is a violation of the treatment technique requirement.

(16) Microbial toolbox options for meeting Cryptosporidium treatment requirements.

(a) 1. Systems receive the treatment credits listed in the table in subparagraph (b) of this paragraph by meeting the conditions for microbial toolbox options described in paragraphs (17) through (21) of this rule. Systems apply these treatment credits to meet the treatment requirements in paragraph (12) or (13) of this rule, as applicable.

2. Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in paragraph (21) of this rule only.

(b) The following table summarizes options in the microbial toolbox:

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MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA

| Toolbox Option | Cryptosporidium treatment credit with design and implementation criteria |
|---|---|
| Source Protection and Management Toolbox Options | |
| (1) Watershed control program. | 0.5-log credit for Department-approved program comprising required elements, annual program status report to Department, and regular watershed survey. Unfiltered systems are not eligible for credit. Specific criteria are in subparagraph (17)(a) of this rule. |
| (2) Alternative source/intake management | No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in subparagraph (17)(b) of this rule. |
| Pre Filtration Toolbox Options | |
| (3) Presedimentation basin with coagulation. | 0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative Department-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through basins. Specific criteria are in subparagraph (18)(a) of this rule. |
| (4) Two-stage lime softening | 0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in subparagraph (18)(b) of this rule. |
| (5) Bank filtration | 0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in subparagraph (18)(c) of this rule. |
| Treatment Performance Toolbox Options | |
| (6) Combined filter performance | 0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria are in subparagraph (19)(a) of this rule. |
| (7) Individual filter performance | 0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in subparagraph (19)(b) of this rule. |
| (8) Demonstration of performance | Credit awarded to unit process or treatment train based on a demonstration to the Department with a Department- approved protocol. Specific criteria are in subparagraph (19)(c) of this rule. |
| Additional Filtration Toolbox Options | |
| (9) Bag or cartridge filters (individual filters) | Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in subparagraph (20)(a) of this rule. |
| (10) Bag or cartridge filters (in series) | Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in subparagraph (20)(a) of this rule. |
| (11) Membrane filtration | Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in subparagraph (20)(b) of this rule. |
| (12) Second stage filtration | 0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in subparagraph (20)(c) of this rule. |
| (13) Slow sand filters | 2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in subparagraph (20)(d) of this rule. |
| Inactivation Toolbox Options | |
| (14) Chlorine dioxide | Log credit based on measured CT in relation to CT table. Specific criteria in subparagraph (21)(b) of this rule. |
| (15) Ozone | Log credit based on measured CT in relation to CT table. Specific criteria in subparagraph (21(b) of this rule. |
| (16) UV | Log credit based on validated UV dose relation to UV dose table; reactor validation testing required to establish UV dose and associated |

| | |
|---|---|
| | operating conditions. Specific criteria in subparagraph (21)(d) of this rule. |

(17) Source toolbox components.

(a) Watershed control program. Systems receive 0.5-log Cryptosporidium treatment credit for implementing a watershed control program that meets the requirements of this paragraph.

1. Systems that intend to apply for the watershed control program credit must notify the Department of this intent no later than two years prior to the treatment compliance date applicable to the system in paragraph (14) of this rule.

2. Systems must submit to the Department a proposed watershed control plan no later than one year before the applicable treatment compliance date in paragraph (14) of this rule. The Department must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the elements in subparts (i) through (iv) of this part.

(i) Identification of an ‘‘area of influence’’ outside of which the likelihood of Cryptosporidium or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under subpart 5(ii) of this subparagraph.

(ii) Identification of both potential and actual sources of Cryptosporidium contamination and an assessment of the relative impact of these sources on the system’s source water quality.

(iii) An analysis of the effectiveness and feasibility of control measures that could reduce Cryptosporidium loading from sources of contamination to the system’s source water.

(iv) A statement of goals and specific actions the system will undertake to reduce source water Cryptosporidium levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

3. Systems with existing watershed control programs (*i.e.,* programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in part 2 of this subparagraph and must specify ongoing and future actions that will reduce source water Cryptosporidium levels.

4. If the Department does not respond to a system regarding approval of a watershed control plan submitted under this subparagraph and the system meets the other requirements of this subparagraph, the watershed control program will be considered approved and 0.5 log Cryptosporidium treatment credit will be awarded unless and until the Department subsequently withdraws such approval.

5. Systems must complete the actions in subparts (i) through (iii) of this subparagraph to maintain the 0.5-log credit.

(i) Submit an annual watershed control program status report to the Department. The annual watershed control program status report must describe the system’s implementation of the approved plan and assess the

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adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the Department or as the result of the watershed survey conducted under subpart (ii) of this part. It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the Department prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

(ii) Undergo a watershed sanitary survey every three years for community water systems and every five years for noncommunity water systems and submit the survey report to the Department. The survey must be conducted according to Department guidelines and by persons the Department approves.

(I) The watershed sanitary survey must meet the following criteria: encompass the region identified in the Department-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water Cryptosporidium levels; and identify any significant new sources of Cryptosporidium.

(II) If the Department determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the Department requires, which may be earlier than the regular date in subpart (ii) of this part.

(iii) The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The Department may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.

6. If the Department determines that a system is not carrying out the approved watershed control plan, the Department may withdraw the watershed control program treatment credit.

(b) Alternative source.

1. A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the Department approves, a system may determine its bin classification under paragraph (11) of this rule based on the alternative source monitoring results.

2. If systems conduct alternative source monitoring under part 1 of this subparagraph, systems must also monitor their current plant intake concurrently as described in paragraph (2) of this rule.

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3. Alternative source monitoring under part 1 of this subparagraph must meet the requirements for source monitoring to determine bin classification, as described in paragraphs (2) through (7) of this rule. Systems must report the alternative source monitoring results to the Department, along with supporting information documenting the operating conditions under which the samples were collected.

4. If a system determines its bin classification under paragraph (11) of this rule using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in paragraph (14) of this rule.

(18) Pre-filtration treatment toolbox components.

(a) Presedimentation. Systems receive 0.5-log Cryptosporidium treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.

1. The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or GWUDI source.

2. The system must continuously add a coagulant to the presedimentation basin.

3. The presedimentation basin must achieve the performance criteria in subpart (i) or (ii) of this subparagraph:

(i) Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\log_{10}$ (monthly mean of daily influent turbidity) minus $\log_{10}$ (monthly mean of daily effluent turbidity).

(ii) Complies with Department-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

(b) Two-stage lime softening. Systems receive an additional 0.5-log Cryptosporidium treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.

(c) Bank filtration. Systems receive Cryptosporidium treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this subparagraph. Systems using bank filtration when they begin source water monitoring under subparagraph (2)(a) of this rule must collect samples as described in subparagraph (4)(d) of this rule and are not eligible for this credit.

1. Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in part 4 of this subparagraph.

2. Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger

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particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.

3. Only horizontal and vertical wells are eligible for treatment credit.

4. For vertical wells, the ground water flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

5. Systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the Department and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the Department determines that microbial removal has been compromised, the Department may revoke treatment credit until the system implements corrective actions approved by the Department to remediate the problem.

6. Springs and infiltration galleries are not eligible for treatment credit under this subparagraph, but are eligible for credit under subparagraph (19)(c) of this rule.

7. Bank filtration demonstration of performance. The Department may approve Cryptosporidium treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this subparagraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in parts 1 through 5 of this subparagraph.

(i) The study must follow a Department-approved protocol and must involve the collection of data on the removal of Cryptosporidium or a surrogate for Cryptosporidium and related hydrogeologic and water quality parameters during the full range of operating conditions.

(ii) The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

(19) Treatment performance toolbox components.

(a) Combined filter performance. Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log Cryptosporidium treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in Rule 0400-45-01-.31.

(b) Individual filter performance. Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log Cryptosporidium treatment credit, which can be in addition to the 0.5-log credit under subparagraph (a) of this paragraph, during any month the system meets the criteria in this subparagraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in Rule 0400-45-01-.31, as applicable.

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1. The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.

2. No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

3. Any system that has received treatment credit for individual filter performance and fails to meet the requirements of part 1 or 2 of this subparagraph during any month does not receive a treatment technique violation under subparagraph (12)(c) of this rule if the Department determines the following:

(i) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.

(ii) The system has experienced no more than two such failures in any calendar year.

(c) Demonstration of performance. The Department may approve Cryptosporidium treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this subparagraph. This treatment credit may be greater than or less than the prescribed treatment credits in paragraph (12) or paragraphs (18) through (21) of this rule and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

1. Systems cannot receive the prescribed treatment credit for any toolbox box option in paragraphs (18) through (21) of this rule if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this subparagraph.

2. The demonstration of performance study must follow a Department-approved protocol and must demonstrate the level of Cryptosporidium reduction the treatment process will achieve under the full range of expected operating conditions for the system.

3. Approval by the Department must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The Department may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

(20) Additional filtration toolbox components.

(a) Bag and cartridge filters. Systems receive Cryptosporidium treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in parts 1 through 10 of this subparagraph. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of parts 2 through 9 of this subparagraph to the Department. The filters must treat the entire plant flow taken from a subpart H source.

1. The Cryptosporidium treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in parts 2 through 9 of this subparagraph. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for

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bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria specified in parts 2 through 9 of this subparagraph.

2. Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of Cryptosporidium. Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

3. Challenge testing must be conducted using Cryptosporidium or a surrogate that is removed no more efficiently than Cryptosporidium. The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.

4. The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation:

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

5. Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

6. Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this subparagraph.

7. Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

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

   Where:

   LRV = log removal value demonstrated during challenge testing; $C_f$ = the feed concentration measured during the challenge test; and Cp = the filtrate concentration measured during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term Cp must be set equal to the detection limit.

8. Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter ($LRV_{filter}$) must be

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assigned the value of the minimum LRV observed during the three challenge periods for that filter.

9. If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest $LRV_{filter}$ among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of $LRV_{filter}$ values for the various filters tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

10. If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the Department.

(b) Membrane filtration.

1. Systems receive Cryptosporidium treatment credit for membrane filtration that meets the criteria of this subparagraph. Membrane cartridge filters that meet the definition of membrane filtration in Rule 0400-45-01-.04 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under subparts (i) and (ii) of this part.

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in part 2 of this subparagraph.

(ii) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in part 3 of this subparagraph.

2. Challenge Testing. The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the Department. Challenge testing must be conducted according to the criteria in subparts (i) through (vii) of this subparagraph. Systems may use data from challenge testing conducted prior to January 5, 2006, if the prior testing was consistent with the criteria in subparts (i) through (vii) of this part.

(i) Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

(ii) Challenge testing must be conducted using Cryptosporidium oocysts or a surrogate that is removed no more efficiently than Cryptosporidium oocysts. The organism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.

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(iii) The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation: Maximum Feed Concentration = $3.16 \times 10^6 \times$ (Filtrate Detection Limit)

(iv) Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (*i.e.*, backwashing).

(v) Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation: $LRV = LOG_{10}(C_f) \times LOG_{10}(C_p)$

Where:

LRV = log removal value demonstrated during the challenge test; $C_f$ = the feed concentration measured during the challenge test; and $C_p$ = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term $C_p$ is set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

(vi) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($LRV_{C\text{-}Test}$). If fewer than 20 modules are tested, then $LRV_{C\text{-}Test}$ is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then LRVC-Test is equal to the 10th percentile of the representative LRVs among the modules tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(vii) The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the Cryptosporidium removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify Cryptosporidium removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

(viii) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the Department.

3. Direct integrity testing. Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal

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credit awarded to the membrane filtration process and meets the requirements described in subparts (i) through (vi) of this subparagraph. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (*i.e.*, one or more leaks that could result in contamination of the filtrate).

(i) The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.

(ii) The direct integrity method must have a resolution of 3 micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.

(iii) The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the Department, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either item (I) or (II) of this subpart as applicable to the type of direct integrity test the system uses.

(I) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation: $LRVDIT = LOG_{10} (Q_p /(VCF \times Q_{breach}))$ Where: LRVDIT = the sensitivity of the direct integrity test; $Q_p$ = total design filtrate flow from the membrane unit; $Q_{breach}$ = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

(II) For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

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

Where:

LRVDIT = the sensitivity of the direct integrity test; $C_f$ = the typical feed concentration of the marker used in the test; and $C_p$ = the filtrate concentration of the marker from an integral membrane unit.

(iv) Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the Department.

(v) If the result of a direct integrity test exceeds the control limit established under subpart (iv) of this part, the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.

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(vi) Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The Department may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for Cryptosporidium, or reliable process safeguards.

4. Indirect integrity monitoring. Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in subparts (i) through (v) of this part. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in subparts 3(i) through (vi) of this subparagraph is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the Department summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

(i) Unless the Department approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

(ii) Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.

(iii) Continuous monitoring must be separately conducted on each membrane unit.

(iv) If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (i.e., two consecutive 15-minute readings above 0.15 NTU), direct integrity testing must immediately be performed on the associated membrane unit as specified in subparts 3(i) through (vi) of this subparagraph.

(v) If indirect integrity monitoring includes a Department-approved alternative parameter and if the alternative parameter exceeds a Department-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in subparts 3(i) through (vi) of this subparagraph.

(c) Second stage filtration. Systems receive 0.5-log Cryptosporidium treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the Department approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The Department must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

(d) Slow sand filtration (as secondary filter). Systems are eligible to receive 2.5-log Cryptosporidium treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The Department must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This subparagraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

(Rule 0400-45-01-.39, continued)

(21) Inactivation toolbox components.

(a) Calculation of CT values.

1. CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under subparagraph (b) or (c) of this paragraph must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in Rule 0400-45-01-.31.

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

(b) CT values for chlorine dioxide and ozone.

1. Systems receive the Cryptosporidium treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in subparagraph (a) of this paragraph.

CT VALUES (MG·MIN/L) FOR CRYPTOSPORIDIUM INACTIVATION BY CHLORINE DIOXIDE [1]

| | Water Temperature in °C | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Log Credit | <=0.5 | 1 | 2 | 3 | 5 | 7 | 10 | 15 | 20 | 25 | 30 |
| (i) 0.25…….. | 159 | 153 | 140 | 128 | 107 | 90 | 69 | 45 | 29 | 19 | 12 |
| (ii) 0.5 ..... | 319 | 305 | 279 | 256 | 214 | 180 | 138 | 89 | 58 | 38 | 24 |
| (iii) 1.0 .....… | 637 | 610 | 558 | 511 | 429 | 360 | 277 | 179 | 116 | 75 | 49 |
| (iv) 1.5…….. | 956 | 915 | 838 | 767 | 643 | 539 | 415 | 268 | 174 | 113 | 73 |
| (v) 2.0…….. | 1275 | 1220 | 1117 | 1023 | 858 | 719 | 553 | 357 | 232 | 150 | 98 |
| (vi) 2.5…… | 1594 | 1525 | 1396 | 1278 | 1072 | 899 | 691 | 447 | 289 | 188 | 122 |
| (vii) 3.0…… | 1912 | 1830 | 1675 | 1534 | 1286 | 1079 | 830 | 536 | 347 | 226 | 147 |

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = (0.001506 × (1.09116)$^{Temp}$) × CT.

2. Systems receive the Cryptosporidium treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in subparagraph (a) of this paragraph.

CT VALUES (MG·MIN/L) FOR *Cryptosporidium* INACTIVATION BY OZONE [1]

| | Water Temperature in °C | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Log Credit | <=0.5 | 1 | 2 | 3 | 5 | 7 | 10 | 15 | 20 | 25 | 30 |
| (i) 0.25…….. | 6.0 | 5.8 | 5.2 | 4.8 | 4.0 | 3.3 | 2.5 | 1.6 | 1.0 | 0.6 | 0.39 |
| (ii) 0.5 ..... | 12 | 12 | 10 | 9.5 | 7.9 | 6.5 | 4.9 | 3.1 | 2.0 | 1.2 | 0.78 |
| (iii) 1.0 .....… | 24 | 23 | 21 | 19 | 16 | 13 | 9.9 | 6.2 | 3.9 | 2.5 | 1.6 |
| (iv) 1.5…….. | 36 | 35 | 31 | 29 | 24 | 20 | 15 | 9.3 | 5.9 | 3.7 | 2.4 |
| (v) 2.0…… | 48 | 46 | 42 | 38 | 32 | 26 | 20 | 12 | 7.8 | 4.9 | 3.1 |
| (vi) 2.5……. | 60 | 58 | 52 | 48 | 40 | 33 | 25 | 16 | 9.8 | 6.2 | 3.9 |
| (vii) 3.0…… | 72 | 69 | 63 | 57 | 47 | 39 | 30 | 19 | 12 | 7.4 | 4.7 |

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = (0.0397 × (1.09757)$^{Temp}$) × CT.

(Rule 0400-45-01-.39, continued)

(c) Site-specific study. The Department may approve alternate chlorine dioxide or ozone CT values to those listed in subparagraph (b) of this paragraph on a site-specific basis. The Department must base this approval on a site-specific study a system conducts that follows a Department approved protocol.

(d) Ultraviolet light. Systems receive Cryptosporidium, Giardia lamblia, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in part 1 of this subparagraph. Systems must validate and monitor UV reactors as described in parts 2 and 3 of this subparagraph to demonstrate that they are achieving a particular UV dose value for treatment credit.

1. The treatment credits listed in this table are for UV light at a wavelength of 254 nm as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing, as described in part 2 of this subparagraph. The UV dose values of this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.

UV DOSE TABLE FOR CRYPTOSPORIDIUM, GIARDIA LAMBLIA, AND VIRUS INACTIVATION CREDIT

| Log Credit | Cryptosporidium UV dose ($mJ/cm^2$) | Giardia lamblia UV dose ($mJ/cm^2$) | Virus UV dose ($mJ/cm^2$) |
|---|---|---|---|
| (i) 0.5 . | 1.6 | 1.5 | 39 |
| (ii) 1.0 | 2.5 | 2.1 | 58 |
| (iii) 1.5 | 3.9 | 3.0 | 79 |
| (iv) 2.0 | 5.8 | 5.2 | 100 |
| (v) 2.5 | 8.5 | 7.7 | 121 |
| (vi) 3.0 | 12 | 11 | 143 |
| (vii) 3.5 | 15 | 15 | 163 |
| (viii) 4.0 | 22 | 22 | 186 |

2. Reactor validation testing. Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in part 1 of this subparagraph (i.e., validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

(i) When determining validated operating conditions, systems must account for the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.

(ii) Validation testing must include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.

(iii) The Department may approve an alternative approach to validation testing.

3. Reactor monitoring.

(i) Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under part 2 of this subparagraph. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the Department

(Rule 0400-45-01-.39, continued)

designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the Department approves.

(ii) To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as described in parts 1 and 2 of this subparagraph. Systems must demonstrate compliance with this condition by the monitoring required under subpart (i) of this part.

(22) Reporting requirements.

(a) Systems must report sampling schedules under paragraph (3) of this rule and source water monitoring results under paragraph (7) of this rule unless they notify the Department that they will not conduct source water monitoring due to meeting the criteria of subparagraph (2)(d) of this rule.

(b) Systems must report the use of uncovered finished water storage facilities to the Department as described in paragraph (15) of this rule.

(c) Filtered systems must report their Cryptosporidium bin classification as described in paragraph (11) of this rule.

(d) Unfiltered systems must report their mean source water Cryptosporidium level as described in paragraph (13) of this rule.

(e) Systems must report disinfection profiles and benchmarks to the Department as described in paragraphs (9) and (10) of this rule prior to making a significant change in disinfection practice.

(f) Systems must report to the Department in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under paragraph (12) or (13) of this rule. Alternatively, the Department may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS

| Toolbox option | Systems must submit the following information | On the following schedule |
|---|---|---|
| (1) Watershed control program (WCP) | (i) Notice of intention to develop a new or continue an existing watershed control program. | No later than two years before the applicable treatment compliance date in paragraph (14) of this rule. |
| | (ii) Watershed control plan. | No later than one year before the applicable treatment compliance date in paragraph (14) of this rule. |
| | (iii) Annual watershed control program status report. | Every 12 months, beginning one year after the applicable treatment compliance date in paragraph (14) of this rule. |
| | (iv) Watershed sanitary survey report. | For community water systems, every three years beginning three years after the applicable treatment compliance date in paragraph (14) of this rule. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in paragraph (14) of this rule. |
| (2) Alternative source/intake | Verification that system has relocated | No later than the applicable treatment |

(Rule 0400-45-01-.39, continued)

| | | |
|---|---|---|
| management | the intake or adopted the intake withdrawal procedure reflected in monitoring results. | compliance date in paragraph (14) of this rule. |
| (3) Presedimentation | Monthly verification of the following:<br>(i) Continuous basin operation;<br>(ii) Treatment of 100% of the flow;<br>(iii) Continuous addition of a coagulant; and<br>(iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative Department-approved performance criteria. | Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (4) Two-stage lime softening | Monthly verification of the following:<br>(i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration; and<br>(ii) Both stages treated 100% of the plant flow. | Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (5) Bank filtration | (i) Initial demonstration of the following:<br>(A) Unconsolidated, predominantly sandy aquifer;<br>(B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit); and<br>(ii) If monthly average of daily max turbidity is greater than 1 NTU then system must report result and submit an assessment of the cause. | No later than the applicable treatment compliance date in paragraph (14) of this rule.<br><br>Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (6) Combined filter performance | Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month. | Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (7) Individual filter performance | Monthly verification of the following:<br>(i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter; and<br>(ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart. | Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (8) Demonstration of performance | (i) Results from testing following a Department approved protocol.<br>(ii) As required by the Department, monthly verification of operation within conditions of Department approval for demonstration of performance credit. | No later than the applicable treatment compliance date in paragraph (14) of this rule. Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (9) Bag filters and cartridge | (i) Demonstration that the following criteria are met:<br>(A) filters. Process meets the definition of bag or cartridge filtration;<br>(B) Removal efficiency established through challenge testing that meets criteria in this subpart.<br>(ii) Monthly verification that 100% of plant flow was filtered. | No later than the applicable treatment compliance date in paragraph (14) of this rule.<br><br>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (10) Membrane filtration | (i) Results of verification testing demonstrating the following: | No later than the applicable treatment compliance date in paragraph (14). |

(Rule 0400-45-01-.39, continued)

| | | |
|---|---|---|
| | (A) Removal efficiency established through challenge testing that meets criteria in this subpart;<br>(B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.<br>(ii) Monthly report summarizing the following:<br>(A) All direct integrity tests above the control limit;<br>(B) If applicable, any turbidity or alternative Department-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken. | Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (11) Second stage filtration | Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step. | Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| 12) Slow sand filtration (as secondary filter) | Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from subpart H sources. | Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (13) Chlorine dioxide | Summary of CT values for each day as described in paragraph (21) of this rule. | Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (14) Ozone | Summary of CT values for each day as described in paragraph (21) of this rule. | Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |
| (15) UV | (i) Validation test results demonstrating operating conditions that achieve required UV dose.<br>(ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in subparagraph (21)(d) of this rule. | No later than the applicable treatment compliance date in paragraph (14) of this rule.<br><br>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (14) of this rule. |

(23) Recordkeeping requirements.

(a) Systems must keep results from the initial round of source water monitoring under subparagraph (2)(a) of this rule and the second round of source water monitoring under subparagraph (2)(b) of this rule until 3 years after bin classification under paragraph (11) of this rule for filtered systems or determination of the mean Cryptosporidium level under paragraph (11) of this rule for unfiltered systems for the particular round of monitoring.

(b) Systems must keep any notification to the Department that they will not conduct source water monitoring due to meeting the criteria of subparagraph (2)(d) of this rule for 3 years.

(Rule 0400-45-01-.39, continued)

(c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under paragraphs (17) through (21) of this rule and with uncovered finished water reservoirs under paragraph (15) of this rule, as applicable, for 3 years.

(24) Requirements to respond to significant deficiencies identified in sanitary surveys performed by the Department or EPA.

(a) A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.

(b) For the purposes of this paragraph, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that EPA determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

(c) For sanitary surveys performed by the Department or EPA, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.

(d) Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by the Department or EPA, or if there is no approved schedule, according to the schedule reported under subparagraph (c) of this paragraph if such deficiencies are within the control of the system.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01.*

**0400-45-01-.40 GROUND WATER RULE.**

(1) General Requirements:

(a) The requirements of this rule constitute national primary drinking water regulations.

(b) This rule applies to all public water systems that use ground water except that it does not apply to public water systems that combine all of their ground water with surface water or with ground water under the direct influence of surface water prior to treatment under Rule 0400-45-01-.31. For purposes of this rule, “ground water system” is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.

(c) All community public water systems designated as ground water systems for purposes of this rule which serve more than 50 connections or 150 persons, except for those systems excluded from the requirements of subparagraph (b) of this paragraph, must meet 4-log treatment of viruses by continuous chlorination (unless other disinfection methods are approved) before or at the first customer. Systems meeting 4-log inactivation and/or removal of viruses must be required to conduct compliance monitoring, the monitoring requirements under subparagraphs (4)(b) and (c) of this rule. Systems meeting the 4-log inactivation and/or removal of viruses are still subject to sanitary surveys, corrective action when deficiencies are identified and associated public notices under this rule. In no case shall contact time be less than 15 minutes.

(d) Systems subject to this rule must comply with the following requirements:

(Rule 0400-45-01-.40, continued)

1. Sanitary survey information requirements for all ground water systems as described in paragraph (2) of this rule.

2. Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 percent (4-log) treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in paragraph (3) of this rule.

3. Treatment technique requirements, described in paragraph (4) of this rule, that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under paragraph (3) of this rule, or that have significant deficiencies that are identified by the Department or that are identified by the Environmental Protection Agency under section 1445 of the Safe Drinking Water Act. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this rule must implement one or more of the following corrective action options: correct all significant deficiencies; provide an alternate source of water; eliminate the source of the contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer.

4. Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in subparagraph (4)(b) of this rule.

5. If requested by the Department, ground water systems must provide the Department with any existing information that will enable the Department to perform a hydrogeologic sensitivity assessment. For purposes of this rule, “hydrogeologic sensitivity assessment” is a determination of whether ground water systems obtain water from hydrogeologically sensitive settings.

(e) Ground water systems must comply, unless otherwise noted, with the requirements of this rule beginning December 1, 2009.

(2) Sanitary Surveys for Ground Water Systems

(a) Ground water systems must provide the Department, at the Department’s request, any existing information that will enable the Department to conduct a sanitary survey.

(b) For the purposes of this rule, a “sanitary survey,” as conducted by the Department, includes but is not limited to, an onsite review of the water source(s) (identifying sources of contamination by using results of source water assessments or other relevant information where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water. Sanitary surveys for the purpose of this paragraph include the applicable components listed parts 1 through 8 of this subparagraph.

1. Source
2. Treatment
3. Distribution system

(Rule 0400-45-01-.40, continued)

4. Finished water storage
5. Pumps, pump facilities, and controls,
6. Monitoring, reporting, and data verification,
7. System management and operation, and
8. Operator compliance with Department requirements.

(3) Ground water source microbial monitoring and analytical methods.

(a) A ground water system must conduct triggered source water monitoring if the conditions identified in parts 1 and either part 2 or 3 of this subparagraph exist.

1. The system does not provide at least 4-log treatment of viruses (using inactivation, removal or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and

2. The system is notified that a sample collected under paragraph (1) of Rule 0400-45-01-.07 is total coliform-positive and the sample is not invalidated under paragraph (3) of Rule 0400-45-01-.07 until March 31, 2016; or

3. The system is notified that a sample collected under paragraphs (4) through (7) of Rule 0400-45-01-.41 is total coliform-positive and the sample is not invalidated under subparagraph (3)(c) of Rule 0400-45-01-.41 beginning April 1, 2016.

(b) A ground water system must collect, within 24 hours of notification of the total coliform-positive sample, at least one ground water source sample from each ground water source in use at the time the total coliform-positive sample was collected under paragraph (1) of Rule 0400-45-01-.07 until March 31, 2016, or collected under paragraphs (4) through (7) of Rule 0400-45-01-.41 beginning April 1, 2016, except as provided in part 2 of this subparagraph.

1. The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the sample.

2. If approved by the Department, systems with more than one ground water source may meet the requirements of this subparagraph by sampling representative ground water source or sources. If directed by the Department, systems must submit for Department approval a triggered source water monitoring plan that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under paragraph (1) of Rule 0400-45-01-.07 until March 31, 2016, and that the system intends to use for representative sampling under this paragraph.

3. Until March 31, 2016, a ground water system serving 1,000 people or fewer may use a repeat sample collected from a ground water source to meet both the requirements of paragraph (2) of Rule 0400-45-01-.07 and to satisfy the monitoring requirements of this subparagraph for that ground water source only if the Department approves the use of E. coli as a fecal indicator for source water monitoring under this paragraph. If the repeat sample collected from the ground water source is E. coli positive, the system must comply with subparagraph (c) of this paragraph. Beginning April 1, 2016, the use of ground water source sample as a repeat sample shall no longer be allowed to meet the requirements of paragraph (2) of Rule 0400-45-01-.07.

(Rule 0400-45-01-.40, continued)

(c) If the Department does not require corrective action under part 2 of subparagraph (a) of paragraph (4) of this rule for fecal-indicator positive source water sample collected under subparagraph (b) of this paragraph that is not invalidated under subparagraph (h) of paragraph (3) this rule, the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample.

(d) Consecutive and Wholesale Systems

1. In addition to the other requirements of this paragraph, a consecutive ground water system that has a total coliform-positive sample collected under paragraph (1) of Rule 0400-45-01-.07 until March 31, 2016, or under Rule 0400-45-01-.41(4) through 0400-45-01-.41(7) beginning April 1, 2016, must notify the wholesale system(s) within 24 hours of being notified of the total coliform-positive sample.

2. In addition to the other requirements of this paragraph, a wholesale ground water system must comply with subparts (i) and (ii) of this part.

(i) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under paragraph (1) of Rule 0400-45-01-07, until March 31, 2016, or under Rule 0400-45-01-.41(4) through 0400-45-01-.41(7) beginning April 1, 2016, is total coliform-positive must, within 24 hours of being notified, collect a sample from its ground water source(s) under subparagraph (b) of this paragraph and analyze it for a fecal indicator under subparagraph (g) of this paragraph.

(ii) If the sample collected under subpart (3)(d)2(i) of this rule is fecal indicator-positive, the wholesale ground water system must notify all consecutive systems served by that ground water source of the fecal indicator source water positive within 24 hours of being notified of the ground water source sample monitoring result and must meet the requirements of subparagraph (c) of this paragraph.

(e) Exceptions to the Triggered Source Water Monitoring Requirements.

A ground water system is not required to comply with the source water monitoring requirements of this paragraph if either of the following conditions exists:

1. The Department determines, and documents in writing, that the total coliform-positive sample collected under paragraph (1) of Rule 0400-45-01-.07, until March 31, 2016, or under Rule 0400-45-01-.41(4) through 0400-45-01-.41(7) beginning April 1, 2016, is caused by a distribution system deficiency; or

2. The total coliform-positive sample collected under paragraph (1) of Rule 0400-45-01-.07, until March 31, 2016, or under Rule 0400-45-01-.41(4) through 0400-45-01-.41(7) beginning April 1, 2016, is collected at a location that meets Department criteria for distribution system conditions that will cause total coliform-positive samples and the system requests in writing that the Department make the determination as to whether the total coliform-positive sample was due to distribution system conditions that will cause total coliform-positive samples.

(f) Assessment Source Water Monitoring. If directed by the Department, ground water systems must conduct assessment source water monitoring that meets Department-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample

(Rule 0400-45-01-.40, continued)

collected under subparagraph (b) of this paragraph to meet the requirements of subparagraph (f) of this paragraph. Department-determined assessment source water monitoring requirements may include:

1. Collection of a total of 12 ground water source samples that represent each month the system provides ground water to the public,

2. Collection of samples from each well unless the system obtains written Department approval to conduct monitoring at one or more wells within the ground water system that are representative of multiple wells used by that system and that draw water from the same hydrogeologic setting,

3. Collection of standard sample volume of at least 100 ml for fecal indicator analysis regardless of fecal indicator or analytical method used,

4. Analysis of all ground water source samples using one of the analytical methods listed in part (10)(a)6 of Rule 0400-45-01-.14 for the presence of E. coli or enterococci,

5. Collection of ground water samples at a location prior to any treatment of the ground water source unless the Department approves a sampling location after treatment, and

6. Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the Department approves an alternate sampling location that is representative of the water quality of that well.

(g) Analytical and Sampling methods.

1. A ground water system subject to the source water monitoring requirements of this paragraph must collect a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used.

2. The analytical method to be used is prescribed in part (10)(a)6 of Rule 0400-45-01-.14.

(h) Invalidation of fecal indicator-positive ground water source sample. A ground water system may obtain Department invalidation of a fecal indicator-positive ground water source sample collected under this paragraph only under the conditions specified in parts 1 and 2 of this subparagraph.

1. The system provides the Department with written notice from the laboratory that improper sample analysis has occurred; or

2. The Department determines and documents in writing that there is substantial evidence that a fecal-indicator positive ground water source sample is not related to source water quality.

(i) If the Department invalidates a fecal indicator-positive ground water sample, the ground water system must collect another source water sample under this paragraph within 24 hours of being notified by the Department of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods in part (10)(a)6 of Rule 0400-45-01-.14. The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the source water sample within 24 hours due to

(Rule 0400-45-01-.40, continued)

circumstances beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the sample.

(j) Sampling location. Any ground water source sample required under this paragraph must be collected at a location prior to any treatment of the ground water source unless the Department approves a sampling location after treatment.

1. If the system's configuration does not allow sampling at the well itself, the system may collect a sample at a Department-approved location to meet the requirements of this paragraph if the sample is representative of the water quality of that well.

(k) New Sources. If directed by the Department, a ground water system that places a new ground water source into service after November 30, 2009, must conduct assessment source water monitoring under subparagraph (f) of this paragraph. If directed by the Department, the system must begin monitoring before the ground water source is used to provide water to the public.

(l) Public Notification. A ground water system with a ground water source sample collected under this paragraph that is fecal indicator-positive and that is not invalidated under subparagraph (h) of this paragraph, including consecutive systems served by the ground water source, must conduct public notification under paragraph (2) of Rule 0400-45-01-.19.

(m) Monitoring Violations. Failure to meet the requirements of subparagraphs (a) through (k) of this paragraph is a monitoring violation and requires the ground water system to provide public notification under paragraph (4) of Rule 0400-45-01-.19.

(4) Treatment Technique Requirements for Ground Water Systems

(a) Ground water systems with significant deficiencies or source water fecal contamination.

1. The treatment technique requirements of this rule must be met by ground water systems when a significant deficiency is identified or when a ground water source sample collected under subparagraph (3)(c) of this rule is fecal-indicator positive.

2. If directed by the Department, a ground water system with a ground water source sample collected under subparagraph (3)(b), (d), or (f) of this rule that is fecal indicator-positive must comply with the treatment technique requirements of this rule.

3. When a significant deficiency is identified at a Subpart H public water system that uses both ground water and surface water or ground water under the direct influence of surface water, the system must comply with provisions of this rule except in cases where the Department determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or ground water under the direct influence of surface water.

4. Unless the Department directs the ground water system to implement a specific corrective action, the ground water system must consult with the Department regarding the appropriate corrective action within 30 days of receiving written notice from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under subparagraph (3)(c) of this rule was found to be fecal indicator-positive, or direction from the Department that a fecal indicator positive collected under subparagraph (3)(b),

(Rule 0400-45-01-.40, continued)

(d) or (f) of this rule requires corrective action. For purposes of this rule, significant deficiencies include, but are not limited to, defects in design, operation or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the Department determines to be causing, or have the potential of causing, the introduction of contamination into the water delivered to consumers.

5. Within 120 days (or earlier if directed by the Department) of receiving written notification from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under subparagraph (3)(c) of this rule was found to be fecal indicator-positive, or direction from the Department that a fecal indicator-positive sample collected under subparagraph (3)(b), (d) or (f) of this rule requires corrective action, the ground water system must either:

   (i) Have completed corrective action in accordance with applicable Department plan review processes or other Department guidance or direction, if any, including Department-specified interim measures, or

   (ii) Be in compliance with a Department-approved corrective action plan and schedule subject to conditions in items (I) and (II) of this subpart.

      (I) Any subsequent modifications to a Department-approved corrective action plan and schedule must also be approved by the Department.

      (II) If the Department specifies interim measures for protection of the public health pending Department approval of the corrective action plan and schedule or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the Department.

6. Corrective Action Alternatives. Ground water systems that meet the conditions of part 1 or 2 of this subparagraph must implement one or more of the following corrective action alternatives:

   (i) Correct all significant deficiencies;

   (ii) Provide an alternate source of water;

   (iii) Eliminate the source of contamination; or

   (iv) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

7. Special notice to the public of significant deficiencies or source water fecal contamination.

   (i) In addition to the applicable public notification requirements of Rule 0400-45-01-.19, a community ground water system that receives notice from the Department of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the Department under subparagraph (3)(h) of this rule must inform the public served by the water system under subparagraph (4)(g) of Rule 0400-45-01-.35 of the fecal indicator-positive source sample or of any significant

(Rule 0400-45-01-.40, continued)

deficiency that has not been corrected. The system must continue to inform the public annually until the significant deficiency is corrected or the fecal contamination in the ground water source is determined by the Department to be corrected under part 5 of this subparagraph.

(ii) In addition to the applicable public notification requirements of Rule 0400-45-01-.19, a non-community ground water system that receives notice from the Department of a significant deficiency must inform the public served by the water system in a manner approved by the Department of any significant deficiency that has not been corrected within 12 months of being notified by the Department, or earlier if directed by the Department. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:

(I) The nature of the significant deficiency and the date the significant deficiency was identified by the Department;

(II) The Department-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed; and

(III) For systems with a large proportion of non-English speaking consumers, as determined by the Department, information in the appropriate language(s) regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.

(iii) If directed by the Department, a non-community water system with significant deficiencies that have been corrected must inform its customers of the significant deficiencies, how the deficiencies were corrected, and the dates of the correction under subpart (ii) of this part.

(b) Compliance Monitoring

1. Existing ground water sources. A ground water system that is not required to meet the source water monitoring requirements of this rule for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer for any ground water source before December 1, 2009, must notify the Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer for the specified ground water source and begin compliance monitoring in accordance with subparagraph (c) of this paragraph by December 1, 2009. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission.

2. New ground water sources. A ground water system that places a ground water source in service after November 30, 2009, that is not required to meet the source water monitoring requirements of this rule for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source must comply with the requirements of subparts (i) and (ii) of this part.

(Rule 0400-45-01-.40, continued)

(i) The system must notify the Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission.

(ii) The system must conduct compliance monitoring as required under subparagraph (c) of this paragraph within 30 days of placing the source into service.

(c) Monitoring Requirements

1. A ground water system subject to the requirements of subparagraph (a), part (b)1 or part (b)2 of this paragraph must monitor the effectiveness and reliability of the treatment for that ground water source before or at the first customer as follows:

(i) A ground water system that serves greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods specified in subparagraph (10)(i) of Rule 0400-45-01-.14 at a location approved by the Department and must record the lowest residual disinfectant concentration each day that water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. If there is a failure in the continuous monitoring equipment, the ground water system must conduct grab sampling every four hours until the continuous monitoring equipment is returned to service. The system must resume continuous residual disinfectant monitoring within 14 days.

(ii) A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods specified in subparagraph (10)(i) of Rule 0400-45-01-.14 at a location approved by the Department and record the residual disinfection each day that water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. The ground water system must take a daily grab sample during the hour of peak flow or at another time specified by the Department. If any daily grab sample measurement falls below the Department-determined residual disinfectant concentration, the ground water system must take follow-up samples every four hours until the residual disinfectant concentration is restored to the Department-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of subpart (i) of this part.

(iii) Membrane filtration. A ground water system that uses membrane filtration to meet the requirements of this rule must monitor the membrane filtration process in accordance with all Department-specified monitoring requirements and must operate the membrane filtration in accordance with all Department-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when:

(Rule 0400-45-01-.40, continued)

(I) The membrane has an absolute molecular weight cutoff (MWCO), or alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;

(II) The membrane process is operated in accordance with Department-specified compliance requirements; and

(III) The integrity of the membrane is intact.

(iv) Alternative treatment. A ground water system that uses a Department-approved alternative treatment to meet the requirements of this rule by providing at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer must:

(I) Monitor the alternative treatment in accordance with all Department-specified monitoring requirements; and

(II) Operate the alternative treatment in accordance with all compliance requirements that the Department determines to be necessary to achieve at least 4-log treatment of viruses.

(d) Failure to meet the monitoring requirements of subparagraphs (b) and (c) of this paragraph is a monitoring violation and requires the ground water system to provide public notification under paragraph (4) of Rule 0400-45-01-.19.

(5) Treatment Technique Violations for Ground Water Systems.

(a) A ground water system with a significant deficiency is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of receiving written notice from the Department of a significant deficiency, the system:

1. Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department specified interim actions and measures, or

2. Is not in compliance with a Department-approved corrective action plan and schedule.

(b) Unless the Department invalidates a fecal indicator-positive ground water source sample under subparagraph (3)(h) of this rule, a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of meeting the conditions of part (4)(a)1 or 2 of this rule, the system:

1. Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department-specified interim measures, or

2. Is not in compliance with a Department-approved corrective action plan and schedule.

(c) A ground water system subject to the requirements of subparagraph (4)(c) of this rule that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique

(Rule 0400-45-01-.40, continued)

requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.

(d) The ground water system must give public notification under paragraph (3) of Rule 0400-45-01-.19 for the treatment technique violations specified in subparagraphs (a), (b) and (c) of this paragraph.

(6) Reporting and Recordkeeping for Ground Water Systems

(a) In addition to the requirements of Rule 0400-45-01-.18, a ground water system regulated under this rule must provide the following information to the Department:

1. A ground water system conducting compliance monitoring under subparagraphs (4)(b) and (c) of this rule must notify the Department any time the system fails to meet any Department-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system must notify the Department as soon as possible, but in no case later than the end of the next business day.

2. After completing any corrective action under subparagraph (4)(a) of this rule, a ground water system must notify the Department within 30 days of completion of the corrective action.

3. If a ground water system subject to the requirements of subparagraph (a) of paragraph (3) of this rule does not conduct source water monitoring under part 2 of subparagraph (e) of paragraph (3) of this rule, the system must provide documentation to the Department within 30 days of the total coliform positive sample that it met the Department criteria and request in writing that the Department make the determination.

(b) Recordkeeping. In addition to the requirements of Rule 0400-45-01-.20, a ground water system regulated under this rule must maintain the following information in its records:

1. Documentation of corrective actions. Documentation shall be kept for a period of not less than ten years.

2. Documentation of notice to the public as required under part (4)(a)7 of this rule. Documentation shall be kept for a period of not less than three years.

3. Records of decisions under part (3)(e)2 of this rule and records of invalidation of fecal indicator-positive ground water source samples under subparagraph (3)(h) of this rule. Documentation shall be kept for a period of not less than five years.

4. For consecutive systems, documentation of notification to the wholesale system(s) of total-coliform positive samples that are not invalidated under paragraph (3) of Rule 0400-45-01-.07 until March 31, 2016, or under Rule 0400-45-01-.41(3) beginning April 1, 2016. Documentation shall be kept for a period of not less than five years.

5. For systems, including wholesale systems, that are required to perform compliance monitoring under subparagraphs (4)(b) and (c) of this rule:

(Rule 0400-45-01-.40, continued)

(i) Records of Department-specified minimum disinfectant residual. Documentation shall be kept for a period of not less than ten years.

(ii) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the Department-prescribed minimum residual disinfectant concentration for a period of more than four hours. Documentation shall be kept for a period of not less than five years.

(iii) Records of Department-specified compliance requirements for membrane filtration and of parameters specified by the Department for Department-approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation shall be kept for a period of not less than five years.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed August 1, 2012; effective October 30, 2012. Rule was previously numbered 1200-05-01. Amendments and new rules filed November 24, 2015; effective February 22, 2016.*

**0400-45-01-.41 REVISED TOTAL COLIFORM RULE.**

(1) General requirements.

(a) The requirements of this rule constitute both maximum contaminant level and treatment technique requirements as national primary drinking water regulations.

(b) The provisions of this rule apply to all public water systems.

(c) Systems must comply with the provisions of this rule beginning April 1, 2016, unless otherwise specified in this rule.

(d) Failure to comply with the applicable requirements of paragraphs (1) through (11) of this rule, including requirements established by the Department pursuant to these provisions, is a violation of the national primary drinking water regulations under this rule.

(2) Analytical methods and laboratory certification.

(a) Analytical methodology.

1. The standard sample volume required for analysis, regardless of analytical method used, is 100 ml.

2. Systems need only determine the presence or absence of total coliforms and E. coli; a determination of density is not required.

3. The time from sample collection to initiation of test medium incubation may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 deg. C during transit.

4. If water having residual chlorine (measured as free, combined, or total chlorine) is to be analyzed, sufficient sodium thiosulfate (Na2S2O3) must be added to the sample bottle before sterilization to neutralize any residual chlorine in the water sample. Dechlorination procedures are addressed in Section 9060A.2 of

(Rule 0400-45-01-.41, continued)

Standard Methods for the Examination of Water and Wastewater (20th and 21st editions).

5. Systems must conduct total coliform and E. coli analyses in accordance with one of the analytical methods in the following table or one of the alternative methods listed in Rule 0400-45-01-.14(10)(a)4.

| Organism | Methodology category | Method[1] | Citation[1] |
|---|---|---|---|
| Total Coliforms | | | |
| | Lactose Fermentation Methods | Standard Total Coliform Fermentation Technique | Standard Methods 9221 B.1, B.2 (20th ed.; 21st ed.) [2 3] Standard Methods Online 9221 B.1, B.2-99 [2 3] |
| | | Presence-Absence (P-A) Coliform Test | Standard Methods 9221 D.1, D.2 (20th ed.; 21st ed.) [2 7] Standard Methods Online 9221 D.1, D.2-99 [2 7] |
| | Membrane Filtration Methods | Standard Total Coliform Membrane Filter Procedure | Standard Methods 9222 B, C (20th ed.; 21st ed.) [2 4] Standard Methods Online 9222 B-97 [2 4], 9222 C-97 [2 4] |
| | | Membrane Filtration using MI medium. m-ColiBlue24® Test [2 4] Chromocult® [2 4] | EPA Method 1604 [2] |
| | Enzyme Substrate Methods | Colilert® | Standard Methods 9223 B (20th ed.; 21st ed.) [2 5] Standard Methods Online 9223 B-97 [2 5] |
| | | Colisure® | Standard Methods 9223 B (20th ed.; 21st ed.) [2 5 6] Standard Methods Online 9223 B-97 [2 5 6] |
| | | E*Colite® Test [2] Readycult® Test [2] Modified Colitag® Test [2] | |
| Escherichia coli. | | | |
| | Escherichia coli Procedure (following Lactose Fermentation Methods). | EC-MUG medium | Standard Methods 9221 F.1 (20th ed.; 21st ed.) [2] |
| | Escherichia coli Partition Method | EC broth with MUG (EC-MUG) | Standard Methods 9222 G.1c(2) (20th ed.; 21st ed.) [2 8] |
| | | NA-MUG medium | Standard Methods |

(Rule 0400-45-01-.41, continued)

| | | | |
|---|---|---|---|
| | | | 9222 G.1c(1) (20th ed.; 21st ed.) [2] |
| | Membrane Filtration Methods | Membrane Filtration using MI medium m-ColiBlue24® Test [2] [4]<br>Chromocult® [2] [4] | EPA Method 1604 [2] |
| | Enzyme Substrate Methods | Colilert® | Standard Methods 9223 B (20th ed.; 21st ed.) [2] [5]<br>Standard Methods Online 9223 B-97 [2] [5] [6] |
| | | Colisure® | Standard Methods 9223 B (20th ed.; 21st ed.) [2] [5] [6]<br>Standard Methods Online 9223 B-97 [2] [5] [6] |
| | | E*Colite® Test [2]<br>Readycult® Test [2]<br>Modified Colitag® Test [2] | |

[1] The procedures must be done in accordance with the documents listed in footnote 2 below, incorporation by reference. For Standard Methods, either editions, 20th (1998) or 21st (2005), may be used. For the Standard Methods Online, the year in which each method was approved by the Standard Methods Committee is designated by the last two digits following the hyphen in the method number. The methods listed are the only online versions that may be used. For vendor methods, the date of the method listed in footnote 2 is the date/version of the approved method. The methods listed are the only versions that may be used for compliance with this rule. Laboratories should be careful to use only the approved versions of the methods, as product package inserts may not be the same as the approved versions of the methods.

[2] Incorporation by reference:

(i) American Public Health Association, 800 I Street, NW., Washington, DC 20001.

(I) ''Standard Methods for the Examination of Water and Wastewater,''20th edition (1998);

I. Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' B.1, B.2, ''Standard Total Coliform Fermentation Technique.''

II. Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' D.1, D.2, ''Presence-Absence (P–A) Coliform Test.''

III. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' B, ''Standard Total Coliform Membrane Filter Procedure.''

IV. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' C, ''Delayed-Incubation Total Coliform Procedure.''

V. Standard Methods 9223, ''Enzyme Substrate Coliform Test,'' B, ''Enzyme Substrate Test,'' Colilert® and Colisure®.

VI. Standard Methods 9221, ''Multiple Tube Fermentation Technique for Members of the Coliform Group,'' F.1, ''Escherichia coli Procedure: EC–MUG medium.''

VII. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.c(2), ''Escherichia coli Partition Method: EC broth with MUG (EC-MUG).''

VIII. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.c(1), ''Escherichia coli Partition Method: NA–MUG medium.''

(II) ''Standard Methods for the Examination of Water and Wastewater,'' 21st edition (2005);

I. Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' B.1, B.2, ''Standard Total Coliform Fermentation Technique.''

II. Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' D.1, D.2, ''Presence-Absence (P–A) Coliform Test.''

III. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' B, ''Standard Total Coliform Membrane Filter Procedure.''

IV. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' C, ''Delayed-Incubation Total Coliform Procedure.''

V. Standard Methods 9223, ''Enzyme Substrate Coliform Test,'' B, ''Enzyme Substrate Test,'' Colilert® and Colisure®.

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VI. Standard Methods 9221, ''Multiple Tube Fermentation Technique for Members of the Coliform Group,'' F.1, ''Escherichia coli Procedure: EC–MUG medium.''

VII. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.c(2), ''Escherichia coli Partition Method: EC broth with MUG (EC–MUG).''

VIII. Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.c(1), ''Escherichia coli Partition Method: NA–MUG medium.''

(III) ''Standard Methods Online'' available at http://www.standardmethods.org:

I. Standard Methods Online 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group'' (1999), B.1, B.2–99, ''Standard Total Coliform Fermentation Technique.''

II. Standard Methods Online 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group'' (1999), D.1, D.2–99, ''Presence-Absence (P–A) Coliform Test.''

III. Standard Methods Online 9222, ''Membrane Filter Technique for Members of the Coliform Group'' (1997), B–97, ''Standard Total Coliform Membrane Filter Procedure.''

IV. Standard Methods Online 9222, ''Membrane Filter Technique for Members of the Coliform Group'' (1997), C–97, ''Delayed-Incubation Total Coliform Procedure.''

V. Standard Methods Online 9223, ''Enzyme Substrate Coliform Test'' (1997), B–97, ''Enzyme Substrate Test'', Colilert® and Colisure®.

(ii) Charm Sciences, Inc., 659 Andover Street, Lawrence, MA 01843–1032, telephone 1–800–343–2170;

(I) E*Colite®—''Charm E*Colite™ Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Drinking Water,'' January 9, 1998.

(iii) CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA, 95403, telephone 1–800–878–7654;

(I) modified Colitag®, ATP D05– 0035—''Modified Colitag™ Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water,'' August 28, 2009.

(iv) EMD Millipore (a division of Merck KGaA, Darmstadt Germany), 290 Concord Road, Billerica, MA 01821, telephone 1–800–645–5476;

(I) Chromocult—''Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and Escherichia coli for Finished Waters,'' November 2000,Version 1.0.

(II) Readycult®—''Readycult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Finished Waters,'' January 2007, Version 1.1.

(v) EPA's Water Resource Center (MC–4100T), 1200 Pennsylvania Avenue NW., Washington, DC 20460, telephone 1–202–566–1729;

(I) EPA Method 1604, EPA 821–R–02–024—''EPA Method 1604: Total Coliforms and Escherichia coli in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium),'' September 2002, http:// www.epa.gov/nerlcwww/1604sp02.pdf.

(vi) Hach Company, P.O. Box 389, Loveland, CO 80539, telephone 1–800– 604–3493:

(I) m-ColiBlue24®—''Membrane Filtration Method m-ColiBlue24® Broth,'' Revision 2, August 17, 1999.

3 Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between lactose broth and lauryl tryptose broth using the water normally tested, and if the findings from this comparison demonstrate that the false-positive rate and false-negative rate for total coliforms, using lactose broth, is less than 10 percent.

4 All filtration series must begin with membrane filtration equipment that has been sterilized by autoclaving. Exposure of filtration equipment to UV light is not adequate to ensure sterilization. Subsequent to the initial autoclaving, exposure of the filtration equipment to UV light may be used to sanitize the funnels between filtrations within a filtration series. Alternatively, membrane filtration equipment that is pre-sterilized by the manufacturer (i.e., disposable funnel units) may be used.

5 Multiple-tube and multi-well enumerative formats for this method are approved for use in presence-absence determination under this rule.

6 Colisure® results may be read after an incubation time of 24 hours.

7 A multiple tube enumerative format, as described in Standard Methods for the Examination of Water and Wastewater 9221, is approved for this method for use in presence-absence determination under this regulation.

8 The following changes must be made to the EC broth with MUG (EC–MUG) formulation: Potassium dihydrogen phosphate, $KH_2PO_4$, must be 1.5g, and 4-methylumbelliferyl-Beta-D-glucuronide must be 0.05 g.

(b) Laboratory certification. Systems must have all compliance samples required under this rule analyzed by a laboratory certified by the Department to analyze drinking water samples. The laboratory used by the system must be certified for each method (and associated contaminant(s)) used for compliance monitoring analyses under this rule.

(3) General monitoring requirements for all public water systems.

(Rule 0400-45-01-.41, continued)

(a) Sample siting plans.

1. Systems must develop a written sample siting plan that identifies sampling sites and a sample collection schedule that are representative of water throughout the distribution system no later than March 31, 2016. These plans are subject to Department review and revision. Systems must collect total coliform samples according to the written sample siting plan. Monitoring required by paragraphs (4) through (8) of this rule may take place at a customer's premise, dedicated sampling station, or other designated compliance sampling location. Routine and repeat sample sites and any sampling points necessary to meet the requirements of Rule 0400-45-01-.40 must be reflected in the sampling plan.

2. Systems must collect samples at regular time intervals throughout the month, except that systems that use only ground water and serve 4,900 or fewer people may collect all required samples on a single day if they are taken from different sites.

3. Systems must take at least the minimum number of required samples even if the system has had an E. coli MCL violation or has exceeded the coliform treatment technique triggers in subparagraph (9)(a) of this rule.

4. A system may conduct more compliance monitoring than is required by this subpart to investigate potential problems in the distribution system and use monitoring as a tool to assist in uncovering problems. A system may take more than the minimum number of required routine samples and must include the results in calculating whether the coliform treatment technique trigger in subparts (9)(a)1(i) and (ii) of this rule has been exceeded only if the samples are taken in accordance with the existing sample siting plan and are representative of water throughout the distribution system.

5. Systems must identify repeat monitoring locations in the sample siting plan. Unless the provisions of subpart (i) of this part are met, 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 service connection away from the end of the distribution system, the system must still take all required repeat samples. However, the Department may allow an alternative sampling location in lieu of the requirement to collect at least one repeat sample upstream or downstream of the original sampling site. Systems required to conduct triggered source water monitoring under Rule 0400-45-01-.40(3)(a) must take ground water source sample(s) in addition to repeat samples required under this rule.

(i) Systems may propose repeat monitoring locations to the Department that the system believes to be representative of a pathway for contamination of the distribution system. A system may elect to specify either alternative fixed locations or criteria for selecting repeat sampling sites on a situational basis in a standard operating procedure (SOP) in its sample siting plan. The system must design its SOP to focus the repeat samples at locations that best verify and determine the extent of potential contamination of the distribution system area based on specific situations. The Department may modify the SOP or require alternative monitoring locations as needed.

(Rule 0400-45-01-.41, continued)

(ii) Reserved.

6. The Department may review, revise, and approve, as appropriate, repeat sampling proposed by systems under subpart 5(i) of this subparagraph. The system must demonstrate that the sample siting plan remains representative of the water quality in the distribution system. The Department may determine that monitoring at the entry point to the distribution system (especially for undisinfected ground water systems) is effective to differentiate between potential source water and distribution system problems.

(b) Special purpose samples. Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, must not be used to determine whether the coliform treatment technique trigger has been exceeded. Repeat samples taken pursuant to paragraph (8) of this rule are not considered special purpose samples, and must be used to determine whether the coliform treatment technique trigger has been exceeded.

(c) Invalidation of total coliform samples. A total coliform-positive sample invalidated under this subparagraph does not count toward meeting the minimum monitoring requirements of this rule.

1. The Department may invalidate a total coliform-positive sample only if the conditions of subpart (i), (ii), or (iii) of this part are met.

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

(ii) The Department, on the basis of the results of repeat samples collected as required under subparagraph (8)(a) of this rule, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The Department 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 at a location other than the original tap are total coliform-negative (e.g., a total coliform-positive sample cannot be invalidated on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the system has only one service connection).

(iii) The Department has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition that does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under subparagraph (8)(a) of this rule, and use them to determine whether a coliform treatment technique trigger in paragraph (9) of this rule has been exceeded. To invalidate a total coliform-positive sample under this subparagraph, the decision and supporting rationale must be documented in writing, and approved and signed by the supervisor of the Department official who recommended the decision. The Department shall make this document available to EPA and the public. The written documentation must identify the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The Department may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(Rule 0400-45-01-.41, continued)

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 Department may waive the 24-hour time limit on a case-by-case basis. Alternatively, the Department may implement criteria for waiving the 24-hour sampling time limit to use in lieu of case-by-case extensions.

(4) Routine monitoring requirements for non-community water systems serving 1,000 or fewer people using only ground water.

(a) General.

1. The provisions of this paragraph apply to non-community water systems using only ground water (except ground water under the direct influence of surface water, as defined in Rule 0400-45-01-.04) and serving 1,000 or fewer people.

2. Following any total coliform-positive sample taken under the provisions of this paragraph, systems must comply with the repeat monitoring requirements and E. coli analytical requirements in paragraph (8) of this rule.

3. Once all monitoring required by this paragraph and paragraph (8) of this rule has been completed for a calendar month, systems must determine whether any coliform treatment technique triggers specified in paragraph (9) of this rule have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by paragraph (9) of this rule.

4. For the purpose of determining eligibility for remaining on or qualifying for quarterly monitoring under the provisions of parts (d)4 and (e)2 of this paragraph for transient non-community water systems, the Department may elect to not count monitoring violations under part (10)(c)1 of this rule if the missed sample is collected no later than the end of the monitoring period following the monitoring period in which the sample was missed. The system must collect the make-up sample in a different week than the routine sample for that monitoring period and should collect the sample as soon as possible during the monitoring period. This authority does not affect the provisions of parts (10)(c)1 and (11)(a)4 of this rule.

(b) Monitoring frequency for total coliforms. Systems must monitor each calendar quarter that the system provides water to the public, except for seasonal systems or as provided under subparagraphs (c) through (e) and (g) of this paragraph. Seasonal systems must meet the monitoring requirements of subparagraph (f) of this paragraph.

(c) Transition to the Revised Total Coliform Rule.

1. Systems, including seasonal systems, must continue to monitor according to the total coliform monitoring schedules under Rule 0400-45-01-.07 that were in effect on March 31, 2016, unless any of the conditions for increased monitoring in

(Rule 0400-45-01-.41, continued)

subparagraph (d) of this paragraph are triggered on or after April 1, 2016, or unless otherwise directed by the Department.

2. Beginning April 1, 2016, the Department must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the Department has performed the special monitoring evaluation during each sanitary survey, the Department may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of this paragraph. For seasonal systems on quarterly monitoring, this evaluation must include review of the approved sample siting plan, which must designate the time period(s) for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). The seasonal system must collect compliance samples during these time periods.

(d) Increased Monitoring Requirements for systems on quarterly monitoring. A system on quarterly monitoring that experiences any of the events identified in parts 1 through 4 of this subparagraph must begin monthly monitoring the month following the event. The system must continue monthly monitoring until the requirements in subparagraph (e) of this paragraph for quarterly monitoring are met. A system on monthly monitoring for reasons other than those identified in parts 1 through 4 of this subparagraph is not considered to be on increased monitoring for the purposes of subparagraph (e) of this paragraph.

1. The system triggers a Level 2 assessment or two Level 1 assessments under the provisions of paragraph (9) of this rule in a rolling 12-month period.

2. The system has an E. coli MCL violation.

3. The system has a coliform treatment technique violation.

4. The system has two monitoring violations of this rule, or one monitoring violation of this rule and one Level 1 assessment under the provisions of paragraph (9) of this rule in a rolling 12-month period for a system on quarterly monitoring.

(e) Requirements for returning to quarterly monitoring. The Department may reduce the monitoring frequency for a system on monthly monitoring triggered under subparagraph (d) of this paragraph to quarterly monitoring if the system meets the criteria in parts 1 and 2 of this subparagraph.

1. Within the last 12 months, the system must have a completed sanitary survey or a site visit by the Department or a voluntary Level 2 assessment by a party approved by the Department, be free of sanitary defects, and have a protected water source; and

2. The system must have a clean compliance history for a minimum of 12 months.

(f) Seasonal systems.

1. Beginning April 1, 2016, all seasonal systems must demonstrate completion of a Department-approved start-up procedure, which must include a negative total coliform sample result as a part of that procedure prior to serving water to the public.

(Rule 0400-45-01-.41, continued)

2. A seasonal system must monitor every month that it is in operation unless it meets the criteria in subparts (i) and (ii) of this part to be eligible for monitoring less frequently than monthly beginning April 1, 2016, except as provided under subparagraph (c) of this paragraph.

(i) Seasonal systems monitoring less frequently than monthly must have an approved sample siting plan that designates the time period for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). Seasonal systems must collect compliance samples during this time period.

(ii) To be eligible for quarterly monitoring, the system must meet the criteria in subparagraph (e) of this paragraph.

(g) Additional routine monitoring the month following a total coliform-positive sample. Systems collecting samples on a quarterly frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations under subparagraph (9)(a) of this rule.

(5) Routine monitoring requirements for community water systems serving 1,000 or fewer people using only ground water.

(a) General.

1. The provisions of this paragraph apply to community water systems using only ground water (except ground water under the direct influence of surface water, as defined in Rule 0400-45-01-.04) and serving 1,000 or fewer people.

2. Following any total coliform-positive sample taken under the provisions of this paragraph, systems must comply with the repeat monitoring requirements and E. coli analytical requirements in paragraph (8) of this rule.

3. Once all monitoring required by this paragraph and in paragraph (8) of this rule has been completed for a calendar month, systems must determine whether any coliform treatment technique triggers specified in paragraph (9) of this rule have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by paragraph (9) of this rule.

(b) Monitoring frequency for total coliforms. The monitoring frequency for total coliforms is one sample/month, except as provided for under subparagraph (c) of this paragraph.

(c) Transition to the Revised Total Coliform Rule.

1. All systems must continue to monitor according to the total coliform monitoring schedules under Rule 0400-45-01-.07 that were in effect on March 31, 2016, unless otherwise directed by the Department.

2. Beginning April 1, 2016, the Department must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule and has an appropriate sampling plan.

(Rule 0400-45-01-.41, continued)

(d) Additional routine monitoring the month following a total coliform-positive sample. Non-community systems monitoring quarterly must collect at least three routine samples during the next month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations.

(6) Routine monitoring requirements for subpart H public water systems serving 1,000 or fewer people.

(a) General.

1. The provisions of this paragraph apply to subpart H public water systems of this part serving 1,000 or fewer people.

2. Following any total coliform-positive sample taken under the provisions of this paragraph, systems must comply with the repeat monitoring requirements and E. coli analytical requirements in paragraph (8) of this rule.

3. Once all monitoring required by this paragraph and in paragraph (8) of this rule has bee completed for a calendar month, systems must determine whether any coliform treatment technique triggers specified in paragraph (9) of this rule have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by paragraph (9) of this rule.

4. Seasonal systems.

(i) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a Department-approved start-up procedure, which must include a negative total coliform sample result as a part of the procedure prior to serving water to the public.

(ii) Reserved.

(b) Routine monitoring frequency for total coliforms. Subpart H systems of this paragraph (including consecutive systems) must monitor monthly. Systems may not reduce monitoring.

(c) Unfiltered subpart H systems. A subpart H system of this paragraph that does not practice filtration in compliance with Rules 0400-45-01-.08 (Turbidity Sampling and Analytical Requirements), 0400-45-01-.31 (Filtration and Disinfection) and 0400-45-01-.39 (Enhanced Treatment for Cryptosporidium) must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in Rule 0400-45-01-.08(3)(a), exceeds 1 NTU. 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 Department determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in paragraph (9) of this rule has been exceeded.

(7) Routine monitoring requirements for public water systems serving more than 1,000 people.

(Rule 0400-45-01-.41, continued)

(a) General.

1. The provisions of this paragraph apply to public water systems serving more than 1,000 persons.

2. Following any total coliform-positive sample taken under the provisions of this paragraph, systems must comply with the repeat monitoring requirements and E. coli analytical requirements in paragraph (8) of this rule.

3. Once all monitoring required by this paragraph and in paragraph (8) of this rule has been completed for a calendar month, systems must determine whether any coliform treatment technique triggers specified in paragraph (9) of this rule have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by paragraph (9) of this rule.

4. Seasonal systems.

(i) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a Department-approved start-up procedure, which must include a negative total coliform sample result as a part of the procedure prior to serving water to the public.

(ii) Reserved.

(b) Monitoring frequency for total coliforms. The monitoring frequency for total coliforms is based on the population served by the system, as follows:

Total Coliform Monitoring Frequency for
Public Water Systems Serving More than 1,000 People

| Population Served | Minimum number of samples per month |
|---|---|
| 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 41,000 | 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 |

(Rule 0400-45-01-.41, continued)

| | |
|---|---|
| 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 |
| 3,960,000 or more | 480 |

(c) Unfiltered subpart H systems. A subpart H system of this rule that does not practice filtration in compliance with Rules 0400-45-01-.08 (Turbidity Sampling and Analytical Requirements), 0400-45-01-.31 (Filtration and Disinfection) and 0400-45-01-.39 (Enhanced Treatment for Cryptosporidium) must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in Rule 0400-45-01-.08(3)(a), exceeds 1 NTU. 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 Department determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in paragraph (9) of this rule has been exceeded.

(8) Repeat monitoring and E. coli requirements.

(a) Repeat monitoring.

1. If a sample taken under paragraphs (4) through (7) of this rule is total coliform-positive, the system must collect a set of repeat samples within 24 hours of being notified of the positive result. The system must collect no fewer than three repeat samples for each total coliform-positive sample found. The Department 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. Alternatively, the Department may implement criteria for the system to use in lieu of case-by-case extensions. In the case of an extension, the Department must specify how much time the system has to collect the repeat samples. The Department cannot waive the requirement for a system to collect repeat samples in parts 1 through 3 of this subparagraph.

2. The system must collect all repeat samples on the same day, except that the Department may allow a system with a single service connection to collect the required set of repeat samples over a three-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 300 ml.

3. The system must collect an additional set of repeat samples in the manner specified in parts 1 through 3 of this subparagraph if one or more repeat samples in the current set of repeat samples is total coliform-positive. The system must collect the additional set of repeat samples within 24 hours of being notified of the positive result, unless the Department extends the limit as provided in part 1 of this subparagraph. The system must continue to collect additional sets of repeat samples until either total coliforms are not detected in one complete set of repeat samples or the system determines that a coliform treatment technique

(Rule 0400-45-01-.41, continued)

trigger specified in subparagraph (9)(a) of this rule has been exceeded as a result of a repeat sample being total coliform-positive and notifies the Department. If a trigger identified in paragraph (9) of this rule is exceeded as a result of a routine sample being total coliform-positive, systems are required to conduct only one round of repeat monitoring for each total coliform-positive routine sample.

4. 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.

5. Results of all routine and repeat samples taken under paragraphs (4) through (8) of this rule not invalidated by the Department must be used to determine whether a coliform treatment technique trigger specified in paragraph (9) of this rule has been exceeded.

(b) 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 E. coli are present. If 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 Department office is closed and the Department does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the Department before the end of the next business day.

2. The Department has the discretion to allow a system, on a case-by-case basis, to forgo E. coli testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is E. coli-positive. Accordingly, the system must notify the Department as specified in part 1 of subparagraph (b) of this paragraph and the provisions of Rule 0400-45-01-.06(4)(g) apply.

(9) Coliform treatment technique triggers and assessment requirements for protection against potential fecal contamination.

(a) Treatment technique triggers. Systems must conduct assessments in accordance with subparagraph (b) of this paragraph after exceeding treatment technique triggers in parts 1 and 2 of this subparagraph.

1. Level 1 treatment technique triggers.

(i) For systems taking 40 or more samples per month, the system exceeds 5.0% total coliform-positive samples for the month.

(ii) For systems taking fewer than 40 samples per month, the system has two or more total coliform-positive samples in the same month.

(iii) The system fails to take every required repeat sample after any single total coliform-positive sample.

2. Level 2 treatment technique triggers.

(i) An E. coli MCL violation, as specified in subparagraph (10)(a) of this rule.

(Rule 0400-45-01-.41, continued)

(ii) A second Level 1 trigger as defined in part 1 of this subparagraph, within a rolling 12-month period, unless the Department has determined a likely reason that the samples that caused the first Level 1 treatment technique trigger were total coliform-positive and has established that the system has corrected the problem.

(b) Requirements for assessments.

1. Systems must ensure that Level 1 and 2 assessments are conducted in order to identify the possible presence of sanitary defects and defects in distribution system coliform monitoring practices. Level 2 assessments must be conducted by parties approved by the Department.

2. When conducting assessments, systems must ensure that the assessor evaluates minimum elements that include review and identification of inadequacies in sample sites; sampling protocol; sample processing; atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., small ground water systems); and existing water quality monitoring data. The system must conduct the assessment consistent with any Department directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

3. Level 1 Assessments. A system must conduct a Level 1 assessment consistent with Department requirements if the system exceeds one of the treatment technique triggers in part (a)1 of this paragraph.

(i) The system must complete a Level 1 assessment as soon as practical after any trigger in part (a)1 of this paragraph. In the completed assessment form, the system must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified. The system must submit the completed Level 1 assessment form to the Department within 30 days after the system learns that it has exceeded a trigger.

(ii) If the Department reviews the completed Level 1 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the Department must consult with the system. If the Department requires revisions after consultation, the system must submit a revised assessment form to the Department on an agreed-upon schedule not to exceed 30 days from the date of the consultation.

(iii) Upon completion and submission of the assessment form by the system, the Department must determine if the system has identified a likely cause for the Level 1 trigger and, if so, establish that the system has corrected the problem, or has included a schedule acceptable to the Department for correcting the problem.

4. Level 2 Assessments. A system must ensure that a Level 2 assessment consistent with Department requirements is conducted if the system exceeds one of the treatment technique triggers in part (a)2 of this paragraph. The system

(Rule 0400-45-01-.41, continued)

must comply with any expedited actions or additional actions required by the Department in the case of an E. coli MCL violation.

(i) The system must ensure that a Level 2 assessment is completed by the Department or by a party approved by the Department as soon as practical after any trigger in part (a)2 of this paragraph. The system must submit a completed Level 2 assessment form to the Department within 30 days after the system learns that it has exceeded a trigger. The assessment form must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified.

(ii) The system may conduct Level 2 assessments if the system has staff or management with the certification or qualifications specified by the Department unless otherwise directed by the Department.

(iii) If the Department reviews the completed Level 2 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the Department must consult with the system. If the Department requires revisions after consultation, the system must submit a revised assessment form to the Department on an agreed-upon schedule not to exceed 30 days.

(iv) Upon completion and submission of the assessment form by the system, the Department must determine if the system has identified a likely cause for the Level 2 trigger and determine whether the system has corrected the problem, or has included a schedule acceptable to the Department for correcting the problem.

(c) Corrective Action. Systems must correct sanitary defects found through either Level 1 or 2 assessments conducted under subparagraph (b) of this paragraph. For corrections not completed by the time of submission of the assessment form, the system must complete the corrective action(s) in compliance with a timetable approved by the Department in consultation with the system. The system must notify the Department when each scheduled corrective action is completed.

(d) Consultation. At any time during the assessment or corrective action phase, either the water system or the Department may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the Department on all relevant information that may impact on its ability to comply with a requirement of this rule, including the method of accomplishment, an appropriate timeframe, and other relevant information.

(10) Violations.

(a) E. coli MCL Violation. A system is in violation of the MCL for E. coli when any of the conditions identified in parts 1 through 4 of this subparagraph occur.

1. The system has an E. coli-positive repeat sample following a total coliform-positive routine sample.

2. The system has a total coliform-positive repeat sample following an E. coli-positive routine sample.

(Rule 0400-45-01-.41, continued)

3. The system fails to take all required repeat samples following an E. coli-positive routine sample.

4. The system fails to test for E. coli when any repeat sample tests positive for total coliform.

(b) Treatment technique violation.

1. A treatment technique violation occurs when a system exceeds a treatment technique trigger specified in subparagraph (9)(a) of this rule and then fails to conduct the required assessment or corrective actions within the timeframe specified in subparagraphs (9)(b) and (c) of this rule.

2. A treatment technique violation occurs when a seasonal system fails to complete a Department-approved start-up procedure prior to serving water to the public.

(c) Monitoring violations.

1. Failure to take every required routine or additional routine sample in a compliance period is a monitoring violation.

2. Failure to analyze for E. coli following a total coliform-positive routine sample is a monitoring violation.

(d) Reporting violations.

1. Failure to submit a monitoring report or completed assessment form after a system properly conducts monitoring or assessment in a timely manner is a reporting violation.

2. Failure to notify the Department following an E. coli-positive sample as required by part (8)(b)1 of this rule in a timely manner is a reporting violation.

3. Failure to submit certification of completion of Department-approved start-up procedure by a seasonal system is a reporting violation.

(11) Reporting and recordkeeping.

(a) Reporting.

1. E. coli.

(i) A system must notify the Department by the end of the day when the system learns of an E. coli MCL violation, unless the system learns of the violation after the Department office is closed and the Department does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the Department before the end of the next business day, and notify the public in accordance with Rule 0400-45-01-.19 (Notification of Customers).

(ii) A system must notify the Department by the end of the day when the system is notified of an E. coli-positive routine sample, unless the system is notified of the result after the Department office is closed and the Department does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the Department before the end of the next business day.

(Rule 0400-45-01-.41, continued)

2. A system that has violated the treatment technique for coliforms in paragraph (9) of this rule must report the violation to the Department no later than the end of the next business day after it learns of the violation, and notify the public in accordance with Rule 0400-45-01-.19 (Notification of Customers).

3. A system required to conduct an assessment under the provisions of paragraph (9) of this rule must submit the assessment report within 30 days. The system must notify the Department in accordance with subparagraph (9)(c) of this rule when each scheduled corrective action is completed for corrections not completed by the time of submission of the assessment form.

4. A system that has failed to comply with a coliform monitoring requirement must report the monitoring violation to the Department within 10 days after the system discovers the violation, and notify the public in accordance with Rule 0400-45-01-.19 (Notification of Customers).

5. A seasonal system must certify, prior to serving water to the public that it has complied with the Department-approved start-up procedure.

(b) Recordkeeping.

1. The system must maintain any assessment form, regardless of who conducts the assessment, and documentation of corrective actions completed as a result of those assessments, or other available summary documentation of the sanitary defects and corrective actions taken under paragraph (9) of this rule for Department review. This record must be maintained by the system for a period not less than five years after completion of the assessment or corrective action.

2. The system must maintain a record of any repeat sample taken that meets Department criteria for an extension of the 24-hour period for collecting repeat samples as provided for under part (8)(a)1 of this rule.

***Authority:*** *T.C.A. §§ 68-221-701 et seq. and 4-5-201 et seq.* ***Administrative History:*** *Original rule filed filed November 24, 2015; effective February 22, 2016. Amendments filed March 7, 2016; effective June 5, 2016.*