310 CMR 22.00: DRINKING WATER

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22.01: Purpose

(1) 310 CMR 22.00 is intended to promote the public health and general welfare by preventing the pollution and securing the sanitary protection of all such waters used as sources of water supply and ensuring that public water systems in Massachusetts provide to the users thereof water that is safe, fit and pure to drink.

(2) 310 CMR 22.00 sets forth those standards and requirements of general application and future effect which shall be used to implement, interpret and enforce M.G.L. c. 40, §§ 15B, 38, 39B, 39C, 40, 41, and 41A; M.G.L. c. 111, §§ 2C, 5E, 5F, 5G, 17, 143, 159, 160, 160A, 160B, 162 and 165; M.G.L. c. 114, §§ 35 and 36; M.G.L. c. 140, §§ 32B and 32H; and M.G.L. c. 165, §§ 4B and 6.

22.01: continued

The Department affirms its authority to determine compliance or initiate enforcement actions related to 310 CMR 22.00 based upon analytical results and other information compiled by its sanctioned representatives and agencies.

22.02: Definitions

(1) As used in 310 CMR 22.00, the following terms shall have the following meanings:

Abandoned Source means a source that is physically disconnected from a public water system and is no longer maintained as an active, inactive, or Emergency Source. Abandoned Source(s) cannot be used as a public water system source. A source may only be abandoned pursuant to 310 CMR 22.25.

Action Level means, for the purpose of 310 CMR 22.06(B), the concentration of lead or copper in water specified in 310 CMR 22.06B(1)(c) which determines, in some cases, the treatment requirements contained in 310 CMR 22.06B that a water system is required to complete. The definition of Action Level for the purpose of a consumer confidence report is contained in 310 CMR 22.16A.

Active Source means an Approved Source(s), monitored and maintained to meet 310 CMR 22.00 and used for primary or backup purposes to meet consumer demands as necessary.

Administrator means the Administrator of the Agency.

Adsorption means the gathering of a gas, liquid, or dissolved substance on the surface or interface zone of another material.

Aeration means the process of adding air to water, whether by passing air through water or by passing water through air.

Agency means the United States Environmental Protection Agency.

Air Stripping means a treatment process used to remove dissolved gases and volatile substances from water by bubbling large volumes of air through the water being treated.

Approved Source means a water supply source approved by the Department for drinking water purposes pursuant to 310 CMR 22.03(1).

Bag Filter means pressure-driven separation devices that remove particulate matter larger than one micrometer using an engineered porous Filtration media. They are typically constructed of a non-rigid, fabric Filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to outside.

Bank means the portion of the land surface which normally abuts and confines a water body; it lies between a water body and a bordering vegetated wetland and adjacent flood plain, or in the absence of these, it lies between a water body and an upland; the upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower; the lower boundary of a Bank is the mean annual low flow level.

Bank Filtration means a water treatment process that uses a well to recover Surface Water that has naturally infiltrated into Groundwater through a river bed or Bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

Best Available Technology or "BAT" means the best technology Treatment Techniques, or other means which the EPA or Department finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration).

Cartridge Filter means pressure-driven separation devices that remove particulate matter larger than one micrometer using an engineered porous Filtration media. They are typically constructed as rigid or semi-rigid, self-supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.

22.02: continued

Certified Operator means an individual who has received a certificate of competency issued by the Board of Certification of Operators of Drinking Water Supply Facilities in accordance with 236 CMR 2.00 through 5.00 and currently maintains a valid license.

Chemical Feed System means an automated or manually controlled mechanism for introducing chemical compounds into a water treatment system in regulated concentrations and amounts at predetermined events or times for the purpose of treating water in order to ensure a safe and pure drinking water supply.

Chloramination means the application of chlorine and ammonia to water to form chloramines for the purpose of Disinfection.

Clean Compliance History means, for purposes of 310 CMR 22.05, a record of no Maximum Contaminant Level (MCL) violations, no monitoring violations, no coliform Treatment Technique trigger exceedances, and no Treatment Technique violations; all under 310 CMR 22.05; and no Treatment Technique violations or Significant Deficiencies under 310 CMR 22.26.

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

Combined Distribution System means the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

Commissioner means the Commissioner of the Department of Environmental Protection

Compliance Cycle means the nine-year (calendar year) cycle during which public water systems must monitor. Each Compliance Cycle consists of 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.

Compliance Period means a three-year (calendar year) period within a Compliance Cycle. Each Compliance Cycle has 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.

Comprehensive Performance Evaluation (CPE) means a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. The 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.

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.

Consecutive Public Water System means 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.

Contaminant means any physical, chemical, biological or radiological substance or matter in water.

Contract Operator Compliance Notice means a written submittal from a Supplier of Water, who has contracted with a Certified Operator (pursuant to 310 CMR 22.11B), to the Department identifying the allocation of the following categories of duties and responsibilities between the Supplier of Water and the Certified Operator, on a form to be provided by the Department:

22.02: continued

(a) operation and maintenance;
(b) monitoring and reporting;
(c) compliance;
(d) recordkeeping;
(e) administration;
(f) emergency response;
(g) budgeting;
(h) safety and source protection;
(i) training;
(j) inspections; and
(k) consumer relations.

Conventional Filtration Treatment means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial particulate removal.

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.

CT or CTcalc is the product of "residual disinfectant concentration" ("C") in mg/l 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). "$CT_{99.9}$" is the CT value required for 99.9% (3-log) inactivation of *Giardia lamblia* cysts. $CT_{99.9}$ for a variety of disinfectants and conditions appear in Tables (1.1-22.20A through 1.6-22.20A, 2.1-22.20A and 3.1-22.20A) in 310 CMR 22.20A(5)(b)3.

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

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

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

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* cysts.

Customers, for the purpose of 310 CMR 22.16A, means billing units or service connections to which water is delivered by a community water system.

Day means calendar day, except as otherwise expressly provided in 310 CMR 22.00.

Department means the Department of Environmental Protection of the Commonwealth of Massachusetts.

Detected Contaminant, for the purpose of 310 CMR 22.16A, means at or above the method detection levels reported by the certified laboratory which shall be less than or equal to the method detection levels prescribed by 310 CMR 22.00.

Diatomaceous Earth means a fine, siliceous (made of silica) material composed mainly of the skeletal remains of diatoms.

Direct Filtration means a method of treating water which consists of the addition of coagulant chemicals, flash mixing, Coagulation, minimal flocculation, and Filtration; but does not include Sedimentation.

22.02: continued

Direct Responsible Charge means accountability for and performance of active, daily on-site operation of a Treatment Facility or Distribution System, or a major segment of a Treatment Facility or Distribution System where shift operation is not required. Where shift operation is required "Direct Responsible Charge" shall mean accountability for and performance of active, daily on-site operation of an operating shift, or a major segment of the operation of a Treatment Facility or Distribution System.

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

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.

Disinfection means a process that inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

Disinfection Profile means a summary of daily *Giardia lamblia* inactivation through the treatment plant.

Distribution System means a system of conduits (laterals, distributors, pipes, mains, and their appurtenances, and in some cases includes interior plumbing) by which potable water is distributed to consumers. The Distribution System may include the source booster pumping stations, storage tanks and reservoirs.

Division means the Drinking Water Program, one of the programs within the Bureau of Resource Protection comprising the Department of Environmental Protection.

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.

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).

Dual Sample Set means 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 310 CMR 22.07F(1) through 310 CMR 22.07F(6) and determining compliance with the TTHM and HAA5 MCLs under 310 CMR 22.07F.

Effective Corrosion Inhibitor Residual, for the purpose of 310 CMR 22.06B only, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

Electrodialysis means the selective separation of dissolved solids on the basis of electrical charge, by diffusion through a semi-permeable membrane across which an electrical potential is imposed.

22.02: continued

Emergency means any situation or event, natural or man-made, which causes or threatens to cause damage to a water supply system that could disrupt normal water supply functions. An Emergency may affect a portion of the system or the entire system. In an Emergency, a water supplier must take immediate action to assess the situation or event and may need to take immediate action to protect public health.

Emergency Source means any source of water used to supplement or temporarily replace a public water system's active or Inactive Source(s) when water of sufficient quality or quantity is not available. An Emergency Source may be placed On-line only after the Department's approval pursuant to a declaration of a state of water emergency under M.G.L. c. 21G, §§ 15 through 17 or as a requirement of a Department administrative order.

Enhanced Coagulation means the addition of sufficient coagulant for improved removal of Disinfection byproduct precursors by conventional Filtration treatment.

Enhanced Softening means the improved removal of Disinfection byproduct precursors by precipitative softening.

EPA means the United States Environmental Protection Agency.

Expand means to increase the yield of a well or Wellfield above the approved pumping rate.

Filter Profile means 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.

Filtration means a process for removing particulate matter from water by passage through porous media.

Finished Water means 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).

First Draw Sample means a one-liter sample of tap water, collected in accordance with 310 CMR 22.06B(1)(a)2. that has been standing in plumbing pipes at least six hours and is collected without flushing the tap.

Flocculation 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.

Flowing Stream means a course of running water flowing in a definite channel.

Foreseeable Future means that a Public Water System has demonstrated its capacity to operate and maintain the system in compliance with 310 CMR 22.00 and each federal national primary drinking water regulation that will be in effect five years from the date of the Department's determination of the system's capacity.

GAC10 means granular activated carbon filter beds with an empty-bed contact time of ten minutes based on average daily flow and a carbon reactivation frequency of every 180 days except that the reactivation frequency for GAC10 used as a Best Available Technology for compliance with the MCLs under 310 CMR 22.07E(1)(c) shall be 120 days.

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.

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

22.02: continued

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

Groundwater means all water that exists beneath the land surface in soils or geologic formations, specifically that part of the subsurface water in the Saturated Zone.

Groundwater 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.

Guidelines and Policies for Public Water Systems means the Department's Drinking Water Program's document titled "Guidelines and Policies for Public Water Systems," as amended, utilized by the Drinking Water Program as a guidance document. Copies of the "Guidelines and Policies for Public Water Systems" are available for a nominal fee from the State Bookstore, State House, Room 116, Boston, Massachusetts and 436 Dwight Street, Springfield, Massachusetts.

Haloacetic Acids (Five) (HAA5) means the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

Halogen means one of the chemical elements chlorine, bromine, or iodine.

Home Water Treatment Device means any apparatus, appliance, instrument, or product designed or used in conjunction with residential plumbing systems or systems providing water in any building or structure for human consumption or use; including but not limited to, apparatus, appliances, instruments, or products using Filtration, distillation, absorption, ion exchange, Reverse Osmosis, or other treatment processes or technologies which alter the properties of water. Home Water Treatment Device includes point-of-entry and point-of-use devices.

Inactive Source means an Approved Source(s) that is expected to be off-line for at least one year (12 months). A source may be deemed inactive only upon written approval of the Department. An Inactive Source may not return to active status without written approval from the Department. Monitoring as specified at 310 CMR 22.00, is not required during the time that the source is inactive, unless otherwise specified by the Department.

Infiltration Gallery means a subsurface Groundwater collection system, which generally consists of a horizontal screen(s) or other porous media that collects Groundwater and induced Surface Water and routes it to a chamber from which water is pumped to a water treatment plant or Distribution System, installed adjacent to a Surface Water body for the purpose of inducing infiltration from the Surface Water body.

Initial Compliance Period means the first full three-year Compliance Period which begins at least 18 months after promulgation of the federal regulations.

Interim Wellhead Protection Area (IWPA) means that for public water systems using wells or Wellfields that lack a Department-approved Zone II, the Department will apply an Interim Wellhead Protection Area. This Interim Wellhead Protection Area shall be a one half mile radius measured from the well or Wellfield for sources whose approved pumping rate is 100,000 gpd or greater. For wells or Wellfields that pump less than 100,000 gpd, the IWPA radius is proportional to the approved pumping rate which may be calculated according to the following equation: IWPA radius in feet = (32 x pumping rate in gallons per minute) + 400. A default IWPA radius or an IWPA radius otherwise computed and determined by the Department shall be applied to Transient Non-community Water System (TNC) and Non-transient Non-community Water System (NTNC) wells when there is no metered rate of withdrawal or no approved pumping rate.

22.02: continued

Laboratory Analyst means a Person who is qualified to perform tests in specified disciplines or categories.

Laboratory Director means the Person who has administrative and legal responsibility for the operation of the laboratory.

Laboratory Supervisor/Consultant means a Person with management and technical responsibility, who exercises supervision over technical personnel, evaluates the quality of analytical methods, performs tests requiring special scientific skills and is responsible for the accuracy and reporting of results.

Lake/Reservoir means 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.

Large Water System, for the purpose of 310 CMR 22.06(B), means a water system that serves more than 50,000 persons.

Lead-free means:

(a) not containing more than 0.2% lead when used with respect to solder and flux; and

(b) not more than a weighted average of 0.25% lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures; provided that the weighted average lead content of a pipe, pipe fitting, plumbing fitting, or fixture shall be calculated by using the following formula:

1. for each wetted component, the percentage of lead in the component shall be multiplied by the ratio of the wetted surface area of that component to the total wetted surface area of the entire product to arrive at the weighted percentage of lead of the component;
2. the weighted percentage of lead of each wetted component shall be added together, and the sum of these weighted percentages shall constitute the weighted average lead content of the product;
3. the lead content of the material used to produce wetted components shall be used to determine compliance; and
4. for lead content of materials that are provided as a range, the maximum content of the range shall be used.

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 that is connected to such lead line.

Legionella means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

Level 1 Assessment means 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, and which consists, at a minimum, of the following elements:

(a) review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired;

(b) changes in Distribution System maintenance and operation that could affect distributed water quality (including water storage);

(c) source and treatment considerations that bear on distributed water quality, where appropriate (*e.g.*, whether a groundwater system is disinfected);

(d) existing water quality monitoring data; and

(e) inadequacies in sample sites, sampling protocol, and sample processing.

Level 2 Assessment means 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, and which consists of a more detailed examination of the system (including the system's monitoring and operational practices) than 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, and includes, at a minimum, the following elements:

22.02: continued

(a) review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired;
(b) changes in Distribution System maintenance and operation that could affect distributed water quality (including water storage);
(c) source and treatment considerations that bear on distributed water quality, where appropriate (*e.g.*, whether a groundwater system is disinfected);
(d) existing water quality monitoring data; and
(e) inadequacies in sample sites, sampling protocol, and sample processing.

Locational Running Annual Average (LRAA) means the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

Man-made Beta Particle and Photon Emitters 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.

Maximum Contaminant Level or MCL means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system. The definition of Maximum Contaminant Level for the purpose of the consumer confidence report is contained in 310 CMR 22.16A(4)(c)2.

Maximum Contaminant Level Goal or MCLG means the level of a contaminant in drinking water at or below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

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. MRDLs are enforceable in the same manner as Maximum Contaminant Levels under 310 CMR 22.00.

Maximum Residual Disinfectant Level Goal (MRDLG) means the maximum level of a Disinfectant added for water treatment at which no known or anticipated adverse effect on the health of Persons would occur, and which allows an adequate margin of safety. MRDLGs are non-enforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

Maximum Total Trihalomethane Potential means the maximum concentration of Total Trihalomethanes produced in a given water containing a Disinfectant residual after seven days at a temperature of 25°C or above.

Medium-size Water System, for the purpose of 310 CMR 22.06B means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

Membrane Filtration means a pressure or vacuum driven separation process in which particulate matter larger than one 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. 310 CMR 22.02: Membrane Filtration includes the common membrane technologies of microfiltration, utrafiltration, nanofiltration, and Reverse Osmosis.

Near the First Service Connection means at one of the 20% of all service connections in the entire system that are nearest the water supply treatment facility, as measured by water transport time within the distribution system.

New Source means any existing, proposed, or expanded use of a water source in a public water system that has not met the requirements of guidelines and regulations utilized by the Drinking Water Program.

New Source Approval Process means the step-by-step process utilized by the Department's Drinking Water Program culminating in the development of water for a public water system.

22.02: continued

Nonzoning Controls means by-laws, ordinances, rules and regulations, other than Zoning Controls, adopted in accordance with the constitutional and statutory powers of cities and towns to protect the health, safety and general welfare of their present and future inhabitants.

On-line means a well, Wellfield or Surface Water Source from which water currently is being pumped or drawn for use in a public water system.

Optimal Corrosion Control Treatment means, for the purpose of 310 CMR 22.06B only, the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations.

Performance Evaluation Sample means a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance set by the Department.

Person means an individual, corporation, company, association, trust, partnership, the Commonwealth, a municipality, district or other subdivision or body politic of the Commonwealth, any department, agency, or instrumentality of the United States, except that nothing herein shall be construed to refer to or include any American Indian tribe, or the United States Secretary of the Interior in his capacity as trustee of Indian lands.

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

Plant Intake means 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.

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.

Point-of-entry Treatment Device (POE) means a device installed to treat the water entering a house or building or portion of such for the purpose of reducing contaminants in the water distributed throughout the house or building or portion of such.

Point-of-use Treatment Device (POU) means a treatment device installed on a single faucet or spigot used for the purpose of reducing contaminants in drinking water at that one faucet or spigot.

Pre-sedimentation means 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.

Primary Operator means a person who is certified by the Board of Certification of Drinking Water Supply Facilities and has a grade certificate at least equal to the class of the corresponding facility at which he or she is employed. The Primary Operator shall be the individual who has direct supervision and responsibility for charge of the operation of a facility such as the superintendent or chief plant operator who has active field supervision of the operation of the facility or who is required in the performance of their normal duties to give responsible, technical advice and supervision of the technical aspects rather than only general administrative supervision of the treatment and/or distribution of the water supply and spends their working hours at the treatment facility or performing distribution system duties and is knowledgeable of 310 CMR 22.00, guidelines and policies. The Primary Operator of the facility shall hold a "Full Operator" status and cannot hold an "Operator-in-Training" certificate as defined in 236 CMR 4.05: *Issuance of Certificates*.

22.02: continued

Public Water System means a system for the provision to the public of water for human consumption, through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year. Public Water System includes any collection, treatment, storage, and distribution facilities under control of the operator of such a system and used primarily in connection with such system, and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. The Department may presume that a system is a Public Water System as defined in 310 CMR 22.00 based on the average number of persons using a facility served by the system or on the number of bedrooms in a residential home or facility. The Department reserves the right to evaluate and determine whether two or more wells located on commonly owned property, that individually may serve less than 25 people, but collectively serve more than 25 people for more than 60 days of the year should not be regulated as a Public Water System, taking into account the risk to public health. A Public Water System includes a "Community Water System" or a "Non community Water System".

(a) Community Water System means a Public Water System which serves at least 15 service connections used by year round residents or regularly serves at least 25 year round residents.

(b) Non community Water System means a Public Water System that is not a Community Water System.

1. Non-transient Non-community Water System or NTNC means a Public Water System that is not a Community Water System and that has at least 15 service connections or regularly serves at least 25 of the same individualss or more approximately four or more hours per day, four or more days per week, more than six months or 180 days per year, such as a workplace providing water to its employees.

2. Transient Non-community Water System or TNC means a Public Water System that is not a Community Water System or a Non-transient Non-community Water System but is a Public Water System which has at least 15 service connections or serves water to 25 different persons at least 60 days of the year. Some examples of these types of systems are: restaurants, motels, camp grounds, parks, golf courses, ski areas and community centers.

Public Water System Capacity means a Public Water System has the technical, financial, and managerial ability to operate in compliance with 310 CMR 22.00, the Department's *Guidelines and Policies for Public Water System* and each National Primary Drinking Water Regulation in effect at the time of such approval and in the foreseeable future

Raw Water means water in its natural state, prior to treatment, which typically is the water entering the first treatment process of a water treatment plant.

Reliably and Consistently below the MCL means that though a system detects contaminants in its water supply, it has sufficient knowledge of the source or extent of the contamination to predict that the MCL would not be exceeded in the future. Wide variations in an analytical results or an analytical results which is close to the MCL are examples of situations where systems would not meet the "reliably and consistently" test.

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

Repeat Compliance Period means any subsequent Compliance Period after the Initial Compliance Period.

Replacement Well means a new well(s)/Wellfield installed to replace or supplement an approved well(s)/Wellfield where the proposed new well(s)/Wellfield will be situated within 250 feet of the original well(s)/Wellfield and have a pumping rate equal to or less than that of the original well(s)/Wellfield. Replacement Wells must be installed in the same unconsolidated geologic formation as the original approved well(s)/Wellfield. Criteria used to determine location of Replacement Wells shall include but not be limited to the following: extent to which negative environmental impacts caused by the existing well can be minimized; degree to which Replacement Wells alter the existing groundwater hydraulics or Zone II boundaries; and the

22.02: continued

degree to which significant potential contamination threats can be lessened. Replacement Wells shall not significantly alter the existing groundwater hydraulics or Zone II boundaries. Replacement Wells are subject to the New Source requirements as deemed applicable by the Department.

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

Reverse Osmosis means the application of pressure to a concentrated solution which causes the passage of a liquid from the concentrated solution to a weaker solution across a semi-permeable membrane. The membrane allows the passage of the water (solvent) but not the dissolved solids (solutes).

River Source means a drinking water source with a direct intake located at any river or stream that is designated as a drinking water source in 314 CMR 4.00: *Massachusetts Surface Water Quality Standards*. Protected Zones A, B, and C, as defined in 310 CMR 22.00, do not apply to River Sources designated as Class B under 314 CMR 4.00: *Massachusetts Surface Water Quality Standards*.

Running Annual Average. The Running Annual Average for MCL/MRDL compliance calculation purposes is defined as the average of quarterly or monthly averages of the compliance monitoring result(s) from the prior four calendar quarters. If multiple compliance monitoring samples are collected in any given quarter or month, then the results of these samples are averaged in order to establish a single representative contaminant concentration for each quarter or month. These quarterly (four values) or monthly (12 values) concentrations are then averaged for the prior four calendar quarters. If all of the required compliance monitoring sample(s) for a quarter or month were not collected, then the Running Annual Average calculation shall exclude a concentration value for that quarter or month (*e.g.* if one quarter's sampling is missing, then the Running Annual Average is based upon the sum of the quarterly averages from the other three quarters divided by three). Results from additional samples that were collected and analyzed in the same manner as compliance monitoring samples and that are representative of drinking water being provided to the public may also be used in this calculation.

Sampling Point means the entry point to the distribution system that represents each source after treatment.

Sanitary Defect means 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. (Sanitary Defect may also be identified as a Significant Deficiency under the Ground Water Rule 310 CMR 22.26.)

Sanitary Survey means an on site review of the water sources, facilities, equipment, operation and maintenance of a Public Water System for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

Satellite Facility means a Treatment Facility which is operated, controlled, and monitored by an appropriately Certified Operator working within the same Public Water System.

Saturated Zone means a zone in which all voids, large and small, are filled with water under pressure, equal to or greater than atmospheric pressure.

SCADA *see* definition for Supervisory Control and Data Acquisition System.

Seasonal System means 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.

22.02: continued

Secondary Maximum Contaminant Level (SMCL) means standards which apply to Public Water Systems and which in the judgment of the Administrator or the Department, are requisite to protect the public welfare. The SMCL is the maximum permissible level of a contaminant in water, which is delivered to the free flowing outlet of the ultimate user of a Public Water System. Contaminants added to the water under circumstances controlled by such user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from Secondary Maximum Contaminant Level (SMCL)

Secondary Operator means a person who is certified by the Board of Certification of Operators of Drinking Water Supply Facilities and has an operator's license not less than one grade lower than the classification of the facility at which they are employed. For Class III treatment facilities or higher, the Secondary Operator must also have at least six months working experience in a Class II treatment facility or higher. A Secondary Operator shall be an individual who spends their working hours at the treatment facility as the shift supervisor or performs distribution system duties as a foreman or assistant superintendent and is knowledgeable of 310 CMR 22.00: *Drinking Water*, guidelines and policies. A Secondary Operator shall be in Direct Responsible Charge during periods of time when the Primary Operator is temporarily absent or is not scheduled for duty. The Secondary Operator may hold an Operator-in-Training certificate as defined in 236 CMR: *Board of Certification of Operators of Drinking Water Supply Facilities*.

Sedimentation means a process for removal of solids before Filtration by gravity or separation.

Service Line Sample means a one-liter sample of water, collected in accordance with 310 CMR 22.06B(7) has been standing for at least six hours in a service line.

Significant Deficiency means one or more conditions that cause, or have the potential to cause, the introduction of contamination into water delivered to customers, including without limitation:

(a) defects in design, operation, or maintenance of any source, Treatment Facility or Distribution System; and

(b) the failure or malfunction of any of source, Treatment Facility or Distribution System.

(Significant Deficiency may also be identified as a Sanitary Defect under 310 CMR 22.05.)

Single Family Structure, for the purpose of 310 CMR 22.06B only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

Slow Sand Filtration means a process involving passage of 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.

Small Water System, for the purpose of 310 CMR 22.06B, means a water system that serves no more than 3,300 persons.

Spring means a natural discharge point where groundwater issues from soil or rocks in concentrated flow. Public water supply Springs will be perennial or intermittent springs of nonthermal origin. A source is not considered a Spring if mechanical methods are used to enhance the flow of water.

Stabilization means the processes that convert organic materials to a form that resists change. Organic material is stabilized by bacteria which convert the material to gases and other relatively inert substances. Stabilized organic material generally will not give off obnoxious odors.

Standard Sample means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

Substantial Modification means any deviation from approved plans or specifications affecting capacity, hydraulic conditions, operating units, the functioning of water treatment processes or systems, or the quality of water delivered to consumers. Substantial Modification does not apply to Substantial Modifications as that term is used in 310 CMR 22.22.

22.02: continued

Supervisory Control and Data Acquisition System or SCADA System means a computer-monitored alarm, response, control and data acquisition system used by drinking water facilities to monitor their operations.

Supplier of Water means any Person who owns or operates a Public Water System.

Surface Water means all water that is open to the atmosphere and subject to surface runoff.

Surface Water Source means any lake, pond, reservoir, river, stream or impoundment designated as a public water supply in 314 CMR 4.00: *Massachusetts Surface Water Quality Standards*.

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^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/l).

System with a Single Service Connection means a system that supplies drinking water to consumers via a single service line.

Tier 1 Public Notice means a public notice required for 310 CMR 22.00 violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure.

Tier 2 Public Notice means a public notice required for 310 CMR 22.00 violations and situations with potential to have serious adverse effects on human health.

Tier 3 Public Notice means a public notice for all other 310 CMR 22.00 violations and situations not included in Tier 1 and Tier 2.

Too Numerous to Count (TNTC) means that the total number of bacterial colonies exceeds 200 on a 47-mm diameter membrane filter used for coliform detection.

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.

Total Trihalomethanes (TTHM) means the sum, rounded to two significant figures, of the concentrations in milligrams per liter of the trihalomethane compounds, trichloromethane (chloroform), bromodichloromethane, dibromochloromethane, and tribromomethane (bromoform).

Treatment Facility means those components of a Public Water System involved in the production of drinking water for public consumption by the addition of any chemical or use of any treatment process to alter the physical, biological or chemical quality of the water.

Treatment Technique (TT) means a process, practice, or device required by 310 CMR 22.00, the National Primary Drinking Water Standards, or by the terms and conditions of a permit, approval or order issued by the Department intended to reduce the level of a contaminant or other constituent in drinking water.

Tributary means any body of running, or intermittently running, water which moves in a definite channel, naturally or artificially created, in the ground due to a hydraulic gradient, and which ultimately flows into a Class A Surface Water Source, as defined in 314 CMR 4.05(3)(a): *Class A*.

Trihalomethane 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.

Two-stage Lime Softening means a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to Filtration.

22.02: continued

Turbidity means a measure of water clarity. Turbidity is measured in terms of Nephelometric Turbidity Units (NTU), representing the intensity of light scattered by a sample under defined conditions.

Uncovered Finished Water Storage Facility means is a tank, reservoir, or other facility used to store water that will undergo no further treatment to reduce microbial pathogens except residual Disinfection and is directly open to the atmosphere.

Variances and Exemptions means, as defined in 310 CMR 22.16A(4)(d)1., permission by the Department or EPA not to meet an MCL or a Treatment Technique under certain conditions

Virus means a Virus of fecal origin which is infectious to humans by waterborne transmission.

Water Used for Human Consumption means water that is used by humans in residential, commercial, industrial, institutional or other setting for drinking, bathing, showering, cooking, dishwashing, or maintaining oral hygiene.

Waterborne Disease Outbreak means the 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 Department in conjunction with the Massachusetts Department of Public Health.

Watershed means the area contained within geomorphic or topographic boundaries of higher elevations which cause Surface Water and/or Groundwater to drain or flow to lower elevations into water used as a Public Water System source.

Wellfield means a series of three or more wells that are manifolded together provided that the wells:

(a) shall be either suction lifted or individually pumped all at the same time;
(b) shall have pump intake depths no greater than 28 feet below ground level; and
(c) shall be a maximum distance of 50 feet apart.

Wholesale System means 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.

Zone A means:

(a) the land area between the Surface Water Source and the upper boundary of the Bank;
(b) the land area within a 400 foot lateral distance from the upper boundary of the Bank of a Class A Surface Water Source, as defined in 314 CMR 4.05(3)(a): *Class A*; and
(c) the land area within a 200 foot lateral distance from the upper boundary of the Bank of a Tributary or associated Surface Water body.

Zone B means the land area within ½ mile of the upper boundary of the Bank of a Class A Surface Water Source, as defined in 314 CMR 4.05(3)(a): *Class A*, or edge of Watershed, whichever is less. However, Zone B shall always include the land area within a 400-foot lateral distance from the upper boundary of the Bank of the Class A Surface Water Source.

Zone C means the land area not designated as Zone A or B within the Watershed of a Class A Surface Water Source as defined at 314 CMR 4.05(3)(a): *Class A*.

Zone I means the protective radius required around a public water supply well or Wellfield. For Public Water System wells with approved yields of 100,000 gpd or greater, the protective radius is 400 feet. Wellfields and infiltration galleries with approved yields of 10,000 gpd or greater require a 250-foot protective radius. Protective radii for all other Public Water System wells, Wellfields, and infiltration galleries are determined by the following equation: Zone I radius in feet = (150 x log of pumping rate in gpd) - 350. This equation is equivalent to the chart in the *Guidelines and Policies for Public Water Systems*. A default Zone I radius or a Zone I radius otherwise computed and determined by the Department shall be applied to Transient Non-community Water System (TNC) and Non-transient Non-community Water System (NTNC) wells when there is no metered rate of withdrawal or no approved pumping rate. In no case shall the Zone I radius be less than 100 feet.

22.02: continued

Zone II means that area of an aquifer that contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at approved yield, with no recharge from precipitation). It is bounded by the groundwater divides that result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone II shall extend upgradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock, or a recharge boundary). The Zone II must include the entire Zone I area. For Springs, the Zone II is that area of an aquifer, which contributes water to the Spring under naturally flowing conditions.

Zone III means that land area beyond the area of Zone II from which Surface Water and groundwater drain into Zone II. The surface drainage area as determined by topography is commonly coincident with the groundwater drainage area and will be used to delineate Zone III. In some locations, where surface and groundwater drainage is not coincident, Zone III shall consist of both the surface drainage and the groundwater drainage areas.

Zoning Controls means by-laws and ordinances adopted by cities and towns in accordance with M.G.L. c. 40A.

(2) Definitions as Related to Cross Connections. As used in 310 CMR 22.22, unless the context indicates otherwise, the following words shall have the following meanings:

Air Gap Separation means the method of preventing backflow through the use of an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood level rim of the receptacle. The air gap separation shall be at least twice the internal diameter of the supply pipe discharge line but in no case less than one inch.

Approved Backflow Prevention Device or Device means a testable or non-testable cross connection control device that is approved by the Department for use in Massachusetts.

Approved Examiner means an individual authorized in writing by the Department to administer written and practical certification examinations at a recognized training institution.

Atmospheric Vacuum Breaker means an approved backflow device used to prevent back siphonage which is not designed for use under static line pressure.

Audit means a review of a Public Water System's implementation of its cross connection program to evaluate its effectiveness in distributing safe drinking water.

Back Pressure means pressure created by mechanical means or other means which causes water or other liquids or substances to flow or move in a direction opposite to that which is intended.

Back Siphonage means a form of backflow due to reduced or sub-atmospheric pressure within a water system.

Backflow means the flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply from any source other than the intended source.

Backflow Preventer with Intermediate Atmospheric Vent means a non testable device having two independently operating check valves separated by an intermediate chamber with a means for automatically venting it to the atmosphere, in which the check valves are force loaded to a normally closed position and the venting means is forced loaded to a normally open position.

Backflow Prevention Device Tester means an individual who is certified by the Department as a Massachusetts Backflow Prevention Device Tester.

Barometric Loop means a loop of pipe rising at least 35 feet, at its topmost point, above the highest fixture it supplies for the protection of back siphonage.

22.02: continued

Certification Examination means an examination approved by the Department for the purpose of testing competency in all areas of cross connection control and backflow prevention device testing.

Certified Backflow Prevention Device Tester means an individual who holds a valid Massachusetts Backflow Prevention Device Tester's Certificate issued by the Department.

Contaminant means any physical, chemical, biological or radiological substance or matter in water.

Cross Connection means any actual or potential physical connection or arrangement between a pipe conveying potable water from a Public Water System and any non-potable water supply, piping arrangement or equipment including, but not limited to, waste pipe, soil pipe, sewer, drain, other unapproved sources.

Cross Connection Program Plan means a plan submitted to the Department by the water supplier describing the current and proposed cross connection program and including information on staffing, training, testing, surveying, fee structure, *etc*.

Cross Connection Surveyor means a Person who is certified by the Department as a Massachusetts Cross Connection Surveyor.

Cross Connection Violation Form means a violation form which is sent to the owner by the water supplier with copies to the plumbing inspectors and Board of Health delineating cross connection violations found on the owner's premises and a procedure for corrective action.

Department's Designee or Designee means any water supplier to whom, upon written request of said water supplier, the Department delegates any portion of its authority to act under 310 CMR 22.22.

Design Data Sheet means a report form submitted to the Department or its Designee along with plans for each installation of a reduced pressure backflow preventer or double check valve assembly, or for each change to any such device already installed, describing and showing the details of the specific installation.

Double Check Valve Assembly means a Department approved testable backflow prevention device that incorporates an assembly of check valves, with shut-off valves at each end and appurtenances for testing.

Health Hazard means an actual or potential threat of contamination to the potable water in a Public Water System, which, in the opinion of the Department or its Designee would endanger health.

Hose Bibb Vacuum Breaker means an atmospheric vacuum breaker designed to be used on outlets with hose connection thread.

In-plant Protection means the location of approved backflow prevention devices in a manner, which provides protection of the consumers of water and the potable water system within the premises.

Inspection means an on-site inspection and survey by a qualified individual to determine the existence and location of cross connections and/or the physical examination and testing of an installed backflow prevention device to verify that the backflow prevention device is functioning properly.

Inspection and Maintenance Report Form means a report form, designated by the Department, which is to be used by certified testers to record all pertinent testing information.

Owner means any Person maintaining a cross connection installation or owning or occupying premises on which cross connections can or do exist.

22.02: continued

Owner's Agent means any Person or body designated by the owner to act as his or her representative.

Potable Water means water from any source that has been approved by the Department for human consumption.

Pressure Vacuum Breaker means an approved backflow prevention device designed to prevent only back siphonage and which is designed for use under static line pressure.

Reduced Pressure Backflow Preventer means an approved testable backflow prevention device incorporating:

(a) two or more check valves;
(b) an automatically operating differential relief valve located between the two checks;
(c) two shut-off valves; and
(d) necessary appurtenances for testing; and which is designed to operate so that:
1. the pressure in the zone between the two check valves is maintained at a value less than the pressure on the Public Water System side of the device;
2. at cessation of normal flow, the pressure in the zone between the two check valves is maintained at a value less than the pressure on the Public Water System side of the device; and
3. in the case of leakage of either check valve, the differential relief valve shall operate to maintain reduced pressure in the zone by discharging to the atmosphere.

Reviewing Authority means the Department, its Designee, or the local plumbing inspector, authorized by M.G.L. c. 142 and licensed by the Board of State Examiners of Plumbers and Gas Fitters, whichever is responsible for the review and approval of the installation of an approved backflow prevention device.

Unapproved Source means the source or distribution system for any water or other liquid or substance which has not been approved by the Department as being of safe and sanitary quality for human consumption, including but not limited to any waste pipe, soil pipe, sewer, drain, or non-acceptable potable water system material.

22.03: Compliance

(1) No source of water used by a Public Water System, no system of water supply used by a Public Water System, and no treatment facilities or treatment works used by a Public Water System shall be deemed by the Department to be safe, fit, or pure, or in any other way approved; and no Supplier of Water, or other Person subject to a requirement of 310 CMR 22.00 shall supply drinking water to the users of a Public Water System, including without limitation for emergency use; unless that Public Water System complies with 310 CMR 22.00. In the event of a violation of 310 CMR 22.00, the Department may establish a schedule for compliance within an administrative consent order or other enforceable document that may include interim measures that the Supplier of Water must take. It shall be a violation of 310 CMR 22.00 to fail to comply with:

(a) any provision or requirement of 310 CMR 22.00;
(b) a schedule for compliance, including any interim measures required by the Department in an administrative consent order or other enforceable document; or
(c) any term or condition of a permit, written approval, registration, certification or order issued by the Department pursuant to M.G.L. c. 111, § 160 or 310 CMR 22.00.

(2) A Supplier of Water, upon request by the Department, shall sample and analyze its water for any parameter, at any location and frequency, deemed necessary to prevent the pollution of and secure the sanitary protection of waters used as sources of water supply and to ensure the delivery of a fit and pure water supply to all consumers, in accordance with 310 CMR 22.00. All results of such sampling and analysis shall be reported to the Department as directed and in accordance with 310 CMR 22.00. A Supplier of Water that fails to report such results to the Department as directed, and in accordance with 310 CMR 22.00, shall be presumed to have failed to conduct such monitoring.

22.03: continued

(3) 310 CMR 22.00 shall apply to every Public Water System in the Commonwealth, except a consecutive Public Water System which demonstrates to the Department's satisfaction that it meets all the following Criteria:

(a) The consecutive system consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(b) The consecutive system obtains all of its water from but is not owned by or operated by, a Public Water System which is subject to 310 CMR 22.00;

(c) The consecutive system does not sell water to any Person;

(d) The consecutive system is not a carrier which conveys passengers in commerce; and

(e) The consecutive system and the supplying system have entered into a written agreement that addresses the status and responsibilities of the parties for the ownership, operation and maintenance of the combined system, including but not limited to, drinking water sources, treatment facilities, Distribution System, storage and water quality sampling.

(4) If the Department determines that a consecutive Public Water System is exempt from 310 CMR 22.00 based on the consecutive system meeting the criteria in 310 CMR 22.03(3)(a) through (e), the supplying system shall thereafter be responsible for the compliance of the combined system with 310 CMR 22.00, including the requirement to obtain the Department's approval for a Substantial Modification to an existing Public Water System pursuant to 310 CMR 22.04.

(5) Where the Department, in consultation with the Department of Public Health, determines that:

(a) a Supplier of Water is supplying drinking water in violation of 310 CMR 22.00; and

(b) an order to cease supplying such water would pose a significantly greater hazard to the public health than the continued supplying of such water in violation of 310 CMR 22.00, the Department may authorize the supplying of such water subject to such conditions as may be imposed by the Commissioner, but only for a temporary, non-renewable period not to exceed the amount of time the Supplier of Water reasonably needs to either eliminate the violation or promptly apply for and obtain a variance or exemption.

(6) The Department shall report all violations of 310 CMR 22.00 to the Massachusetts Department of Public Health promptly upon obtaining knowledge of such violations, and shall consult with the Massachusetts Department of Public Health with regard to enforcement actions taken to obtain compliance with 310 CMR 22.00.

(7) No Person shall violate, or cause to be violated, any municipal zoning or nonzoning control that is required as part of a Department-issued approval of a Groundwater source or Surface Water Source for public water supply approval pursuant to 310 CMR 22.20C or 22.21(2), or a requirement of an approved watershed protection/control program.

(8) In the event the Department finds on the basis of a health assessment made by the Department's Office of Research and Standards that the level of any contaminant found in water collected within a Distribution System and/or at a Sampling Point at the entry to a Distribution System, poses an unacceptable health risk to consumers, acting alone or in combination with other contaminants, the Supplier of Water shall take appropriate actions to reduce the level of contaminant concentrations to levels the Department deems safe or remove the source of supply from service by the deadline specified by the Department. The Supplier of Water shall be required to monitor the source as directed by the Department, provide public notification and notify the Department of the actions it intends to take in response to a finding that a source of supply poses an unacceptable risk to health.

22.03: continued

(9) Schedule for Compliance.

(a) No Supplier of Water shall violate, or cause to be violated, any Treatment Technique requirement established by 310 CMR 22.20A. A Supplier of Water subject to one or more Treatment Technique requirements shall take appropriate action to timely come into compliance with each such requirement. The Department may require a Supplier of Water to notify the Department of the actions it intends to take to come into compliance with each Treatment Technique requirement. Each such notice must include, at a minimum, a schedule that includes the dates by which the Supplier of Water will hire a professional engineer to prepare plans and specifications, submit draft and final design plans and specifications to the Department for approval, request bids for construction, award a contract for construction, and commence and complete construction of the work necessary.

(b) If an extension is required to meet an Action Level, Treatment Technique, or other requirement established by 310 CMR 22.00, the Department will set a schedule for compliance with an administrative consent order or other enforceable document and may specify any interim measures that the Supplier of Water must take. Failure to meet the schedule or interim measures constitutes a violation of 310 CMR 22.00.

(10) All water quality data submitted to the Department shall be analyzed by a laboratory certified pursuant to 310 CMR 42.00: *Certification and Operation of Environmental Analysis Laboratories* unless otherwise specified by the Department. All water quality data for contaminants listed in 310 CMR 22.00, including additional and voluntary samples, shall be submitted to the Department, unless otherwise specified by the Department. All sample collection, handling and preservation shall be subject to the following procedures:

(a) those procedures referenced or defined in 310 CMR 22.00. Samples shall be stored in such a way that cross-contamination from other samples, standards or reagents is avoided; and

(b) a Supplier of Water shall maintain a copy of the chain-of-custody for each sample collected, shall retain said copy for the same time period applicable to the corresponding sample reports as specified in 310 CMR 22.17, and shall provide a copy to the Department upon request. Chain of custody information shall be recorded for all samples, including those shipped by mail or courier, using either a chain-of-custody form that accompanies the samples or an electronic tracking system meeting at a minimum, generally accepted industry standards for establishing a chain of custody by such means. Chain-of-custody information shall include:

1. sample number;
2. sample description including any preservation (*e.g.*, chemical, thermal, *etc.*) used;
3. date and time of sample collection;
4. specific location of sample collection (including applicable Location ID#);
5. analysis requested;
6. name of sample collector and intermediate custodians, if any;
7. date(s) and time(s) of custody transfer to the laboratory; and
8. name(s) and signature(s) of the individual(s) receiving the sample.

(11) The Department may require that special purpose samples collected by a Supplier of Water and analyzed by a certified laboratory using approved methods as specified at 310 CMR 42.00: *Certification and Operation of Environmental Analysis Laboratories* be used to determine compliance with the applicable MCL.

(12) A Public Water System is in operation during the period the system is providing (pumping or gravity feeding) water to the water Distribution System and/or the Public Water System is providing water to at least one of its service connections or customers.

(13) A Supplier of Water shall submit or report to the Department all data or information required to be submitted or reported pursuant to 310 CMR 22.00, including without limitation 310 CMR 22.15, in the format and manner as specified and approved by the Department.

(14) In the event of a violation of a regulated contaminant limit established by 310 CMR 22.00, or notification by the Department either pursuant to sampling and analysis required by 310 CMR 22.03(2), or pursuant to 310 CMR 22.03(8), a Supplier of Water shall:

22.03: continued

(a) take appropriate actions to reduce the level of contaminant concentrations to levels the Department deems safe by the deadline specified by the Department. The Supplier of Water shall conduct monitoring as directed by the Department and provide public notification in accordance with 310 CMR 22.16; and

(b) unless the Department directs the Supplier of Water to take specific corrective action, the Supplier of Water shall submit a corrective action plan to the Department within 30 days of the Supplier of Water learning of the violation or receipt of the Department's notification of the exceedance. The corrective action plan shall detail the specific interim and long-term action measures the Supplier of Water intends to take to ensure water supplied to consumers meets applicable standards.

(15) Requests for Information.

(a) To properly carry out its responsibilities under M.G.L. c. 111, § 160 and 310 CMR 22.00 to protect the health, environment, and well-being of the citizens of the Commonwealth, the Department and its authorized agents and representatives may request information from any Person as it deems necessary to ascertain the purity and fitness of water supply for domestic use, or the possibility of the water supply Distribution System imperiling the public health, or to evaluate whether that Person is subject to, in compliance with, or in violation of, M.G.L. c. 111, § 160, or 310 CMR 22.00.

(b) No Person shall fail to provide any information requested within the time specified by the Department pursuant to 310 CMR 22.03(15)(a).

(16) Altering, Falsifying or Tampering with Collection, Analysis, or Reporting of Samples.

(a) No Person shall alter, falsify, tamper with, or attempt to tamper with, the collection, analysis or reporting of samples required by 310 CMR 22.00; nor allow or cause any other Person to alter, falsify, tamper with, or attempt to tamper with, the collection, analysis or reporting of samples required by 310 CMR 22.00.

(b) No Person shall render inaccurate any monitoring device required by 310 CMR 22.00, nor allow or cause any other Person to render inaccurate any monitoring device required by 310 CMR 22.00.

(c) No Person shall render inaccurate any method required to be performed by 310 CMR 22.00, nor allow or cause any other Person to render inaccurate any method required to be performed by 310 CMR 22.00.

(17) Intentional or Negligent Damage. No Person shall intentionally or negligently break, damage, destroy, uncover, deface, or tamper with any source, structure, appurtenance, equipment, or any other component of a Public Water System; nor cause or allow any other Person to intentionally or negligently break, damage, destroy, uncover, deface, or tamper with any source, structure, appurtenance, equipment, or any other component of a Public Water System.

(18) False, Inaccurate, Incomplete or Misleading Statements.

(a) No Person shall make, nor allow or cause any other Person to make, any false, inaccurate, incomplete or misleading statement in any submission required by 310 CMR 22.00, or by any permit, approval, certification or registration issued pursuant to 310 CMR 22.00.

(b) No Person shall make, nor allow or cause any other Person to make, any false, inaccurate, incomplete or misleading statement in any record, report, plan, file, log, register or other document which such Person is required to keep by the terms of a permit, approval, certification or registration issued pursuant to M.G.L. c. 111, § 160, or 310 CMR 22.00.

(19) Orders. Without limitation, the Department may issue such orders as in its opinion may be necessary to prevent the pollution and to secure the sanitary protection of all waters used as sources of water supply and to ensure the delivery of a fit and pure water supply to all consumers. Such orders may include, but shall not be limited to, orders requiring Persons to cease any activity which is in violation of M.G.L. c. 111, § 160, or 310 CMR 22.00 or to carry out activities necessary to bring such Person into compliance.

22.03: continued

(20) Penalties. Any Person violating M.G.L. c. 111, § 160, or 310 CMR 22.00 shall be subject to the full range of legal actions authorized by M.G.L. c. 21A, § 16, c. 111, § 160, 310 CMR 5.00: *Administrative Penalty*, and any other applicable law or regulation including, without limitation, criminal fines, imprisonment, and civil and administrative orders and penalties.

22.04: Construction, Operation and Maintenance of Public Water Systems

(1) New or Substantially Modified Public Water Systems. Any Person proposing to construct a new Public Water System, operate a Public Water System or to substantially modify an existing Public Water System shall obtain the prior written approval of the Department, by at a minimum demonstrating to the Department's satisfaction that:

(a) the drinking water source for the system meets the criteria in 310 CMR 22.20A, 22.20B, 22.20C, and 22.21, as applicable, and complies with the Department's Guidelines and Policies for Public Water System;

(b) the storage, treatment and Distribution System and facilities including transmission lines for the system have been sited, designed, and constructed in compliance with 310 CMR 22.19, 22.20A, 22.22 and the Department's *Guidelines and Policies for Public Water Systems*;

(c) the Supplier of Water has the technical, managerial and financial capacity to operate and maintain the Public Water System in compliance with 310 CMR 22.00, and each National Primary Drinking Water Regulation in effect at the time of the Department's determination of the system's capacity and in effect in the foreseeable future;

(d) the Public Water System is in compliance with the Department's *Guidelines and Policies for Public Water Systems*, in effect at the time of the Department's determination of the system's capacity;

(e) the Public Water System manager has attended a capacity training program approved by the Department or shall attend such a program if deemed necessary by the Department;

(f) in the case of Transient Non-community Water Systems or any other Public Water System, if deemed necessary by the Department, a notice has been or shall be recorded on the deed of the property where a drinking water source serving such Public Water System is located, stating that such property contains a drinking water source subject to 310 CMR 22.00; and

(g) the staffing of the Public Water System complies with 310 CMR 22.11B and any related policies established by the Department or the Board of Certification of Operators of Drinking Water Supply Facilities.

(2) To the extent practicable, said Person shall avoid locating all or any part of a new or substantially modified 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;

(b) except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist; and can reasonably obtain service from an existing system (the Department shall consider proximity to existing systems and the economic feasibility of extending service).

(3) Information Required for Department Approval. Persons seeking the Department's approval under 310 CMR 22.04(1), shall submit the following information:

(a) all necessary plans, specifications, standard operating, maintenance procedures, and proposed staffing for the system, prepared by a Massachusetts registered professional engineer unless otherwise determined by the Department;

(b) documentation, including but not limited to, a water system business plan, which demonstrates that the Public Water System complies with the capacity requirements in 310 CMR 22.04(1)(c); and

(c) any additional information that the Department deems relevant to its review and approval.

22.04: continued

(4) Prohibition on Construction or Substantial Modification of a Public Water System Without Prior Department Approval.

(a) No Person shall commence construction or otherwise implement or operate a proposed new Public Water System or make Substantial Modifications to an existing Public Water System unless the Department has issued its prior written approval and any other applicable Department permits.

(b) No Person shall operate a Public Water System unless such operation is in accordance with the terms and conditions of all Department permits and approvals. No Person shall make changes to a permitted or approved Treatment Technique or remove a permitted or approved treatment device from service without prior notification to and approval by the Department unless the change or removal is in response to an Emergency. If the change or removal is in response to an Emergency, then the Public Water System must notify the Department within 24 hours of the change or removal.

(c) After a Treatment Technique has been approved by the Department, the Supplier of Water shall install and maintain such Treatment Technique and implement any such approved procedures and practices in accordance with 310 CMR 22.00 and the terms and conditions of all applicable permits, approvals, and orders issued by the Department.

(5) Existing Public Water Systems. The Department may require any existing Public Water System to demonstrate its compliance with 310 CMR 22.00, including but not limited to 310 CMR 22.04(1) and the Department's *Guidelines and Policies for Public Water Systems*, at the time of a Sanitary Survey conducted pursuant to 310 CMR 22.04(12) or as otherwise directed by the Department.

(6) By no later than December 31, 2001, all Public Water Systems shall install meter(s) at location(s) sufficient to record each system's total production of water from all sources, including water purchased from and/or water sold to other Public Water Systems.

(7) Each Supplier of Water shall operate and maintain its system in a manner that ensures the delivery of safe drinking water to consumers. In determining whether a Supplier of Water is properly operating and maintaining a Public Water System, the Department will apply the standards for Public Water Systems set forth in the Drinking Water Program's *Guidelines and Policies for Public Water Systems*.

(8) New Product or Technology.

(a) No Supplier of Water shall add, install or use any chemicals, drinking water additives, or treatment devices or equipment that come into direct contact with drinking water, unless such devices or equipment have received the prior written approval of the Department.

(b) To obtain the Department's approval of a new product (*e.g.*, additives, coatings), a manufacturer shall demonstrate that the product:

1. conforms to the applicable American National Standards Institute (ANSI) and the National Sanitation Foundation (NSF) Standard 60 or 61; or Underwriter Laboratory (UL) standards or the performance of the technology has been verified by the Environmental Protection Agency's (EPA's) Environmental Technology Verification Program (ETV);
2. was approved by the EPA prior to April 1990 and conforms to the standards of the American Water Works Association (AWWA); and
3. is capable of producing finished water that meets all federal and state Maximum Contaminant Levels and drinking water standards for the intended and approved technology use.

(c) To obtain the Department's approval of a major new technology system, a manufacturer shall demonstrate that:

1. The major technology has been approved and used successfully in the United States for at least five years. In addition, such major new technology must have been approved and used successfully in three states for at least two years. One of the three states must either be a New England state or New York state or another state determined by the Department to have similar environmental conditions, and the other two states must be primacy states.

22.04: continued

2. If a technology does not meet the requirements of 310 CMR 22.04(8)(c)1., then the technology must be piloted in Massachusetts in accordance to 310 CMR 22.04(9).

3. The Department will consider for approval technologies that have received prior approval from third party organizations such as UL, ANSI/NSF, or AWWA. Additionally, the Department will consider for approval technologies with published ETV performance verification reports.

(d) If the technology is a vending machine, then National Automatic Merchandizing Association (NAMA) certification shall be required to obtain the Department's approval.

(e) If the technology is a POU/POE device it shall conform to the requirements of 310 CMR 22.23.

(f) Persons seeking to have a product or technology listed are directed to follow the procedures set forth in the Drinking Water Program's policy entitled: *New Product or Technology Review Policy* DWP Policy No. 89-01, a copy of which is available from the Drinking Water Program. The Department may revoke its approval of a product or technology if it determines that the product or technology is defective or performs inadequately in the field.

(g) For products, if the drinking water chemicals or coatings have NSF certification, a NSF certification shall also be required of the original producer of the product. Repackers of chemicals are not required to be formally certified, but shall self-certify to the Department that the cleanliness of their procedures and purity of the resultant product is equivalent to the standards applicable to the original manufacturer. Any local reformulation of chemical requires certification in accordance with NSF 60.

(h) Any public or private entity providing the testing and certification described in 310 CMR 22.04(6)(b) for other parties shall be certified by the American National Standards Institute (ANSI).

(9) Pilot Requirements. The Department may require Persons seeking approval of a Disinfection or Filtration treatment system or process for use in a Public Water System to perform a pilot study to determine whether the proposed system or process will perform adequately in the field. Persons required to perform such a study should follow the procedures set forth in the Division's policy entitled *Pilot Study Requirements for Proposed Surface Water Treatment/Filtration Plants*, DWS Policy No. 90-04, a copy of which is available from the Drinking Water Program.

(10) Treatment Techniques for Acrylamide and Epichlorohydrin. Each Supplier of Water using acrylamide or epichlorohydrin in a Public Water System shall certify annually in writing to the Department (using third party or manufacturer's certification) that 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)

Such certifications shall be made by the manufacturers or third parties, as approved by the Department.

(11) Any application of a herbicide to any surface water body that serves as a source of water for a Public Water System shall comply with 310 CMR 22.20B(8).

(12) Sanitary Surveys. The Department or its agent may conduct Sanitary Surveys of Public Water Systems to evaluate each system's source, facilities, equipment, operation, monitoring schedule, technical, managerial and financial capacity, and maintenance procedures at a frequency determined by the Department.

(a) If any violation or deficiency of 310 CMR 22.00, M.G.L. c. 111, § 160 or any other statute or regulation administered by the Department is identified during a Sanitary Survey, including without limitation any violations or deficiencies related to system capacity, the Public Water System shall be notified of the violation, the action necessary to comply with the statute or regulations, and the time period within which compliance must be attained. The Public Water System shall respond to any violations or deficiencies identified in the Sanitary Survey report within 30 days of receipt of such, unless the Department otherwise requires certain corrective action. The Department shall also include capacity recommendations for whole system improvements in its report.

22.04: continued

(b) The owner of a Transient Non-community Water Systems (TNC) shall be responsible for conducting or having a Sanitary Survey conducted by June 29, 1999 to evaluate the system's source, facilities, equipment, operation, monitoring schedule and maintenance plan. Thereafter, TNC systems shall undergo another Sanitary Survey every five years unless otherwise required by the Department. The survey information shall be submitted to the Department on a form or in a format provided by the Department for such use no later than 90 days after the completion of the survey or as specified by the Department. The Department will review the results of each Sanitary Survey to determine whether the existing monitoring frequency is adequate and whether additional measures are necessary, to improve drinking water quality. In conducting the survey the Public Water System shall be subject to 310 CMR 22.04(1)(a), except that the Department may conduct a survey of the TNC system at any time to determine compliance with 310 CMR 22.00.

(c) If a Significant Deficiency is identified by the Department or its agent during a Sanitary Survey at a groundwater Public Water System conducted to comply with 310 CMR 22.26(2),the system must comply with the requirements of 310 CMR 22.26(4)(a). Unless the Department requires the groundwater system to implement corrective action, the groundwater system shall consult with the Department in accordance with the schedule listed under 310 CMR 22.26(4)(a)4. and 5.

(13) Emergencies.

(a) Each Supplier of Water must prepare and keep in an easily accessible location an Emergency Response Plan prepared in accordance with 310 CMR 22.04(13) and *Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Chapter 12 - Emergency Response Planning Requirements Guidance* including *Appendix O - Handbook for Water Supply Emergencies*. The Emergency Response Plan shall be designed to ensure that the water supplier is able to respond effectively to potential and actual Emergencies. The Emergency Response Plan shall include detailed steps that the water supplier shall implement to ensure the continuation of service in the event of a potential or actual Emergency, including but not limited to:

1. Loss of water supply from a source;
2. Loss of water supply due to major component failure;
3. Damage to power supply equipment or loss of power;
4. Contamination of water in the Distribution System from backflow or other causes;
5. Collapse of a reservoir, reservoir roof, or pump house structure;
6. Break in a transmission or distribution line that could result in a loss of service to customers for more than four hours;
7. Potential or imminent threat of chemical or microbiological contamination of the water supply over limits specified by 310 CMR 22.00, including without limitation, any standards specific to an individual Public Water System established pursuant to a health assessment as provided in 310 CMR 22.03(8);
8. Potential or imminent threat of an overfeed of an approved drinking water treatment chemical into the system;
9. An act of vandalism or sabotage that has the potential to impact or impacts water quality or the quantity of water available to the system.
10. A shortage or lack of resources that could affect the operations of the system, such as:
    a. Staffing shortages:
    b. Receipt of notice from a power utility of lengthy power outages; or
    c. Imminent depletion of treatment chemical inventory; and
11. Any other failure of part or all of the water supply system due to equipment failure, human acts (deliberate or accidental) or natural or human made disasters.

(b) The Emergency Response Plan required by 310 CMR 22.04(13) shall include, at a minimum, a description of the procedures, structures and equipment used to respond to potential or actual Emergencies, including but not limited to:

1. Identification of alternate sources of water supply for use during an Emergency and procedures for bringing such sources On-line;
2. Procedures for notifying the Department and other regulatory agencies, the news media, and consumers of the Emergency and the actions, if any, consumers should take during the Emergency, including the use of personal protective equipment, if necessary, and water-use guidelines or restrictions;

22.04: continued

3. Procedures for communication, including a clear outline of the lines communication among system personnel and between the water supplier and local, state and federal officials and the public;
4. Procedures for testing and maintaining all facility communications and alarm systems as necessary to ensure their proper operation;
5. Procedures for disinfecting and testing the Distribution System after an Emergency in order to return it to service;
6. Identification of critical system components that must remain in service or be returned to service quickly;
7. An inventory of equipment needs and availability, including the location of existing Emergency equipment, generators and spill response materials, identification of additional Emergency equipment needs, and procedures for obtaining additional services and equipment, including critical spare parts;
8. Procedures for implementing any interconnections with other Public Water Systems and any other arrangements in effect with neighboring communities or other public water suppliers;
9. A description of the duties and responsibilities of key personnel who will be involved in Emergency response actions, and a procedure for contacting and scheduling staff;
10. A plan for annually training staff and local partners in Emergency response procedures to ensure that they are familiar with the all Emergency procedures, equipment and systems; and
11. Any other matter identified by the Department in *Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Chapter 12 - Emergency Response Planning Requirements* including *Appendix O - Handbook for Water Supply Emergencies*.

(c) Each water supplier must implement the Emergency Response Plan established in accordance with 310 CMR 22.04(13)(a) and (b), including without limitation the provisions for annual training of staff and local partners in the implementation of such plan in the event of a potential or actual Emergency.

(14) Chemical Safety Control for Critical Chemical Feed Systems.

(a) Any Chemical Feed System which uses any of the chemicals listed in 310 CMR 22.04(14)(a)1. through 5. shall be subject to critical Chemical Feed System requirements as set forth in 310 CMR 22.04(14)(b).

1. Gaseous or liquid chlorine;
2. Chloramines;
3. Hydrofluorosilicic acid;
4. Sodium hydroxide; or
5. Potassium hydroxide.

(b) Critical Chemical Feed System Requirements. All Chemical Feed Systems subject to 310 CMR 22.04(14)(b) shall be equipped with control systems and alarm systems, consisting at a minimum and meeting at a minimum the following:

1. Analyzer Requirements.
   a. Each water pump or group of pumps discharging treated water into a Distribution System shall be monitored with a chemical analyzer for each critical chemical injected into the water system by a chemical metering pump.
   b. A Supplier of Water that demonstrates to the Department's satisfaction that an overfeed or underfeed would not lead to an unsafe or impure drinking water supply shall be exempt from the requirement of 310 CMR 22.04(14)(b)1.a.
2. Interlock Requirements.
   a. The pump motor controller(s) of the pump that paces the chemical injection, chemical metering pump(s), and chemical analyzer(s) shall be interlocked so that no chemical is injected if the pump is not running;
   b. A flow meter or thermal type flow switch shall be installed and interlocked such that when no flow is detected, the chemical feed pumps shall not operate;
   c. Each water pump and associated metering pump(s) shall automatically shut down, and the alarm system shall immediately send an alarm to a properly Certified Operator, if the analyzer for the critical chemical injected into the water system detects a parameter that is out of the range set in the analyzer; and

22.04: continued

d. A facility that is staffed 24 hours a day, seven days a week, 365 days a year shall not be required to have an automatic shut down, nor shall any of its Satellite Facilities, but a properly Certified Operator shall be available to take proper action in the event of an overfeed or underfeed.

3. Powering of all metering pumps shall be configured to prevent overriding of the safety shut down systems.

4. Controls, instrumentation, alarms, and data logging system requirements. In every Public Water System, controls, instrumentation, alarms, and data logging systems shall be:

a. installed in order to insure a reliable and safe system;

b. calibrated in accordance with the manufacturer's recommendations; and

c. tested quarterly.

5. The Supplier of Water shall maintain logs recording all test results for a rolling period of five years from the date of each set of tests. The Supplier of Water shall make the logs available for review by the Department during inspections or upon request.

6. The Supplier of Water shall establish written protocols for testing critical alarms, which protocols shall be periodically reviewed and updated as appropriate.

(15) Lead Reduction Act.

(a) Except as provided in 310 CMR 22.04(15)(b), no Person shall use any pipe, pipe fitting, plumbing fitting or fixture, any solder, or any flux; that is not Lead-free; in the installation or repair of any Public Water System or any plumbing in a residential or nonresidential facility providing water for human consumption.

(b) The prohibition set forth in 310 CMR 22.04(15)(a) shall not apply to the following:

1. pipes, pipe fittings, plumbing fittings or fixtures; including backflow preventers; that are used exclusively for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption; or

2. service saddles, or water distribution main gate valves that are two inches in diameter or larger; or

3. fire hydrants.

(c) All products required to be lead free shall be certified as being in compliance with NSF/ANSI 372 or Annex G of NSF/ANSI 61. Certification shall be made by an independent agency in accordance with the preceding standards. Self-certification by the manufacturer will not be accepted.

22.05: Maximum Microbiological Contaminant Levels, Monitoring Requirements and Analytical Methods

(1) Routine Coliform Monitoring.

(a) General Requirements. Each Supplier of Water shall collect total coliform samples at sites which are representative of water throughout the Distribution System, at the entry point to the Distribution System, and at storage facilities. All such samples shall be collected at the frequency applicable to total coliform sampling set forth in the coliform sampling plan for that Supplier of Water's Public Water System. Samples required to be collected at the entry point to the Distribution System, in accordance with an approved coliform sampling plan required by 310 CMR 22.05(1)(a)3., shall be collected in addition to the minimum number of samples required pursuant to 310 CMR 22.05(1)(b), as set forth in 310 CMR 22.05: *Table 1*. Samples required to be collected at storage facilities, in accordance with an approved coliform sampling plan required by 310 CMR 22.05(1)(a)3., shall be collected in addition to the minimum number of samples required pursuant to 310 CMR 22.05(1)(b), as set forth in 310 CMR 22.05: *Table 1*, unless otherwise provided in the coliform sampling plan. The Department may require additional routine monitoring samples to ensure adequate Distribution System representation.

1. Each Supplier of Water is required to maintain a Raw Water source sample tap at a location prior to any alteration or treatment of the source water unless otherwise specified by the Department in an approved coliform sampling plan.

a. A Supplier of Water shall collect a Raw Water source sample if the water at the entry point to the Distribution System is not representative of the source, or as otherwise specified in an approved coliform sampling plan required by 310 CMR 22.05(1)(a)3.

22.05: continued

b. If a Supplier of Water is required to collect a Raw Water sample under 310 CMR 22.05(1)(a)1.a., then it shall collect the sample monthly on the same day as any one of its required Distribution Samples.

c. A total coliform-positive Raw Water sample shall not trigger the requirements of 310 CMR 22.05(2).

d. In the event of a total coliform-positive Raw Water sample, the Supplier of Water shall comply with the applicable provisions of 310 CMR 22.26(3)(b) and other provisions of 310 CMR 22.26.

2. Community Water Systems and Non-community Non-transient Water Systems are required to install a chemical injection port for Emergency Disinfection. The injection port shall be located prior to the first customer and at a location which maximizes Disinfection contact time.

3. Coliform Sampling Plan. A Supplier of Water shall develop and implement a written coliform sampling plan that identifies sampling sites and a sample collection schedule that are representative of water throughout the Distribution System. These plans, including any revisions to these plans, are subject to Department review, revision and approval. The Supplier of Water shall ensure that an approved sampling plan continues to be representative of water throughout the Distribution System, including seeking Department approval for a sampling plan revision as necessary. Monitoring required by 310 CMR 22.05(1) and (2) may take place at a customer's premises, a Department approved dedicated sampling station, or other designated compliance sampling location. Routine and repeat sample sites and any Sampling Points necessary to meet the requirements of 310 CMR 22.05(1) and (2), and 22.26 must be reflected in the sampling plan.

a. A Supplier of Water shall collect samples at regular time intervals throughout the month, except that a Supplier of Water, whose Public Water System uses only groundwater and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sampling locations.

b. A Supplier of Water shall take at least the minimum number of required samples even if the Public Water System has had an *E. coli* MCL violation or has exceeded the coliform Treatment Technique triggers in 310 CMR 22.05(4)(a).

c. A Supplier of Water, subject to Department approval, may conduct more compliance monitoring than is required by 310 CMR 22.05(1) to investigate potential problems in the Distribution System and use monitoring as a tool to assist in uncovering problems. If a Supplier of Water takes more than the minimum number of required routine samples at the locations specified in the existing coliform sampling plan, then the Supplier of Water shall include those sampling results in calculating whether the coliform Treatment Technique trigger in 310 CMR 22.05(4)(a)1.a. or b. has been exceeded. If a Supplier of Water takes samples at locations not previously specified in the existing coliform sampling plan, and the Department determines that these locations are representative of water throughout the Distribution System, the Supplier of Water shall include those sampling results in calculating whether the coliform Treatment Technique trigger in 310 CMR 22.05(4)(a)1.a. or b. has been exceeded.

d. A Supplier of Water shall identify repeat monitoring locations in the coliform sampling plan. Unless a Supplier of Water has obtained the Department's approval pursuant to 310 CMR 22.05(1)(a)3.d.i. or ii., that Supplier of Water 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 Supplier of Water must still take all required repeat samples. The Supplier of Water, subject to Department approval, may propose an alternative sampling location in lieu of the requirement to collect at least one repeat sample upstream or downstream of the original sampling site in accordance with 310 CMR 22.05(1)(a)3.d.i. or ii. Except as provided for in 310 CMR 22.05(1)(a)3.d.ii., a Supplier of Water required to conduct triggered source water monitoring under 310 CMR 22.26 shall take groundwater source sample(s) in addition to repeat samples required under 310 CMR 22.05(1)(a)3.d.

22.05: continued

i. A Supplier of Water may propose repeat monitoring locations to the Department that the Supplier of Water believes to be representative of a pathway for contamination of the Distribution System. A Supplier of Water 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 coliform sampling plan. The Supplier of Water 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 in order to meet the requirements of 310 CMR 22.05(1)(a)3.

ii. Groundwater Public Water Systems serving 1,000 or fewer people may propose repeat sampling locations to the Department that differentiate potential source water and Distribution System contamination (*e.g.*, by sampling at entry points to the Distribution System). A groundwater Public Water System with a single well required to conduct triggered source water monitoring may, with written Department approval, take one of its repeat samples at the monitoring location required for triggered source water monitoring under 310 CMR 22.26(3)(a) if the Supplier of Water demonstrates to the Department's satisfaction that the coliform sampling plan remains representative of water quality in the Distribution System. If approved by the Department, the Supplier of Water may use that sample result to meet the monitoring requirements in both 310 CMR 22.05(1)(a)3. and 22.26(3)(a).

A. If a repeat sample taken at the monitoring location required for triggered source water monitoring is *E. coli*-positive, the Supplier of Water has violated the *E. coli* MCL and must also comply with 310 CMR 22.26(3)(a)4. If a Supplier of Water takes more than one repeat sample at the monitoring location required for triggered source water monitoring under 310 CMR 22.26, the Supplier of Water may reduce the number of additional source water samples required under 310 CMR 22.26(3)(a) by the number of repeat samples taken at that location that were not *E. coli*-positive.

B. If a Supplier of Water takes more than one repeat sample at the monitoring location required for triggered source water monitoring under 310 CMR 22.26(3)(a), and more than one repeat sample is *E. coli*-positive, the system has violated the *E. coli* MCL and must also comply with 310 CMR 22.26(4)(a)1.

C. If all repeat samples taken at the monitoring location required for triggered source water monitoring are *E. coli*-negative and a repeat sample taken at a monitoring location other than the one required for triggered source water monitoring is *E. coli*-positive, the system has violated the *E. coli* MCL, but is not required to comply with 310 CMR 22.26(3)(a)4.

e. The Department may review, revise, and approve, as appropriate, repeat sampling proposed by a Supplier of Water under 310 CMR 22.05(1)(a)3.d.i. or ii. The Supplier of Water shall demonstrate that the coliform sampling 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 groundwater Public Water Systems) is effective to differentiate between potential source water and Distribution System problems.

f. 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. Repeat samples taken pursuant to 310 CMR 22.05(2) are not considered special purpose samples, and must be used to determine whether the coliform Treatment Technique trigger has been exceeded.

(b) Coliform Monitoring Frequency. The minimum number of total coliform samples for Public Water Systems is based on the population served by the Public Water System according to 310 CMR 22.05: *Table 1*.

22.05: continued

310 CMR 22.05: *Table 1*
TOTAL COLIFORM MONITORING FREQUENCY
FOR PUBLIC WATER SYSTEMS

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

[1] Includes Public Water Systems which have at least 15 service connections, but serve fewer than 25 people.

22.05: continued

(c) Routine monitoring requirements for Community Water Systems serving 1,000 or fewer people using only groundwater.

1. Following any total coliform-positive sample taken under 310 CMR 22.05(1), Public Water Systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in 310 CMR 22.05(2).

2. Once all monitoring required by 310 CMR 22.05(1)(c) and (2) for a calendar month has been completed, Suppliers of Water must determine whether any coliform Treatment Technique triggers specified in 310 CMR 22.05(4)(a) have been exceeded. If any trigger has been exceeded, Suppliers of Water must complete assessments as required by 310 CMR 22.05(4)(b).

3. Monitoring Frequency for Total Coliforms. All Suppliers of Water described in 310 CMR 22.05(1)(c). shall monitor for total coliforms monthly. No such Supplier of Water shall be eligible for quarterly monitoring.

4. Each Public Water System shall be subject to a special monitoring evaluation by the Department during each Sanitary Survey to review the status of the Public Water System, including the Distribution System, and to determine whether the Public Water System is on an appropriate monitoring schedule. After the Department has performed the special monitoring evaluation during each Sanitary Survey, the Supplier of Water may be required by the Department to modify the Public Water System's monitoring schedule, as necessary, or it may allow the Public Water System to stay on its existing monitoring schedule, consistent with 310 CMR 22.05(1)(c).

(d) Routine monitoring requirements for Non-community Water Systems serving 1,000 or fewer people using only groundwater.

1. General.

a. 310 CMR 22.05(1)(d) shall apply to Non-community Water Systems using only groundwater (except Groundwater Under the Direct Influence of Surface Water, as defined in 310 CMR 22.02(1)) and serving 1,000 people or fewer.

b. Any Supplier of Water who takes a sample pursuant to 310 CMR 22.05(1)(d) that is total coliform-positive shall comply with the repeat monitoring requirements and *E. coli* analytical requirements set forth in 310 CMR 22.05(2).

c. Once a Supplier of Water completes all monitoring required by 310 CMR 22.05(1)(d) and (2) for a calendar month, the Supplier of Water shall determine whether any coliform Treatment Technique triggers specified in 310 CMR 22.05(4) have been exceeded. If any such trigger has been exceeded, the Supplier of Water shall complete assessments as required by 310 CMR 22.05(4).

d. A Supplier of Water for the purpose of determining eligibility for remaining on or qualifying for quarterly monitoring under 310 CMR 22.05(1)(d)4.a. and 5.d., respectively, for Transient Non-community Water Systems, may request, subject to approval from the Department, not to count monitoring violations under 310 CMR 22.05(11)(c)1. 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 Supplier of Water shall collect the make-up sample in a different week than the routine sample for that monitoring period and as soon as possible during the monitoring period. Provided, however, that no such Department approval not to count a monitoring violation shall affect a determination made under 310 CMR 22.05(11)(c)1. nor an obligation to report under 310 CMR 22.05(12)(a)4.

2. Monitoring Frequency for Total Coliforms. All Suppliers of Water described in 310 CMR 22.05(1)(d)1.a. shall monitor for total coliforms each calendar month that its Public Water System provides water to the public or as provided under 310 CMR 22.05(1)(d)3. through 5., or 7. Provided, however, a Seasonal System shall meet the monitoring requirements set forth in 310 CMR 22.05(1)(d)6.

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3. Special Monitoring Evaluation for Public Water Systems During Sanitary Survey. Each Public Water System shall be subject to a special monitoring evaluation by the Department during each Sanitary Survey to review the status of its compliance with 310 CMR 22.05(1)(a) and (b) and to determine whether it is on an appropriate monitoring schedule. After the Department has performed the special monitoring evaluation during each Sanitary Survey, the Supplier of Water may be required by the Department to modify its monitoring schedule, as necessary, or may be allowed to stay on its existing monitoring schedule, consistent with the requirements of 310 CMR 22.05. Provided, however, that no Supplier of Water shall be allowed to begin less frequent monitoring under the special monitoring evaluation unless its Public Water System has already met the applicable criteria for less frequent monitoring in 310 CMR 22.05(1)(d)4. For Seasonal Systems on quarterly monitoring, the special monitoring evaluation shall include review of the approved coliform sampling 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). Seasonal Systems shall collect compliance samples during these time periods.

4. Criteria for Quarterly Monitoring. Notwithstanding 310 CMR 22.05(1)(d)2., any Supplier of Water approved in writing by the Department for quarterly monitoring prior to April 1, 2016 may remain on quarterly monitoring unless the Department determines otherwise pursuant to 310 CMR 22.05(1)(d)3. and except as provided in 310 CMR 22.05(1)(d)5. A Supplier of Water may submit a written request to reduce the monitoring frequency for its Public Water System from monthly monitoring to quarterly monitoring, subject to the following requirements. The Supplier of Water must demonstrate, subject to the Department's written approval, that its Public Water System meets the criteria set forth in 310 CMR 22.05(1)(d)4.a. through f.

a. The Public Water System must have a Clean Compliance History for the preceding 12 months;

b. The Public Water System must be found to be free of Sanitary Defects based upon one or more of the following, which must have occurred during the preceding 12 months:

i. a Sanitary Survey;

ii. a site visit completed by the Department;

iii. a voluntary Level 2 Assessment by a Person approved by the Department.

c. The Public Water System is in compliance with 310 CMR 22.21(1)(b)3. through 5., (3)(b) and (4);

d. The Public Water System must be in compliance with the certified operator provisions under 310 CMR 22.11B;

e. The Public Water System is not required to disinfect for microbiological contaminants by the Department pursuant to 310 CMR 22.05; and

f. The Public Water System must be constructed in compliance with 310 CMR 22.04.

5. Increased monitoring requirements for Public Water Systems on quarterly monitoring. A Supplier of Water who operates a Public Water System on quarterly monitoring that experiences any of the events identified in 310 CMR 22.05(1)(d)5.a., through d. shall begin monthly monitoring the month following the event. The Supplier of Water shall continue monthly monitoring until approved to return to quarterly monitoring in accordance with 310 CMR 22.05(1)(d)4. A Public Water System on monthly monitoring for reasons other than those identified in 310 CMR 22.05(1)(d)5.a. through d. is not considered to be on increased monitoring for the purposes of 310 CMR 22.05(1)(d)4.

a. The Public Water System triggers a Level 2 assessment or two Level 1 assessments under 310 CMR 22.05(4) in a rolling 12-month period.

b. The Public Water System has an *E. coli* MCL violation.

c. The Public Water System has a coliform treatment technique violation.

d. The Public Water System has two monitoring violations under 310 CMR 22.05(11)(c) or one monitoring violation under 310 CMR 22.05(11)(c) and one Level 1 assessment under 310 CMR 22.05(4) in a rolling 12-month period.

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6. Seasonal Systems.

a. A Supplier of Water who owns or operates a Seasonal System shall demonstrate completion of a Department approved start-up procedure prior to serving water to the public each season, including start-up sampling, in accordance with the following requirements. A written start-up procedure signed by the Supplier of Water shall be submitted no less than seven days prior to serving water to the public each season, and shall be deemed approved unless the Department otherwise notifies the Supplier of Water prior to the date the Supplier of Water will begin serving water to the public, provided that the written start-up procedure includes all of the following elements:

i. notification to the Department and the Primary Operator of the date the Supplier of Water will begin serving water to the public;

ii. inspection of all Seasonal System components including source(s), treatment components, distribution lines and storage tanks;

iii. activation of source(s);

iv. flushing of the entire Distribution System;

v. collection of coliform samples in accordance with the Department-approved coliform sampling plan, including any additional samples representing the re-activated portions of the system;

vi. if the Seasonal System uses chlorination, a requirement that all chlorination equipment be installed and operational and chlorinated water be left in the Distribution System for at least 24 hours and then flushed prior to any coliform sample collection;

vii. a requirement that the Seasonal System disinfect and flush atmospheric storage tank(s) if applicable; and

viii. a requirement to re-install water meters, and re-install and test backflow preventers throughout the Distribution System, if applicable.

Completion of a start-up procedure shall be demonstrated by submitting a description of all start-up activities completed on a Department-approved form, signed by the Supplier of Water, to the Department no less than seven days prior to serving water to the public each season, which shall constitute the Supplier of Water's certification of the completion of the start-up procedure.

b. Monitoring Frequency for Total Coliforms. All Suppliers of Water who operate a Seasonal System described in 310 CMR 22.05(1)(d)1.a. shall monitor for total coliforms each calendar month that it is in operation unless it meets the criteria in 310 CMR 22.05(1)(d)6.b.i. through iii. to be eligible for monitoring less frequently than monthly, except as provided in 310 CMR 22.05(1)(d)3.

i. Seasonal Systems monitoring less frequently than monthly shall have an approved coliform sampling 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 shall collect compliance samples during this time period.

ii. To be eligible for quarterly monitoring, the Seasonal System shall meet the criteria in 310 CMR 22.05(1)(d)4.

c. The Supplier of Water may request, subject to approval from the Department, an exemption from some or all of the requirements for Seasonal Systems if the entire Distribution System remains pressurized during the entire period that the Seasonal System is not operating, except that a Seasonal System that monitors less frequently than monthly shall still monitor during the vulnerable period designated by the Department pursuant to the site-specific considerations identified in 310 CMR 22.05(1)(d)6.b.i.

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7. Additional Routine Monitoring the Month Following a Total Coliform-positive Sample. A Public Water System collecting samples on a quarterly frequency shall conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). A Public Water System shall collect at least three routine samples during the next month, except that the Supplier of Water may request, subject to approval from the Department a waiver of this requirement if the conditions of 310 CMR 22.05(1)(d)7.a., b., or c. are met. A Public Water System shall either collect samples at regular time intervals throughout the month or shall collect all required routine samples on a single day if samples are taken from different sites. A Public Water System shall use the results of additional routine samples in coliform Treatment Technique trigger calculations under 310 CMR 22.05(4)(a).

a. A Supplier of Water may request, subject to approval from the Department, a waiver of the requirement to collect three routine samples the next month in which the Public Water System provides water to the public if the Department, or an agent approved by the Department, performs a site visit before the end of the next month in which the Public Water System provides water to the public. Although a Sanitary Survey need not be performed, the site visit must be sufficiently detailed to allow the Department to determine whether additional routine monitoring and/or any corrective action is needed. An employee of the Public Water System cannot perform this site visit, even if the employee is an agent approved by the Department to perform Sanitary Surveys.

b. A Supplier of Water may request, subject to approval from the Department, a waiver of the requirement to collect three routine samples the next month in which its Public Water System provides water to the public, if, based upon appropriate submittals:

i. the Department has determined why the sample was total coliform-positive; and

ii. the Department has established that the Public Water System has corrected the problem or will correct the problem before the end of the next month in which the Public Water System serves water to the public.

The waiver shall be effective once the Supplier of Water has received written documentation from the Department of its decision describing the specific cause of the total coliform-positive sample and what action the Public Water System has taken and/or will take to correct this problem, a copy of which shall be made available to EPA and the public.

c. A Supplier of Water shall not receive a waiver of the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. A Suppler of Water may request, subject to approval from the Department, a waiver of the requirement for additional routine monitoring the next month if it demonstrates that the contamination problem was corrected before the Supplier of Water is scheduled to take the set of repeat samples required in 310 CMR 22.05(2), and all repeat samples were total coliform-negative.

(e) Routine Monitoring Requirements for Public Water Systems Serving More than 1,000 People.

1. 310 CMR 22.05(1)(e) shall apply to all Public Water Systems serving more than 1,000 people.

2. Following any total coliform-positive sample taken under the provisions of 310 CMR 22.05(1)(e), the Supplier of Water must comply with the repeat monitoring requirements and *E. coli* analytical requirements in 310 CMR 22.05(2).

3. Once all monitoring required by 310 CMR 22.05(1)(e) and (2) for a calendar month has been completed, the Supplier of Water must determine whether any coliform Treatment Technique triggers specified in 310 CMR 22.05(4) have been exceeded. If any trigger has been exceeded, the Supplier of Water must complete assessments as required by 310 CMR 22.05(4).

4. Monitoring Frequency for Total Coliforms. All Suppliers of Water described in 310 CMR 22.05(1)(e)1. shall monitor for total coliforms monthly, except as provided in 310 CMR 22.05(1)(e)7.

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5. Seasonal Systems.

a. A Supplier of Water who owns or operates a Seasonal System shall demonstrate completion of a Department approved start-up procedure prior to serving water to the public each season, including start-up sampling, in accordance with the following requirements. A written start-up procedure signed by the Supplier of Water shall be submitted no less than seven days prior to serving water to the public each season, and shall be deemed approved unless the Department otherwise notifies the Supplier of Water prior to the date the Supplier of Water will begin serving water to the public, provided that the written start-up procedure includes all of the following elements:

i. notification to the Department and the Primary Operator of the date the Supplier of Water will begin serving water to the public;

ii. inspection of all Seasonal System components including source(s), treatment components, distribution lines and storage tanks;

iii. activation of source(s);

iv. flushing of the entire Distribution System;

v. collection of coliform samples in accordance with the Department-approved coliform sampling plan, including any additional samples representing the re-activated portions of the system;

vi. if the Seasonal System uses chlorination, a requirement that all chlorination equipment be installed and operational and chlorinated water be left in the Distribution System for at least 24 hours and then flushed prior to any coliform sample collection;

vii. a requirement that the Seasonal System disinfect and flush atmospheric storage tank(s) if applicable; and

viii. a requirement to re-install water meters, and re-install and test backflow preventers throughout the Distribution System, if applicable.

Completion of a start-up procedure shall be demonstrated by submitting a description of all start-up activities completed on a Department-approved form, signed by the Supplier of Water, to the Department no less than seven days prior to serving water to the public each season, which shall constitute the Supplier of Water's certification of the completion of the start-up procedure.

b. A Supplier of Water who owns or operates a Seasonal System may request, subject to Department approval, an exemption from some or all of the requirements for Seasonal Systems if the entire Distribution System remains pressurized during the entire period that the system is not operating.

6. Unfiltered Surface Water or Groundwater under the Direct Influence of Surface Water. A Public Water System serving more than 1,000 people using Surface Water or Groundwater Under the Direct Influence of Surface Water which does not practice Filtration (in compliance with 310 CMR 22.20A, 22.20D, 22.20F, and 22.20G) 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 310 CMR 22.20A(5)(b)2., exceeds one NTU. When one or more Turbidity measurements in any day exceed one NTU, the Supplier of Water shall collect a coliform sample within 24 hours of the first exceedance, unless the Supplier of Water demonstrates to the Department's satisfaction that, for logistical reasons outside the Supplier of Water's control, it cannot have the sample analyzed within 30 hours of collection and that it has developed an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform Treatment Technique trigger in 310 CMR 22.05(4)(a) has been exceeded.

7. Reduced Monitoring. No Public Water Systems described in 310 CMR 22.05(1)(e) shall reduce monthly monitoring, except for Non-community Water System using only groundwater (and not Groundwater Under the Direct Influence of Surface Water) serving 1,000 or fewer people in some months and more than 1,000 people in other months. In months when more than 1,000 people are served, the Supplier of Water shall monitor at the frequency specified in 310 CMR 22.05(1)(e). In months when 1,000 or fewer people are served, the Supplier of Water may request, subject to approval from the Department, reducing the monitoring frequency to a frequency allowed under 310 CMR 22.05(1)(d) for a similarly situated Public Water System that always serves 1,000 or fewer people, taking into account the provisions in 310 CMR 22.05(1)(d)4. and 5.

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(f) Routine monitoring requirements for Surface Water or Groundwater under the Direct Influence of Surface Water Public Water Systems serving 1,000 or fewer people.

1. 310 CMR 22.05(1)(f) applies to Surface Water or Groundwater under the Direct Influence of Surface Water Public Water Systems serving 1,000 or fewer people.

2. Following any total coliform-positive sample taken under 310 CMR 22.05(1)(f)1., a Supplier of Water shall comply with the repeat monitoring requirements and *E. coli* analytical requirements in 310 CMR 22.05(2).

3. Once all monitoring required by 310 CMR 22.05(1)(f) and (2) for a calendar month has been completed, a Supplier of Water shall determine whether any coliform Treatment Technique triggers specified in 310 CMR 22.05(4) have been exceeded. If any trigger has been exceeded, a Supplier of Water shall complete assessments as required by 310 CMR 22.05(4).

4. Seasonal Systems.

a. All Seasonal Systems must demonstrate completion of a Department-approved start-up procedure, in accordance with 310 CMR 22.05(1)(d)6.a. and (e)3.a. which includes a requirement for start-up sampling prior to serving water to the public.

b. The Department may exempt any Seasonal System from some or all of the requirements for Seasonal Systems if the entire Distribution System remains pressurized during the entire period that the system is not operating.

5. Monitoring Frequency for Total Coliforms. All Suppliers of Water described in 310 CMR 22.05(1)(f)1. (including consecutive systems) shall monitor for total coliforms monthly. No such Supplier of Water shall be eligible for quarterly monitoring.

6. A Public Water System that uses Surface Water or Groundwater Under the Direct Influence of Surface Water, as defined in 310 CMR 22.02, that does not practice Filtration (in compliance with 310 CMR 22.20A, 22.20D, 22.20F, and 22.20G) 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 310 CMR 22.20A(5)(b)2., exceeds one NTU. This sample must be analyzed for the presence of total coliform. When one or more Turbidity measurements in any day exceeds one NTU, the Supplier of Water must collect this coliform sample within 24 hours of the first exceedance, unless the Department determines that the Supplier of Water, for logistical reasons outside the Supplier of Water '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 310 CMR 22.05(4)(a) has been exceeded.

(2) Repeat Monitoring and *E. coli* Requirements.

(a) Repeat Monitoring. If a sample taken under 310 CMR 22.05(1) is total coliform-positive, the Supplier of Water must collect a set of repeat samples within 24 hours of being notified of the positive result. A Supplier of Water must collect no fewer than three repeat samples for each total coliform-positive sample found. The Supplier of Water may request an extension of the 24-hour limit on a case-by-case basis, subject to Department approval. In order to obtain such approval, the Supplier of Water shall demonstrate a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. In the case of an extension, the Supplier of Water must collect the repeat samples within the amount of time specified by the Department. There shall be no waiver granted from the requirement for a Supplier of Water to collect repeat samples in 310 CMR 22.05(2)(a), (c) and (d).

(b) Unless the provisions of 310 CMR 22.05(1)(a)3.d.i. or ii. are met, the Supplier of Water 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 Supplier of Water must still take all required repeat samples, using an alternative sampling location approved by the Department in *lieu* of the requirement to collect at least one repeat sample upstream or downstream of the original sampling site. Except as provided for in 310 CMR 22.05(1)(a)3.d.ii., a Supplier of Water required to conduct triggered source water monitoring under 310 CMR 22.26(3)(a) must take groundwater source sample(s) in addition to repeat samples required under 310 CMR 22.05(2).

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(c) A Supplier of Water must collect all repeat samples on the same day, except that a Public Water System with a Single Service Connection, in accordance with a coliform sampling plan approved pursuant to 310 CMR 22.05(1)(a)3., may collect:

1. the required set of repeat samples over a three-day period; or
2. 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.

(d) If one or more repeat samples in the current set of repeat samples is total coliform-positive, the Supplier of Water must collect an additional set of repeat samples in the manner specified in 310 CMR 22.05(2)(a), (c) and (d). 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 310 CMR 22.05(2)(a). A Supplier of Water 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 Supplier of Water determines that a coliform Treatment Technique trigger in 310 CMR 22.05(4)(a) has been exceeded as a result of a repeat sample being total coliform-positive and notifies the Department in accordance with 310 CMR 22.05(4)(a). If a trigger identified in 310 CMR 22.05(4)(a) is exceeded as a result of a routine samples being total coliform-positive, a Supplier of Water is required to conduct only one round of repeat monitoring for each total coliform-positive routine sample.

(e) After a Supplier of Water 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 Supplier of Water may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(f) Results of all routine and repeat samples taken under 310 CMR 22.05(1) and 310 CMR 22.05(2) not invalidated by the Department must be used to determine whether a coliform Treatment Technique trigger specified in 310 CMR 22.05(4)(a) has been exceeded.

(g) *Escherichia coli (E. coli)* Testing.

1. If any routine or repeat sample is total coliform-positive, the Supplier of Water shall analyze that total coliform-positive culture medium to determine if *E. coli* are present. If *E. coli* are present the Supplier of Water must notify and consult with the Department as soon as possible but no later than the end of the day when the Supplier of Water learns of an *E. coli* MCL violation. If the Public Water System receives such notification outside of the Department's regular business hours, then it shall provide notification to the Department by calling the Department's Emergency notification telephone number and using any other electronic reporting tool designated by the Department, or other Department designated numbers.
2. A Supplier of Water may forgo *E. coli* testing on a total coliform-positive sample provided that the Supplier of Water assumes the total coliform-positive sample is *E. coli*-positive, in which case the provisions of 310 CMR 22.05(8)(a) shall apply for purposes of determining whether the Public Water System is in compliance with the MCL for *E. coli*. The Supplier of Water making such assumption shall notify the Department as specified in 310 CMR 22.05(2)(g)1.

(3) Invalidation of Total Coliform Samples. A total coliform-positive sample invalidated under 310 CMR 22.05(3) does not count towards meeting the minimum monitoring requirements of 310 CMR 22.05(1).

(a) A Supplier of Water may request that a total coliform-positive sample be invalidated, subject to Department approval. Any such request shall satisfy the conditions of 310 CMR 22.05(3)(a)1. through 3.

1. The laboratory establishes that improper sample analysis caused the total coliform-positive result.
2. The Supplier of Water demonstrates, on the basis of the results of repeat samples collected as required by 310 CMR 22.05(2)(a) through (d), that the total coliform-positive sample resulted from a domestic or other non-Distribution System plumbing problem. No sample shall be invalidated 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.*, no total coliform-positive sample shall be invalidated 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).

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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 Supplier of Water must still collect all repeat samples required under 310 CMR 22.05(2)(a) through (d), and use them to determine if a coliform Treatment Technique trigger in 310 CMR 22.05(4) has been exceeded. To invalidate a total coliform-positive sample under 310 CMR 22.05(3)(a)3., 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 must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the Supplier of Water 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 coliform 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 Supplier of Water 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 Supplier of Water 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) Coliform Treatment Technique Triggers and Assessment Requirements for Protection against Potential Fecal Contamination.

(a) Treatment Technique Triggers. A Supplier of Water shall conduct assessments in accordance with 310 CMR 22.05(4)(b) after exceeding any Treatment Technique trigger in 310 CMR 22.05(4)(a)1. or 2.; and shall notify the Department as soon as possible but no later than five calendar days after the collection date of the sample that triggered the assessment.

1. Level 1 Treatment Technique Triggers. Any of the following occurrences is a Level 1 Treatment Technique trigger:

a. for a Supplier of Water taking 40 or more samples per month, the Public Water System exceeds 5.0% total coliform-positive samples for the month;

b. for a Supplier of Water taking fewer than 40 samples per month, the Public Water System has two or more total coliform-positive samples in the same month; or

c. for each Supplier of Water, failure to take every required repeat sample after any single total coliform-positive sample.

2. Level 2 Treatment Technique Triggers. Any of the following occurrences is a Level 2 Treatment Technique trigger:

a. An *E. coli* MCL violation, as specified in 310 CMR 22.05(11); or

b. A second occurrence of a Level 1 trigger, as defined in 310 CMR 22.05(4)(a)1., 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 Supplier of Water has corrected the problem.

(b) Requirements for Assessments.

1. Parties responsible for performing assessments.

a. Level 1 Assessments. A Supplier of Water shall ensure that Level 1 Assessments are conducted in order to identify the possible presence of Sanitary Defects and defects in Distribution System coliform monitoring practices. Level 1 Assessments shall be conducted by the Supplier of Water unless notified in writing by the Department, within ten days of the Supplier of Water's Treatment Technique trigger notification to the Department pursuant to 310 CMR 22.05(4)(a) that the Department will conduct the assessment.

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b. Level 2 Assessments. A Supplier of Water shall ensure that Level 2 Assessments are conducted, by Department-approved parties, in order to identify the possible presence of Sanitary Defects and defects in Distribution System coliform monitoring practices; unless notified in writing, within ten days of the Supplier of Water's Treatment Technique trigger notification to the Department pursuant to 310 CMR 22.05(4)(a), that the Level 2 Assessment will be conducted by the Department.

c. All assessments shall be submitted in a Department-approved format.

2. When conducting assessments, Suppliers of Water must ensure that the assessor's evaluation includes review and identification of the following elements, at a minimum:

a. inadequacies in sample sites;

b. sampling protocol;

c. sample processing;

d. atypical events that could affect distributed water quality or indicate that distributed water quality was impaired;

e. changes in Distribution System maintenance and operation that could affect distributed water quality (including water storage);

f. source and treatment considerations that bear on distributed water quality, where appropriate (*e.g.*, small groundwater Public Water Systems); and

g. existing water quality monitoring data.

When conducting an assessment under 310 CMR 22.05(4) a Public Water System may integrate any other required assessment (*e.g.* an assessment under the Groundwater Rule) provided that the integrated assessment shall meet all applicable requirements of all such rules.

3. Level 1 Assessments. A Supplier of Water must conduct a Level 1 Assessment consistent with Department requirements if the Public Water System exceeds one of the Treatment Technique triggers in 310 CMR 22.05(4)(a)1.

a. The Supplier of Water must complete and submit to the Department a Level 1 Assessment as soon as practical after collecting the sample that triggered the assessment in 310 CMR 22.05(4)(a)1., but no later than 30 days after the collection date. In the completed assessment form, (which may include any relevant portions of a corrective action plan submitted under 310 CMR 22.26(4)), the Supplier of Water shall either:

i. describe any Sanitary Defects detected;

ii. describe all corrective actions completed;

iii. propose a timetable for any corrective actions not yet completed;

iv. describe any interim measures it plans to implement for the protection of human health prior to the completion of any corrective actions, including a timetable for doing so; or

v. state that no Sanitary Defects were identified.

b. The Supplier of Water, upon notification from the Department that the Level 1 Assessment is not sufficient (including any proposed timetable for any corrective actions not yet completed) shall consult with the Department regarding the assessment. Following such consultation, the Supplier of Water shall submit a revised assessment on a schedule approved by the Department not to exceed 30 days from the date of the consultation.

c. All Level 1 Assessments, including any revised Level 1 Assessments pursuant to 310 CMR 22.05(4)(b)3.b. shall be subject to the Department's review to determine whether the Supplier of Water has identified a likely cause for the Level 1 trigger and whether the Supplier of Water has corrected the problem, or has included a schedule acceptable to the Department including any Department-specified interim measures, for correcting the problem.

i. The Supplier of Water shall comply with any interim measures, including any specified schedule, specified by the Department for the protection of public health, pending Department approval of the corrective action plan, or the Supplier of Water's completion of the corrective action plan, or both.

ii. No Department-approved corrective action plan may be modified unless such modification is approved by the Department.

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4. Level 2 Assessments. A Supplier of Water must ensure that a Level 2 Assessment consistent with Department requirements is conducted if the Public Water System exceeds one of the Treatment Technique triggers in 310 CMR 22.05(4)(a)2. The Supplier of Water shall comply with any expedited actions or additional actions required by the Department in the case of an *E. coli* MCL violation.

a. Unless the Department notifies the Supplier of Water that the Department intends to conduct the Level 2 Assessment, the Supplier of Water must ensure that a Level 2 Assessment is completed by a party approved by the Department as soon as practical after any trigger in 310 CMR 22.05(4)(a)2. The Supplier of Water must submit a completed Level 2 Assessment form to the Department no later than 30 days after the collection date of the sample that triggered the assessment. The completed assessment form (which may include any relevant portions of a corrective action plan submitted under 310 CMR 22.26(4)) must either:

i. describe any Sanitary Defects detected;

ii. describe all corrective actions completed;

iii. propose a timetable for any corrective actions not yet completed;

iv. describe any interim measures planned for the protection of human health prior to the completion of any corrective actions, including a timetable for performing those interim measures; or

v. state that no Sanitary Defects were identified.

b. The Supplier of Water may conduct Level 2 Assessments if the Public Water System has staff or management with the certification or qualifications specified by the Department unless otherwise directed by the Department.

c. The Supplier of Water, upon notification from the Department that a Level 2 Assessment, the performance of which is ensured by the Supplier of Water, is not sufficient (including any proposed timetable for any corrective actions not yet completed) shall consult with the Department regarding the assessment. Following such consultation, the Supplier of Water shall submit a revised assessment on a schedule approved by the Department not to exceed 30 days from the date of the consultation.

d. Upon the Supplier of Water completing and submitting the assessment form, the Department will determine if the Supplier of Water has identified a likely cause for the Level 2 trigger and if so the Department will determine whether the Supplier of Water has corrected the problem, or has included a schedule acceptable to the Department for correcting the problem.

i. If the Department has specified 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, or both, the Supplier of Water shall comply with these interim measures, including any specified schedule.

ii. Any subsequent modifications to a Department-approved corrective action plan must also be approved by the Department.

(c) Corrective Action. Supplier of Water shall correct Sanitary Defects found through either Level 1 or Level 2 Assessments conducted under 310 CMR 22.05(4)(b). For corrections not completed by the time of submission of the assessment form, the Supplier of Water shall complete the corrective action(s) in compliance with a timetable approved by the Department in consultation with the Supplier of Water. The Supplier of Water shall notify the Department in writing when each scheduled corrective action is completed.

(d) Consultation. At any time during the assessment or corrective action phase, the Supplier of Water may request a consultation with the Department to determine the appropriate actions to be taken. In addition, the Supplier of Water shall consult with the Department upon written notification from the Department to do so. The Supplier of Water may consult with the Department on all relevant information that may impact its ability to comply with a requirements of 310 CMR 22.05(4), including the method of accomplishment, an appropriate timeframe, and other relevant information.

(5) Maximum Microbiological Contaminant Levels, Monitoring Requirements and Analytical Methods. (Reserved)

22.05: continued

(6) Analytical Methodology.

(a) The Standard Sample volume required for analysis, regardless of analytical method used, is 100 ml.

(b) Public Water Systems need only determine the presence or absence of total coliform and *E. coli*; a determination of density is not required.

(c) The time from sample collection to initiation of test medium incubation shall not exceed 30 hours. Suppliers of Water are encouraged but not required to hold samples below 10˚C during transit.

(d) If water having residual chlorine (measured as free, combined, or total chlorine) is to be analyzed, sufficient sodium thiosulfate ($Na_2S_2O_3$) 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 *Standard Methods for the Examination of Water and Wastewater*, 20th edition (1998) and 21st edition (2005), American Public Health Association, 800 I Street, NW., Washington, DC 20001.

(e) Public Water 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 described in 310 CMR 22.10.

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Organism	Methodology Category	Method[1]	Citation[1]
Total Coliforms	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	EPA Method 1604[2]
		m-ColiBlue24® Test[2,4]	
		Chromocult[2,4]	
	Enzyme Substrate Methods	Colilert®	Standard Methods 9223 B (20th ed.; 21st ed.)[2, 5]
		Colisure®	Standard Methods 9223 B (20th ed.; 21st ed.)[2, 5, 6]
		E*Colite® Test[2]	Standard Methods Online 9223 B-97[2, 5]
		Readycult® Test[2, 9] modified	
		Colitag® Test[2]	
Escherichia coli	*Escherichia coli* Partition Method . .	EC broth with MUG (EC-MUG)	Standard Methods 9222 G.1 c(2) (20th ed.; 21st ed.)[2, 8]
	Membrane Filtration Methods	NA-MUG medium	Standard Methods 9222 G.1c(1) (20th ed.; 21st ed.)[2]
	Enzyme Substrate Methods	Membrane Filtration using MI medium m-ColiBlue24® Test[2, 4]	EPA Method 1604[2]
		Chromocult[2, 4]	
		Colilert®	Standard Methods 9223 B (20th ed.; 21st ed.)[2, 5]
		Colisure®	Standard Methods Online 9223 B-97[2, 5, 6]
		E*Colite® Test[2]	Standard Methods 9223 B (20th ed.; 21st ed.)[2, 5, 6]
		Readycult® Test[2]	Standard Methods Online 9223 B-97[2, 5, 6]
		modified Colitag® Test[2]	

[1] The procedures must be done in accordance with the documents listed in 310 CMR 22.05(6)(g). 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 310 CMR 22.05(6)(g) 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] Incorporated by reference. *See* 310 CMR 22.05(6)(g).

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[3] Lactose broth, as commercially available, may be used in *lieu* of lauryl tryptose broth, if the Public Water 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%.
[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 310 CMR 22.00.
[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, KH2PO4, must be 1.5g, and 4-methylumbelliferyl-Beta-D-glucuronide must be 0.05 g.

(f) Laboratory Certification. Public Water Systems must have all compliance samples required under 310 CMR 22.05(1) and 310 CMR 22.05(2) analyzed by a laboratory certified by the Department or EPA to analyze drinking water samples. The laboratory used by the Public Water System must be certified for each method (and associated contaminant(s)) used for compliance monitoring analyses under 310 CMR 22.05(1) and 310 CMR 22.05(2).

(g) Incorporation by Reference. The following standards are incorporated by reference into 310 CMR 22.05.

1. American Public Health Association, 800 I Street, NW., Washington, DC 20001.
   a. *Standard Methods for the Examination of Water and Wastewater*, 20th edition (1998):
      i. Standard Methods 9222, *Membrane Filter Technique for Members of the Coliform Group*, B, *Standard Total Coliform Membrane Filter Procedure*.
      ii. Standard Methods 9222, *Membrane Filter Technique for Members of the Coliform Group*, C, *Delayed-Incubation Total Coliform Procedure*.
      iii. Standard Methods 9223, *Enzyme Substrate Coliform Test*, B, *Enzyme Substrate Test*, Colilert and Colisure.
      iv. 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)*.
      v. Standard Methods 9222, *Membrane Filter Technique for Members of the Coliform Group*, G.1.c(1), *Escherichia coli Partition Method: NA-MUG medium*.
   b. *Standard Methods for the Examination of Water and Wastewater*, 21st edition (2005):
      i. Standard Methods 9222, *Membrane Filter Technique for Members of the Coliform Group*, B, *Standard Total Coliform Membrane Filter Procedure*.
      ii. Standard Methods 9222, *Membrane Filter Technique for Members of the Coliform Group*, C, *Delayed-Incubation Total Coliform Procedure*.
      iii Standard Methods 9223, *Enzyme Substrate Coliform Test*, B, *Enzyme Substrate Test*, Colilert and Colisure.
      iv. 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)*.
      v. Standard Methods 9222, *Membrane Filter Technique for Members of the Coliform Group*, G.1.c(1), *Escherichia coli Partition Method: NA-MUG medium*.
   c. Standard Methods Online available at http://www.standardmethods.org.
      i. Standard Methods Online 9222, *Membrane Filter Technique for Members of the Coliform Group* (1997), B-97, *Standard Total Coliform Membrane Filter Procedure*.
      ii. Standard Methods Online 9222, *Membrane Filter Technique for Members of the Coliform Group* (1997), C-97, *Delayed-incubation Total Coliform Procedure*.
      iii. Standard Methods Online 9223, *Enzyme Substrate Coliform Test* (1997), B-97, *Enzyme Substrate Test*, Colilert and Colisure.

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2. Charm Sciences, Inc., 659 Andover Street, Lawrence, MA 01843-1032, telephone 1-800-343-2170: E*Colite - *Charm E*ColiteTM Presence/Absence Test for Detection and Identification of Coliform Bacteria and Escherichia coli in Drinking Water*, January 9, 1998.

3. CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA, 95403, telephone 1-800-878-7654: modified Colitag, ATP D05- 0035-*Modified ColitagTM Test Method for the Simultaneous Detection of E. coli and other Total Coliforms in Water*, August 28, 2009.

4. EMD Millipore (a division of Merck KGaA, Darmstadt Germany), 290 Concord Road, Billerica, MA 01821, telephone 1-800-645-5476:

a. 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.

b. 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.

5. EPA's Water Resource Center (MC-4100T), 1200 Pennsylvania Avenue NW., Washington, DC 20460, telephone 1-202-566-1729: 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.

6. Hach Company, P.O. Box 389, Loveland, CO 80539, telephone 1-800- 604-3493: m-ColiBlue24 - *Membrane Filtration Method m-ColiBlue24 Broth*, Revision 2, August 17, 1999.

(7) Maximum Microbiological Contaminant Levels, Monitoring Requirements and Analytical Methods. (Reserved)

(8) Maximum Contaminant Levels (MCLs) for Microbiological Contaminants.

(a) A Public Water System shall be considered to be in compliance with the MCL for *E. coli* for samples taken under 310 CMR 22.05, unless any of the conditions identified in 310 CMR 22.05(8)(a)1. through 4. occurs. For purposes of the public notification requirements in 310 CMR 22.16, the occurrence of any of the following conditions is a violation that may pose an acute risk to health:

1. the Public Water System has an *E. coli*-positive repeat sample following an associated total coliform-positive routine sample;

2. the Public Water System has a total coliform-positive repeat sample following an *E. coli*-positive routine sample;

3. the Supplier of Water fails to take all required repeat samples following an *E. coli*-positive routine sample; or

4. the Supplier of Water fails to test for *E. coli* when any repeat sample tests positive for total coliform.

(b) A Supplier of Water shall determine compliance with the MCL for *E. coli* in 310 CMR 22.05(8)(a) for each month in which it is required to monitor for total coliforms.

(c) As provided in 310 CMR 22.26(3)(a), a Supplier of Water who is in violation of 310 CMR 22.05(8)(a)1. due to an *E. coli*-positive repeat sample taken at the monitoring location required for triggered source water monitoring under 310 CMR 22.26(3)(a), is also subject to 310 CMR 22.26(3)(a)4.

(9) Best Available Technology, Treatment Techniques.

(a) The following have been determined to provide best available technology, treatment techniques or other means available for achieving compliance with the Maximum Contaminant Level for *E. coli* in 310 CMR 22.05(8)(a):

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;

22.05: continued

4. Filtration and/or disinfection of surface water, as described in 310 CMR 22.20A, 310 CMR 22.20D, 22.20F, and 22.20G or disinfection of ground water using strong oxidants such as chlorine, chlorine dioxide, or ozone; and

5. For Public Water Systems using groundwater, compliance with the Department's wellhead protection requirements under 310 CMR 22.21(1).

(b) The Department hereby identifies the technology, Treatment Techniques, or other means available identified in 310 CMR 22.05(9)(a)1. through 5. as affordable technology, Treatment Techniques, or other means available to Public Water Systems serving 10,000 or fewer people for achieving compliance with the Maximum Contaminant Level for *E. coli* in 310 CMR 22.05(8)(a).

(10) Maximum Microbiological Contaminant Levels, Monitoring Requirements and Analytical Methods. (Reserved)

(11) Violations.

(a) *E. coli* MCL Violation. A Supplier of Water at whose Public Water System any of the conditions identified in 310 CMR 22.05(8)(a)1. through 4. occurs is in violation of the MCL for *E. coli*.

(b) Treatment Technique Violation. Each of the following occurrences is a Treatment Technique violation:

1. when a Public Water System exceeds a Treatment Technique trigger specified in 310 CMR 22.05(4)(a)1.a. through c. or in 2.a. through b. and the Supplier of Water then fails to conduct the required assessment or corrective actions within the timeframe specified in 310 CMR 22.05(4)(b) and (c). A Supplier of Water that has failed to submit the required assessment form within the timeline specified in 310 CMR 22.05(4)(b)3.a. or 4.a. shall be deemed to have failed to conduct the assessment; or

2. when a Seasonal System fails to complete a Department-approved start-up procedure prior to serving water to the public. A Public Water System that has failed to submit a required start-up certification within the timeframe specified in 310 CMR 22.05(12)(a)5. shall be deemed to have failed to complete the start-up procedure.

(c) Monitoring Violations. Each of the following occurrences is monitoring violation:

1. failure to take every required routine or additional routine sample in a Compliance Period; or

2. failure to analyze for *E. coli* following a total coliform-positive routine sample is a monitoring violation.

(d) Reporting Violations. Each of the following occurrences is a reporting violation:

1. failure to submit a monitoring report or completed assessment form after a Public Water System properly conducts monitoring or assessment by the deadlines established in 310 CMR 22.15(2)(a) and (b), and 22.05(4)(b)3.a. and 4.a. respectively;

2. failure to notify the Department following an *E. coli*-positive sample as required by 310 CMR 22.05(12)(a)1.b. and by the deadline established in 310 CMR 22.05(2)(g);

3. failure to submit certification of completion of Department-approved start-up procedure by a Seasonal System by the deadline established in 310 CMR 22.05(1)(d)6.a. or (e)5.a.;

4. failure to notify the Department of a Treatment Technique trigger by the deadline established in 310 CMR 22.05(4)(a); or

5. failure to notify the Department of an *E. coli* MCL violation in accordance with 310 CMR 22.05(12)(a)1.a.

(12) Reporting and Recordkeeping.

(a) Reporting.

1. *E. coli*.

a. A Supplier of Water shall notify and consult with the Department as soon as possible but no later than the end of the day when the Supplier of Water learns of an *E. coli* MCL violation and shall notify the public in accordance with 310 CMR 22.16. If the Supplier of Water receives such notification outside of the Department's regular business hours, then it shall provide notification to the Department by calling the Department's Emergency notification telephone number and using any other electronic reporting tool designated by the Department, or other Department designated numbers.

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b. If *E. coli* are present in a routine sample, the Supplier of Water shall notify and consult with the Department on the same day as the Supplier of Water receives notification from the laboratory. If the Supplier of Water receives such notification outside of the Department's regular business hours, then the Supplier of Water shall on the same day call the Department's Emergency notification telephone number and use any other electronic reporting tool designated by the Department, or other Department designated numbers.

2. A Supplier of Water whose Public Water System has violated the Treatment Technique for coliforms in 310 CMR 22.05(4)(a) shall 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 310 CMR 22.16.

3. A Supplier of Water required to conduct an assessment under 310 CMR 22.05(4) shall submit the assessment report as soon as possible but not later than 30 days after the collection date of the sample that triggered the assessment, pursuant to 310 CMR 22.05(4)(b)3.a or 4.a.

The Supplier of Water shall notify the Department in accordance with 310 CMR 22.05(4)(c) when each scheduled corrective action is completed for corrections not completed by the time of submission of the assessment form.

4. A Supplier of Water who has failed to comply with a coliform monitoring requirement shall report the monitoring violation to the Department within ten days after the Supplier of Water discovers the violation and notify the public in accordance with 310 CMR 22.16.

5. At the beginning of each operating period, a Supplier of Water of a Seasonal System shall certify, prior to serving water to the public, that it has complied with the Department-approved start-up procedure in accordance with 310 CMR 22.05(1)(d)6.a. or (e)3.a.

6. A Supplier of Water shall notify the Department as soon as possible but no later than five days after the collection date of the sample that, in accordance with 310 CMR 22.05(4)(a)1. or 2., triggered an assessment.

(b) Recordkeeping.

1. The Supplier of Water shall 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 310 CMR 22.05(4), for Department review. This record shall be maintained by the Supplier of Water for a period not less than five years after completion of the assessment or corrective action.

2. The Supplier of Water shall 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 310 CMR 22.05(2)(a).

22.06: Inorganic Chemical Maximum Contaminant Levels, Monitoring Requirements and Analytical Methods

(1) Monitoring. A Supplier of Water shall collect samples of water as specified in 310 CMR 22.06(4) and provide for analysis of such samples for inorganic chemical contaminants listed in 310 CMR 22.06(2) consistent with the requirements set forth in 310 CMR 22.06(5) through (9) and methods set forth in 310 CMR 22.06(16).

All analytical results shall be rounded to the same number of significant figures as the applicable MCL or SMCL.

(2) Inorganic Maximum Contaminant Levels (MCLs). The Maximum Contaminant Levels for inorganic contaminants specified in 310 CMR 22.06(2)(b) through (g) and (k) through (q) apply to Community Water Systems and Non-transient Non-community Water Systems. The Maximum Contaminant Level specified in 310 CMR 22.06(2)(a) only applies to Community Water Systems. The Maximum Contaminant Levels specified in 310 CMR 22.06(2)(h) through (j) apply to Community, Non-transient Non-community, and Transient Non-community Water Systems. The Maximum Contaminant Level for arsenic is 0.05 milligrams per liter for Community Water Systems and Non-transient Non-community Water Systems until January 23, 2006.

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MAXIMUM CONTAMINANT LEVELS FOR INORGANIC CHEMICALS

Contaminant	MCL (mg/l)
(a) Fluoride (C)	4.0
(b) Asbestos (C, NTNC)	7 Million Fibers/liter (longer than 10 µm)
(c) Arsenic (C,NTNC)	0.010
(d) Barium (C,NTNC)	2
(e) Cadmium (C,NTNC)	0.005
(f) Chromium (C,NTNC)	0.1
(g) Mercury (C,NTNC)	0.002
(h) Nitrate (C,NTNC,TNC)	10 (as Nitrogen)
(i) Nitrite (C,NTNC,TNC)	1 (as Nitrogen)
(j) Total Nitrate & Nitrite (C,NTNC,TNC)	10 (as Nitrogen)
(k) Selenium (C,NTNC)	0.05
(l) Antimony (C,NTNC)	0.006
(m) Beryllium (C,NTNC)	0.004
(n) Cyanide (as free Cyanide) (C,NTNC)	0.2
(o) Nickel (C,NTNC)	[Reserved] (Under review)
(p) Thallium (C,NTNC)	0.002
(q) Perchlorate (C,NTNC)	0.0020[1]

C = Community Water Systems; NTNC = Non-transient Non-community Water Systems;
TNC = Transient Non-community Water Systems

[1] The Department will review and revise as necessary the perchlorate MCL within six years of its promulgation, taking into account new data on health effects, sources and occurrence, Treatment Techniques and associated issues, analytical feasibility and any other relevant information.

(3) Inorganic Chemicals (IOC). Sampling and Analytical Requirements: Community Water Systems and Non-transient Non-community Water Systems shall conduct monitoring to determine compliance with the Maximum Contaminant Levels specified in 310 CMR 22.06(2) in accordance with 310 CMR 22.06. Transient, Non-community Water Systems shall conduct monitoring to determine compliance with the MCLs for nitrate, nitrite and total nitrate in 310 CMR 22.06(2)(h) through (j) (as appropriate) in accordance with 310 CMR 22.06.

(4) Sampling Protocol. Monitoring shall be as follows:

(a) Ground Water Sampling Points. Groundwater systems shall take one sample at every entry point to the Distribution System which is representative of each well after treatment (Sampling Point) beginning in the Compliance Period starting January 1, 1993. 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.

(b) Surface Water Sampling Points. Surface water systems (Note: or purposes of 310 CMR 22.06(4)(b), Surface Water systems include systems with a combination of surface and ground sources) 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 (Sampling Point) beginning in the Compliance Period beginning January 1, 1993. 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.

(c) Multiple Sources. 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).

(d) Composite Sampling. The total number of samples which must be analyzed may be reduced by compositing samples. 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 1/5 of the MCL and none of the samples to be composited are representative of multiple sources. Compositing of samples must be approved by the Department and must be done in the laboratory. Compositing of source with previous detects is not allowed, unless otherwise authorized by the Department.

22.06: continued

1. If the concentration in the composite sample is greater than or equal to 1/5 of the MCL of any inorganic chemical, then a follow-up sample must be analyzed within 14 days from each Sampling Point included in the composite. These samples must be analyzed for the contaminants that exceeded 1/5 of the MCL in the composite sample. Detection limits for each analytical method and MCL are the following:

DETECTION LIMITS FOR INORGANIC CONTAMINANTS

Contaminant	MCL(mg/l)	Methodology	Detection Limit (mg/l)
Antimony	0.006	Atomic Absorption; furnace	0.003
			0.0008[5]
		ICP-Mass Spectrometry	0.0004
		Hydride-Atomic absorption	0.001
Arsenic	0.010[6]	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform-Stabilized Temperature	0.0005[7]
		Atomic Absorption; Gaseous Hydride	0.001
		ICP- Mass Spectrometry	0.0014[8]
Asbestos	7 MFL[1]	Transmission Electron Microscopy	0.2 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]
		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, 4]	0.05
		Distillation, Amenable, Spectrophotometric [4]	0.02
		UV, Distillation, Spectrophotometric[11]	0.0005
		Micro Distillation, Flow Injection, Spectrophotometric[3]	0.0006
		Ligand Exchange with Amperometry[4]	0.0005
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	Reserved		
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
		Capillary Ion Electrophoresis	0.076
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
		Capillary Ion Electrophoresis	0.103
Perchlorate	0.0020	Ion Chromatography[9]	0.0010[10]
		LC/MS or LC/MS/MS	
	0.0010		
		IC/MS or IC/MS/MS	0.0010
Selenium	0.05	Atomic Absorption; furnace	0.002
		Atomic Absorption: gaseous hydride	0.002
Sodium		*See* 310 CMR 22.06A	
Thallium	0.002	Atomic Absorption; furnace	0.001
		Atomic Absorption; platform	0.0007[5]
		ICP-Mass Spectrometry	0.0003

22.06: continued

[1] MFL = million fibers per liter >10 μm.

[2] Using a 2X preconcentration step as noted in Method 200.7. Lower MDLs may be achieved when using a 4X preconcentration.

[3] Screening methods for total cyanides.

[4] Measures "free" cyanides when distillation, digestion, or ligand exchange is omitted.

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

[6] The MCL 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 MDL determined for samples analyzed using direct analyses (*i.e.*, no sample digestion) will be higher. Using multiple deposition, 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.

[9] Analysis must be conducted using EPA Method 314.0, revision 1.0, November 1999 as modified to achieve the stated detection limit or EPA Method 314.1.

[10] Minimum Reporting Level (MRL). EPA Method 314.0 is capable of obtaining a MDL of less than 0.0010 mg/l.

[11] Measures total cyanides when UV-digestor is used, and "free" cyanides when UV-digestor is bypassed.

2. If the population served by the system is >3,300 persons, then compositing may only be permitted at Sampling Points within a single system. In systems serving <3,300 persons, compositing among different systems may be allowed with the approval of the Department, provided the five-sample limit is maintained.

3. If duplicates of the original sample 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 after completion of the composite analyses or before the holding time for the control sample is exceeded, whichever is sooner.

(e) Frequency Requirements for IOC Monitoring. The frequency of monitoring for asbestos shall be in accordance with 310 CMR 22.06(5); the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be in accordance with 310 CMR 22.06(6); the frequency of monitoring for nitrate shall be in accordance with 310 CMR 22.06(7); the frequency of monitoring for nitrite shall be in accordance with 310 CMR 22.06(8); and the frequency of monitoring for perchlorate shall be in accordance with 310 CMR 22.06(9).

(f) Consecutive System Monitoring. Public Water Systems that obtain water from another Public Water System are exempt from conducting compliance monitoring for the purchased portion of the system for the inorganic chemicals under 310 CMR 22.06, provided that the system from which the water is obtained has conducted the analyses required under 310 CMR 22.06, unless otherwise specified by the Department. These systems are not exempt from 310 CMR 22.06(5) asbestos sampling.

(5) Asbestos Sampling Frequency. The frequency of monitoring conducted to determine compliance with the Maximum Contaminant Level for asbestos specified in 310 CMR 22.06(2) shall be conducted as follows:

(a) Initial Sampling Frequency. 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 as specified in 310 CMR 22.06(5)(e) through (g).

(b) Sampling During Waiver. 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 for a waiver of the monitoring requirement in 310 CMR 22.06(5)(a). If the Department grants the waiver, the system will be required to monitor pursuant to 310 CMR 22.06(5)(d).

(c) Basis of an Asbestos Waiver. The granting of a waiver will be based on a consideration of the following factors:

1. Potential asbestos contamination of the water source; and

2. The use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.

22.06: continued

(d) Effect of an Asbestos Waiver. A waiver remains in effect until the completion of the three-year Compliance Period. Systems not receiving a waiver must monitor in accordance with the provisions of 310 CMR 22.06(5)(a).

(e) Distribution System Sampling Criteria for Asbestos. A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take at a minimum one sample at a tap approved by the Department. This tap location must be served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur. Additional sample locations (taps) may be required if in the Department's opinion the use of asbestos-cement is extensive and contamination is likely to occur in several areas of the system.

(f) Source Water Sampling Criteria for Asbestos. A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provisions of 310 CMR 22.06(2) and (4).

(g) Combined Asbestos Vulnerability. A system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall monitor in accordance with 310 CMR 22.06(5)(e) and (f).

(h) Exceeding the Asbestos MCL. A system which exceeds the Maximum Contaminant Levels as defined by 310 CMR 22.06(2) shall report to the Department within seven days and shall monitor quarterly beginning in the following quarter.

(i) Average Exceeding MCL. When the average of four analyses made pursuant to 310 CMR 22.06(5)(h), rounded to the same number of significant figures as the Maximum Contaminant Level for the substance in question, exceeds the Maximum Contaminant Level, the Supplier of Water shall report to the Department pursuant to 310 CMR 22.15 and give public notice to the public pursuant to 310 CMR 22.16. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the Maximum Contaminant Level has not been exceeded in two successive samples or until a monitoring schedule as condition to variance, exemption or enforcement action shall become effective.

(j) Asbestos Reliably & Consistently below the MCL. The quarterly monitoring requirement may be decreased to the frequency specified in 310 CMR 22.06(5)(a) provided the Department has determined that the system is reliably and consistently below the Maximum Contaminant Level and a groundwater system has taken a minimum of two quarterly samples and a surface (or combined surface/ground) water system has taken a minimum of four quarterly samples.

(k) Grandfathered Asbestos Data. If monitoring data collected after January 1, 1990 are generally consistent with the requirements of 310 CMR 22.06(5), the data may be used with the Department's approval, to satisfy the monitoring requirement for the Initial Compliance Period beginning January 1, 1993.

(6) Sampling Frequency for IOCs. The frequency of monitoring conducted to determine compliance with the Maximum Contaminant Levels in 310 CMR 22.06(2) for antimony, arsenic, beryllium, barium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be as follows:

(a) IOCs Sampling Frequency. Groundwater systems shall take one sample at each Sampling Point once every three years. Surface Water systems (or combined surface/ground) shall take one sample annually at each Sampling Point.

(b) IOCs Sampling Waiver. The system may apply to the Department for a waiver from the monitoring frequencies specified in 310 CMR 22.06(6)(a).

(c) IOC Sampling During a Waiver. 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).

(d) Basis of an IOC Waiver & Grandfathered Data. A waiver may be granted by the Department provided the Surface Water systems have monitored annually for at least three years and groundwater systems have conducted a minimum of three rounds of monitoring. (Analytical monitoring results must have been representative of all sources at the time of sampling.) 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.

22.06: continued

(e) Basis of the IOC Sampling Frequency During a Waiver. The granting of a waiver by the Department will be based on the following:

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.

(f) Effect of an IOC Waiver. A Supplier of Water must have received a written approval from the Department which 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 System shall specify the basis for its request. The Department may revise its determination of the appropriate monitoring frequency, if the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.

(g) Exceeding an IOC MCL. Systems which exceed a Maximum Contaminant Levels as defined by 310 CMR 22.06(2) shall report to the Department within seven days and shall monitor quarterly beginning in the following quarter.

(h) Average Exceeding MCL. When the average of four analyses made pursuant to 310 CMR 22.06(6)(g), rounded to the same number of significant figures as the Maximum Contaminant Level for the substance in question, exceeds the Maximum Contaminant Level, the Supplier of Water shall report to the Department pursuant to 310 CMR 22.15 and give public notice to the public pursuant to 310 CMR 22.16. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the Maximum Contaminant Level has not been exceeded in two successive samples or until a monitoring schedule as condition to variance, exemption or enforcement action shall become effective.

(i) IOCs Reliably & Consistently below the MCL. If the system is reliably and consistently below the Maximum Contaminant Level, the quarterly monitoring requirement may be decreased with the Department's approval to the frequencies specified in 310 CMR 22.06(6)(a). Systems requesting this decrease must have taken at a minimum two quarterly samples for a groundwater system and four quarterly samples for a Surface Water system.

(j) All new Public Water Systems or systems that use a New Source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time as 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 in 310 CMR 22.06(6).

(7) Sampling Frequency for Nitrate. All Public Water Systems (Community, Non-transient Non-community, and Transient Non-community Water Systems) shall monitor to determine compliance with the Maximum Contaminant Level for nitrate specified in 310 CMR 22.06(2).

(a) Initial Nitrate Sampling. Community and Non-transient Non-community Water Systems served by groundwater source shall monitor annually beginning January 1, 1993; systems served by Surface Water shall monitor quarterly beginning January 1, 1993.

(b) Transient Non-community Nitrate Sampling Frequency. Each Transient Non-community Water System shall monitor annually beginning January 1, 1993.

(c) Ground Water Repeat Nitrate Sampling Frequency. For all Public Water Systems: the repeat monitoring frequency for groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is >50% the MCL. A groundwater system may reduce the sampling frequency to annually with the Department's approval, after four consecutive quarterly samples are reliably and consistently less than the MCL.

(d) Surface Water Repeat Nitrate Sampling Frequency. All Public Water Systems with Surface Water Sources may reduce the sampling frequency to annually with the Department's approval, if all analytical results from four consecutive quarters are <50% of the MCL. A Surface Water system shall return to quarterly monitoring if any one sample is ≥ 50% of the MCL.

(e) Scheduling Annual Nitrate Repeat Samples. After the initial round of quarterly sampling is completed, all Public Water Systems which are monitoring quarterly because the concentration of any one sample was >50% of the MCL shall take subsequent annual samples during the quarter(s) which previously resulted in the highest analytical result.

22.06: continued

(8) Sampling Frequency for Nitrite. All Public Water Systems (Community, Non-transient Non-community, and Transient Non-community Water Systems) shall monitor to determine compliance with the Maximum Contaminant Level for nitrite in 310 CMR 22.06(2).

(a) Initial Nitrite Sampling. All Public Water Systems shall take one sample at each Sampling Point in the Compliance Period beginning January 1, 1993 and ending December 31, 1995.

(b) Under the Nitrite Trigger Level. After the initial sample, systems where an analytical result for nitrite is <50% of the MCL shall monitor at the frequency specified by the Department.

(c) Above the Nitrite Trigger Level. 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 >50% of the MCL. With the Department's approval, a system may reduce the sampling frequency to annually if the system is reliably and consistently less than the MCL.

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

(9) Sampling Frequency for Perchlorate.

(a) Initial Monitoring. Community and Non-transient Non-community systems shall complete initial monitoring for perchlorate as specified in 310 CMR 22.06(9)(a).

1. Effective January 1, 2007, for systems served by groundwater, perchlorate shall be monitored twice, once during the month of April and once during the month of September.
2. Effective January 1, 2007, for systems served by surface water, perchlorate shall be monitored for four consecutive quarters.

(b) Grandfathered Perchlorate Data. If the perchlorate monitoring data collected by a Public Water System after January 1, 2004 is consistent with the requirements of 310 CMR 22.06(9), such data may be used with the Department's approval to satisfy the initial monitoring requirements specified in 310 CMR 22.06(9)(a).

(c) Exceeding the Perchlorate MCL. A Public Water System that exceeds the Maximum Contaminant Level (MCL) for perchlorate in 310 CMR 22.06(2) shall follow the reporting and confirmation procedures in 310 CMR 22.06(10)(c).

(d) Repeat Perchlorate Sampling Frequency. If, after completing the initial monitoring required in 310 CMR 22.06(9)(a), no perchlorate is detected, a Public Water System may thereafter reduce the sampling frequency to once per year.

(e) Exceeding the Perchlorate Trigger Level. The repeat monitoring frequency for any Public Water System shall be on a quarterly basis for at least one year following any one sample in which the concentration is > 0.0010 mg/L (unqualified). With the Department's approval, a system may reduce the sampling frequency to once per year, provided the monitoring for perchlorate done by the system is Reliably and Consistently below the MCL.

(f) Eligibility for a Waiver. A Public Water System may apply for a waiver from the monitoring requirements for perchlorate specified in 310 CMR 22.06(9) in accordance with the IOC waiver provisions in 310 CMR 22.06(6)(b) through (f).

(g) The Department may, on a case-by-case basis, require a Public Water System to monitor for perchlorate more frequently than otherwise provided in 310 CMR 22.06(9)(b) through (f).

(10) Confirmation Sampling.

(a) Deadline for IOCs Confirmation Samples. Where the results of sampling for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, or thallium indicate an exceedance of the Maximum Contaminant Level, one additional 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.

22.06: continued

(b) Deadline for Nitrate & Nitrite Confirmation Samples. 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 and shall report to the Department within seven days. Systems unable to comply with the 24-hour sampling requirement must immediately notify the consumers served by the area served by the Public Water System in accordance with 310 CMR 22.16. Systems exercising this option must take and analyze a confirmation sample within two weeks of notification of the analytical results of the first sample.

(c) Deadline for Perchlorate Confirmation Samples. Whenever the perchlorate sampling results indicate an exceedance of the Maximum Contaminant Level, the system shall take a confirmation sample using EPA Method 331.0 or EPA Method 332.0 in accordance with 310 CMR 22.06(10)(c)1. and 2. within 24 hours of the system's receipt of written notification of the analytical results. For the purposes of 310 CMR 22.06(10)(c), written notification of the analytical results means notification by email, fax, or letter. The system shall report the initial sample result that exceeded the MCL to the Department within seven days. Systems that are unable to take a confirmation sample within 24 hours of the system's receipt of written notification of the analytical results, shall immediately contact the Department for further direction. When taking a confirmation sample as required by 310 CMR 22.06(10)(c):

1. The system shall obtain an analysis and written notification turnaround time for the confirmation sample of no more than three days.
2. The system shall report the confirmation sample results to the Department within three days of the system's receipt of the written notification of the analytical results.

(d) Compliance Calculations & Confirmation Samples. 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 310 CMR 22.06(13). Obvious sampling errors may be deleted with the approval of the Department.

(11) Increased Sampling Frequency. The Department may require more frequent monitoring than specified in 310 CMR 22.06(5) through (9) or may require confirmation samples for positive and negative results at its discretion.

(12) PWS Request for Increased Sampling Frequency. Systems may apply to the Department to conduct more frequent monitoring than the minimum monitoring frequencies specified in 310 CMR 22.06.

(13) Compliance Calculations. Compliance with the Maximum Contaminant Levels set out in 310 CMR 22.06(2) 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.

(a) Sampling Frequencies Greater than Annual. For systems monitoring more than once per year, compliance with the MCL, with the exception of nitrate, nitrite and perchlorate, is determined by a Running Annual Average at each Sampling Point.

(b) Sampling Frequencies of Annual or Less. Each Supplier of Water monitoring annually or less frequently whose sample result exceeds an MCL, with the exception of nitrate, nitrite and perchlorate, must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

(c) 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.

(d) If a Supplier of Water fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

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

(f) Compliance Calculations for Nitrate & Nitrite. 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 level of nitrate or nitrite exceeds the MCL in the initial sample, a confirmation sample is required in accordance with 310 CMR 22.06(10)(b) and (d), and compliance shall be determined based on the average of the initial and confirmation samples.

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(g) Compliance Calculations for Perchlorate. Compliance with the Maximum Contaminant Level for perchlorate is determined based on one sample if the level is below the MCL. If the level of perchlorate exceeds the MCL in the initial sample a confirmation sample is required in accordance with 310 CMR 22.06(10)(c) and (d), and compliance shall be determined based on the average of the initial and the confirmation sample. The Department may allow or require additional sampling.

(h) Average Exceeding Nitrate, Nitrite and Perchlorate MCL. When the average of analyses made pursuant to 310 CMR 22.06(7) through (9), (10)(b) and (c), rounded to the same number of significant figures as the Maximum Contaminant Level for the substance in question, exceeds the Maximum Contaminant Level, the Supplier of Water shall report to the Department pursuant to 310 CMR 22.15 and give public notice pursuant to 310 CMR 22.16. Monitoring after public notification shall be at a frequency designated by the Department.

(i) Arsenic sampling results shall be reported to the nearest 0.001 mg/l.

(14) Sampling Schedules: Each Public Water System shall monitor at the time designated by the Department during each Compliance Period.

(15) Reporting MCL Violation: A system which exceeds the MCL listed in 310 CMR 22.06(2) and is out of compliance shall report the exceedance to the Department within seven days.

(16) Analytical and Sampling Methods for Inorganics:

(a) Analytical Methods for IOCs: Analysis for the listed inorganic contaminants shall be conducted using the following methods:

INORGANIC CONTAMINANTS ANALYTICAL METHODS
Reference (Method Number)

Contaminant	Methodology[11]	EPA	ASTM[3]	SM[4]	SM Online[23]	Other
Antimony	Atomic Absorption: Furnace			3113B	3113 B-99	
	Atomic Absorption: platform	[2]200.9				
	ICP-Mass Spectrometry	[2]200.8				
	Hydride-Atomic Absorption		D-3697-92, 02			
Arsenic[12]	Atomic Absorption: Furnace		D2972-97C, 03C	3113B	3113 B-99	
	Atomic Absorption; Hydride		D-2972-97, 03B	3114B	3114 B-97	
	Inductively Coupled Plasma[13]	[2]200.7		3120B[5]	3120 B-99	
	ICP-Mass Spectrometry	[2]200.8				
	Atomic Absorption; Platform	[2]200.9				
	Differential Pulse Anodic Stripping Voltametry					Method 1001[16]
Asbestos	Transmission Electron Microscopy	[9]100.1				
	Transmission Electron Microscopy	[10]100.2				
Barium	Atomic Absorption; Furnace			3113B	3113B-99	
	Atomic Absorption; Direct			3111D	3111D-99	
	Inductively Coupled Plasma	[2]200.7		3120B	3120B-99	
	ICP-Mass Spectrometry	[2]200.8				
Beryllium	Atomic Absorption; Furnace		D3645-97, 03B	3113B	3113B-99	
	Atomic Absorption; Platform	[2]200.9				
	Inductively Coupled Plasma	[2]200.7		3120B	3120B-99	
	ICP-Mass Spectrometry	[2]200.8				

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Contaminant	Methodology[11]	EPA	ASTM[3]	SM[4]	SM Online[23]	Other
Cadmium	Atomic absorption; Furnace			3113B	3113B-99	
	Inductively-coupled Plasma	[2]200.7				
	ICP-Mass Spectrometry	[2]200.8				
	Atomic Absorption; Platform	[2]200.9				
Chromium	Atomic absorption; Furnace			3113B	3113B-99	
	Inductively Coupled Plasma	[2]200.7		3120B	3120B-99	
	ICP-Mass Spectrometry	[2]200.8				
	Atomic Absorption; Platform	[2]200.9				
Cyanide	Manual Distillation		D2036-98A	4500-CN^-C		
	Manual Distillation followed by: Spectrophotometric, Amenable		D2036-98B	4500-C^-NG	4500-CN^-G-99	
	Manual Distillation followed by Spectrophotometric, Manual		D2036-98A	4500-CN^-E	4500-CN^-E-99	I-3300-85[5]
	Spectrophotometric, Semi-automated	[6]335.4				
	Selective Electrode			4500-CN^-F	4500-CN^-F-99	
	UV, Distillation, Spectrophotmetric Micro Distillation, Flow Injection Spectrophotometric					Kelada-01[18] QuikChem10-204-00-1-X[19]
	Ligand Exchange and Amperometry[22]	D6888-04			OIA-1677-DW[21]	
Mercury	Manual cold vapor	[2]245.1	D3223-97,02	3112B	3112B-99	
	Automated cold vapor	[1]245.2				
	ICP-Mass Spectrometry	[2]200.8				
Nickel	Atomic Absorption: Furnace			3113B	3113B-99	
	Atomic Absorption: Platform	[2]200.9				
	Atomic Absorption Direct			3111B	3113B-99	
	Inductively Coupled Plasma	[2]200.7		3120B	3120-99	
	ICP-Mass Spectrometry	[2]200.8				
Nitrate	Manual cadmium reduction		D3867-90B	4500-NO_3^-E	4500-NO_3^-E-00	
	Automated cadmium reduction	[6]353.2	D3867-90A	4500-NO_3^-F	4500-NO_3^-F-00	
	Ion selective electrode			4500-NO_3^-D	4500-NO_3^-D-0	601[7]
	Ion chromatography	[6]300.0	D4327-97,03	4110B	4110B-00	B-1011[8]
		[20]300.1				
	Capillary Ion Electrophoresis					D6508-00, Rev.2[24]
Nitrite	Spectrophotometric			4500-NO_2^-B	4500- NO_2^-B-00	
	Automated cadmium reduction	[6]353.2	D3867-90A	4500-NO_3^-F	4500-NO_3^-F-00	
	Manual cadmium reduction		D3867-90B	4500-NO_3^-E	4500-NO_3^-E-00	
	Ion chromatography	[6]300.0	D4327-97,03	4110B	4110B-00	B-1011[8]
		[20]300.1				
	Capillary Ion Electrophoresis					D6508-00, Rev.2[24]
Perchlorate	Ion chromatography	[14]314.0				
		[15]314.1				
	LC/MS or LC/MS/MS	[16]331				
	IC/MS or IC/MS/MS	[17]332				
Selenium	Hydride-Atomic absorption;		D3859-98,03A	3114B	3114B-97	
	Atomic Absorption: Furnace		D3859-98,03B	3113B	3113B-99	
	ICP-Mass Spectrometry	[2]200.8				
	Atomic Absorption; Platform	[2]200.9				
Thallium	Atomic absorption; Platform	[2]200.9				
	ICP-Mass Spectrometry	[2]200.8				

22.06: continued

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1-11 and 15 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 regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 900-426-4791. 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 Capital Street, NW., Suite 700, Washington, DC.

[1] *Methods of 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, PB 95-125472.

[3] Annual Book of ASTM Standards, 1994 , 1996, or 1999 Vols. 11.01 and 11.02, American Society for Testing and Materials. The previous versions of D1688-95A, D1688-95C (copper), D3559-95D (lead), D1293-95 (pH), D1125-95A, (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, Vols. 11.01. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

[4] 18th, 19th, and 20th edition of *Standard Methods for the Examination of Water and Wastewater*, 18th (1982), 19th (1995), and 20th (1998) editions, American Public Health Association; either edition may be used. Copies may be obtained from the 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 3111B, 3111D, 3113B and 3114B 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 Inorganic and Organic Constituents in Water and Fluvial Sediments*, 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 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, *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.

[9] Method 100.1, *Analytical Methods for Determination of Asbestos Fibers in Water*, EPA/600/4-83/043, September 1983, Available at NTIS, PB83-206471.

[10] Method 100.2, *Determination of Asbestos Structures Over 10 μm in Length in Drinking Water*, EPA/600/R-94/134, June 1994. Available at NTIS, PB94-201902.

[11] 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 3120B 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 3113B; and lead by Method D3559-90D unless multiple infurnace depositions are made.

[12] If ultrasonic nebulization is used in the determination of arsenic by Method 200.8 the arsenic must be in the pentavalent state to provide uniform signal response. For direct analysis of arsenic with the Method 200.8 using ultrasonic nebulization, samples and standards must contain 1 mg/L of sodium hypochlorite.

[13] [Deleted].

[14] Revision 1.0, November, 1999, *Determination of Perchlorate in Drinking Water Using Ion Chromatography* as modified to achieve performance requirements in 310 CMR 22.06(4).

[15] EPA Method 314.1: *Determination of Perchlorate in Drinking Water Using Inline Column Concentration/Matrix Elimination Ion Chromatography with Suppressed Conductivity Detection*.

[16] EPA Method 331.0: *Determination of Perchlorate in Drinking Water by Liquid Chromatography Electrospray Ionization Mass Spectrometry*.

22.06: continued

[17] EPA Method 332.0: *Determination of Perchlorate in Drinking Water Using Ion Chromatography with Suppressed Conductivity and Electrospray Ionization Mass Spectrometry*.

[18] 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-B-01-009 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. Similarity, modified flow cell configurations and flow conditions may be used in the method, provided that the QC acceptance criteria are met.

[19] 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.

[20] *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.

[21] 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 OL Analytical, P.O. Box 9010, College Station, TX 77842-9010.

[22] 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 interference is present, and treat samples accordingly.

[23] Standard Methods Online are available at http://www.standardmethods.org. The year in which each method was approved by the Standards 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.

[24] Method D6508, Rev.2, *Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte*.

(b) Analytical Methods for Fluoride: Analyses for fluoride shall be conducted using the following methods:

	Reference (Method Number)				
Methodology	EPA	ASTM[1]	SM[2]	SM Online[8]	Other
Ion Chromatography	300.05	D4327-97	4110B	4110B-00-	
Manual Distillation; Colorimetric SPADNS	300.16		4500F-B,D	4500F-B,D-97	
Manual Electrode		D1179-93,99B	4500F-C	4500F-C-97	
Automated Alizarin fluorine blue - lanthanum with distillation (complexone)			4500F-E		129-71W[3]
Automated ion selective electrode					380-75WE[4]
Capillary Ion Electrophoresis					D6508, Rev. 2[7]

[1] Annual Book of ASTM Standards, part 31 Water. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[2] *Standard Methods for the Examination of Water and Wastewater*, 18th, 19th, and 20th edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1992, 1995, and 1998.

[3] *Fluoride in Water and Wastewater, Industrial Method # 129-71W*. Technicon Industrial Systems. December 1972. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.

[4] *Fluoride in Water and Wastewater*, Technicon Industrial Systems. February 1976. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.

[5] *Methods for the Determination of Inorganic Substances in Environmental Samples*, EPA-600/R-93/100, August 1993. Available at NTIS, PB94-120821.

[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.

22.06: continued

[7] Method 6508, Rev.2, *Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoreses and Chromate Electrolyte*, available from Waters Corp., 34 Maple St., Milford, MA 01757, Telephone: 508/482-2131, Fax: 508/482-3625.

[8] 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.

(c) Sample Collection Methods for IOCs: Sample collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, perchlorate, selenium and thallium under 310 CMR 22.06 shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the table below:

Contaminant	Preservative[1]	Container[2]	Time[3]
Antimony	Con HNO_3 to pH<2	P or G	six months
Arsenic	Con HNO_3 to pH<2	P or G	six months
Asbestos	Cool, 4°C	P or G	48 hours
Barium	Con HNO_3 to pH<2	P or G	six months
Beryllium	Con HNO_3 to pH<2	P or G	six months
Cadmium	Con HNO_3 to pH<2	P or G	six months
Chromium	Con HNO_3 to pH<2	P or G	six months
Cyanide	Cool,4°C, NAOH to pH>12[4]	P or G	14 days
Fluoride	None	P or G	one month
Mercury	Con HNO_3 to pH<2	P or G	28 days
Nickel	Conc HNO_3	P or G	six months
Nitrate			
Chlorinated	Cool, 4°C	P or G	14 days
Chlorinated	Con H_2SO_4 to pH<2	P or G	28 days
Non-chlorinated	Cool 4°C	P or G	48 hours
Non-chlorinated	Con H_2SO_4 to pH<2	P or G	28 days
Nitrite	Cool, 4°C	P or G	48 hours
Perchlorate	None	P or G	28 days
Selenium	Con HNO_3 to pH<2	P or G	six months
Thallium	Con HNO_3 to pH<2	P or G	six months

[1] For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time of 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 analyses is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instruction in Section 8.3 of EPA methods 200.78 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 the method.

[4] See method(s) for the information for preservation.

22.06: continued

(17) BATs for IOCs: The following are the best technology, Treatment Technique, or other means available for achieving compliance with the Maximum Contaminant Level for inorganic contaminants identified in 310 CMR 22.06(2) except fluoride:

BAT FOR INORGANIC CONTAMINANTS LISTED IN 310 CMR 22.06(2)

CHEMICAL NAME	BAT(s)
Antimony	2,7
Arsenic	1, 2, 5, 6, 7, 9, 12[5]
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Cadmium	2, 5, 6, 7
Chromium	2, 5, 6[2], 7
Cyanide	5, 7, 13
Mercury	2[1], 4, 6[1], 7[1]
Nickel	5, 6, 7
Nitrate	5, 7, 9
Nitrite	5, 7
Perchlorate	5
Selenium	1, 2[3], 6, 7, 9
Thallium	1, 5

Key to BATs in Table
1 = Activated Alumina
2 = Coagulation/Filtration (Not BAT for Systems <500 service connections)
3 = Direct and Diatomite Filtration
4 = Granular Activated Carbon
5 = Ion Exchange
6 = Lime Softening (not BAT for systems <500 service connections)
7 = Reverse Osmosis
8 = Corrosion Control
9 = Electrodialysis
10 = Chlorine
11 = Ultraviolet
12 = Oxidation/Filtration
13 = Alkaline Chlorination

1
2 BAT only if influent Hg concentrations ≤10 µg/l.
BAT for Chromium III only
3 BAT for Selenium IV only
4
5 BAT for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.
To obtain high removals; iron to arsenic ratio must be at least 20.1.

(18) The Administrator, pursuant to the Safe Drinking Water Act, Title 14, § 1412, hereby identifies in the following table the affordable technology, Treatment Technique, or other means available to systems serving 10,000 persons or fewer for achieving compliance with the Maximum Contaminant Level for arsenic:

22.06: continued

SMALL SYSTEM COMPLIANCE TECHNOLOGIES (SSCTS)[1] FOR ARSENIC[2]

Small System Compliance Technology	Affordable for Listed Small System Categories[3]
Activated Alumina (centralized)	All size categories.
Activated Alumina (Point-of-Use)[4]	All size categories.
Coagulation/Filtration[5]	501–3,300, 3,301–10,000.
Coagulation-assisted Microfiltration	501–3,300, 3,301–10,000.
Electrodialysis reversal[6]	501–3,300, 3,301–10,000.
Enhanced Coagulation/Filtration	All size categories.
Enhanced lime softening (pH> 10.5)	All size categories.
Ion Exchange	All size categories.
Lime Softening[5]	501–3,300, 3,301–10,000.
Oxidation/Filtration[7]	All size categories.
Reverse Osmosis (centralized)[6]	501–3,300, 3,301–10,000.
Reverse Osmosis (Point-of-Use)[4]	All size categories.

1 Section 1412(b)(4)(E)(ii) of SDWA specifies that SSCTs must be affordable and technically feasible for small systems.

2 SSCTs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

3 The SDWA (*ibid.*) specifies three categories of small systems: (i) those serving 25 or more, but fewer than 501, (ii) those serving more than 500, but fewer than 3,301, and (iii) those serving more than 3,300, but fewer than 10,001.

4 When POU or POE devices are used for compliance, programs to ensure proper long-term operation, maintenance, and monitoring must be provided by the water system to ensure adequate performance.

5 Unlikely to be installed solely for arsenic removal. May require pH adjustment to optimal range if high removals are needed.

6 Technologies reject a large volume of water—may not be appropriate for areas where water quantity may be an issue.

7 To obtain high removals, iron to arsenic ratio must be at least 20:1.

22.06A: Special Monitoring for Sodium, Reporting and Analytical Methods and Frequency

(1) Monitoring. All public water systems (community, non-transient non-community and transient non-community) shall monitor for the determination of sodium concentration levels.

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

(a) GW Sampling Frequency. Groundwater systems shall take one sample at each sampling point during each compliance period beginning in the compliance period starting January 1, 1993, (once every three years).

(b) SW Sampling Frequency. Surface water systems (or combined surface/ground) shall take one sample annually at each sampling point beginning January 1, 1993.

(3) Sampling Protocol. Monitoring shall be conducted as follows:

(a) Ground Water Sampling Points. 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 (sampling point) beginning in the compliance period starting January 1, 1993. 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.

(b) Surface Water Sampling Points. Surface water systems (Note: For purposes of 310 CMR 22.06A(3)(b), surface water systems include systems with a combination of surface and ground sources.) 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 (sampling point) beginning in the compliance period beginning January 1, 1993. 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.

22.06A: continued

(c) Multiple Sources. 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).

(4) Sodium Reporting. The supplier of water shall report to the Department the results of the analyses for sodium within the first ten days of the month following the month in which the sample results were received or within the first ten days following the end of the required monitoring period, whichever comes first.

(5) Sodium Notification. The supplier of water shall report the level of sodium for each source to the local Boards of Health and Massachusetts Department of Public Health by written notice by direct mail within 30 days after the supplier of water first learns of the analytic results which indicate a level of sodium.

(6) Sampling Schedules. Each public water system shall monitor at the time designated by the Department during each compliance period.

(7) Sodium Analysis Analytical Methods. Analysis for sodium shall be conducted using the following method:

SODIUM ANALYTICAL METHODS

		Reference (Method Number)	
Contaminant	Methodology[4]	EPA[1]	SM[2]
Sodium	Inductively-coupled Plasma	200.7	--
	Atomic absorption; direct aspiration	--	3111B

[1] *Methods for the Determination of Metals in Environmental Samples - Supplement I"*, EPA-600/r-94/111, May 1994. Available at NTIS, PB-95-125472.

[2] *Standard Methods for the Examination of Water and Wastewater*", 18th and 19th edition, American Public Health Association, 1992 and 1995, only - not the 20th edition.

[3] For approved analytical procedures for metals, the technique applicable to total metals must be used.

[4] 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.

22.06B: Control of Lead and Copper in Drinking Water

(1) General Requirements.

(a) Applicability. The requirements of 310 CMR 22.06B constitute the Massachusetts drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of 310 CMR 22.06B applies to community water systems and non-transient, non-community water systems ("water systems" or "systems").

(b) Scope. 310 CMR 22.06B establishes a treatment technique for lead and copper that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These requirements are triggered, in some cases, by lead and copper action levels measured in samples collected at consumers' taps.

(c) Lead and Copper Action Levels:

1. The lead action level is exceeded if the concentration of lead in more than 10% of tap water samples collected during any monitoring period conducted in accordance with 310 CMR 22.06B(7) 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% of tap water samples collected during any monitoring period conducted in accordance with 310 CMR 22.06B(7) is greater than 1.3 mg/L (*i.e.*, if the "90th percentile" copper level is greater than 1.3 mg/L).

22.06B: continued

3. The 90th percentile lead and copper levels shall be computed as follows:
   a. 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 one 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.
   b. The number of samples taken during the monitoring period shall be multiplied by 0.9.
   c. The contaminant concentration in the numbered sample yielded by the calculation in 310 CMR 22.06B(1)(c)3.b. is the 90th percentile contaminant level.
   d. For water systems serving fewer than 100 people that collect five samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.
   e. For a public water system that has been allowed by the Department to collect fewer than five samples in accordance with 310 CMR 22.06B(7)(c), the sample result with the highest concentration is considered the 90th percentile value.
   f. If unapproved sample sites are submitted with lead and copper results, they shall be included in the computation of the 90th percentile.

(d) Corrosion Control Treatment Requirements.
1. All water systems shall install and operate optimal corrosion control treatment as defined in 310 CMR 22.02.
2. Any water system that complies with the applicable corrosion control treatment requirements specified by the Department under 310 CMR 22.06B(2) and (3) shall be deemed in compliance with the treatment requirement contained in 310 CMR 22.06B(1)(d)1.

(e) Source Water Treatment Requirements. Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the Department under 310 CMR 22.06B(4).

(f) Lead Service Line Replacement Requirements. 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 contained in 310 CMR 22.06B(5).

(g) Public Education Requirements. Pursuant to 310 CMR 22.06B(6), all water systems shall provide a consumer notice of lead and copper tap water monitoring results to the persons served at the sites (taps) that are tested. Any system exceeding the lead action level shall implement the public education requirements.

(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 analyses of the monitoring results under 310 CMR 22.06B(1) shall be completed in compliance with 310 CMR 22.06B(7) through (10).

(i) Reporting Requirements. Systems shall report to the Department any information required by the treatment provisions of 310 CMR 22.06B(1) and 310 CMR 22.06B(11).

(j) Recordkeeping Requirements. Systems shall maintain records in accordance with 310 CMR 22.06B(12).

(k) Violation of National Primary Drinking Water Regulations. Failure to comply with the applicable requirements of 310 CMR 22.06B(1) through (12), including requirements established by the Department pursuant to 310 CMR 22.00 shall constitute a violation of the national primary drinking water regulations for lead and/or copper.

(2) Applicability of corrosion control treatment steps to small, medium-size and large water systems.

(a) Systems shall complete the applicable corrosion control treatment requirements described in 310 CMR 22.06B(3) by the deadlines established in 310 CMR 22.06B.

1. A large system (serving >50,000 persons) shall complete the corrosion control treatment steps specified in 310 CMR 22.06B(2)(d), unless it is deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)2. or (b)3.

22.06B: continued

2. A small system (serving ≤3300 persons) and a medium size system (serving >3,300 and ≤50,000 persons) shall complete the corrosion control treatment steps specified in 310 CMR 22.06B(2)(e), unless it is deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)1., 2., or 3.

(b) A system is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in 310 CMR 22.06B if the system satisfies one of the criteria specified in 310 CMR 22.06(2)(b)1. through 3. Any such system deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b), 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 that optimal corrosion control 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 310 CMR 22.06B(7).

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 310 CMR 22.06B. 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 310 CMR 22.06B(3)(f). Water systems deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)2. shall operate in compliance with Department-designated optimal water quality control parameters in accordance with 310 CMR 22.06B(3)(g) and continue to conduct lead and copper tap and water quality parameter sampling in accordance with 310 CMR 22.06B(7)(d)3. and 310 CMR 22.06B(8)(d), respectively. A system shall provide the Department with the following information in order to support a determination under 310 CMR 22.06B(2)(b)2.:

a. the results of all test samples collected for each of the water quality parameters in 310 CMR 22.06B(3)(c)3.

b. a report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in 310 CMR 22.06B(3)(c)1., the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment;

c. 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; and

d. the results of tap water samples collected in accordance with 310 CMR 22.06B(7) 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 310 CMR 22.06B(7) and source water monitoring conducted in accordance with 310 CMR 22.06B(9) that demonstrates for two consecutive six-month monitoring periods that the difference between the 90^{th} percentile tap water lead level computed under 310 CMR 22.06B(1)(c)3. and the highest source water lead concentration, is less than the Practical Quantitation Level (PQL) for lead specified in 310 CMR 22.06B(10)(a)1.b.

a. Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)3.a. if the 90^{th} percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two consecutive six-month monitoring periods.

b. Any water system deemed to have optimized corrosion control in accordance with 310 CMR 22.06B(2)(b)3.b. 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 310 CMR 22.06B(7)(c) and collecting the samples at times and locations specified in 310 CMR 22.06B(7)(d)4.d. Any such system that has not conducted a round of monitoring pursuant to 310 CMR 22.06(B)(7)(d) since September 30, 1997, shall complete a round of monitoring pursuant to 310 CMR 22.06B(2)(b)3.b. no later than September 30, 2000.

22.06B: continued

c. Any water system deemed to have optimized corrosion control pursuant to 310 CMR 22.06B(2)(b)3.c. shall notify the Department in writing pursuant to 310 CMR 22.06(B)(11)(a)3. of any upcoming long-term change in treatment or the addition of a new source as described in 310 CMR 22.06B(11)(a)3. 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 any such system to conduct 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.

d. As of July 12, 2001, a system is not deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)3.d., and shall install corrosion control treatment pursuant to 310 CMR 22.06B(2)(b)3.e. unless it meets the copper action level.

e. Any system triggered into corrosion control because it is no longer deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)3.e. shall implement corrosion control treatment in accordance with the deadlines in 310 CMR 22.06B(2)(e). Any such large system shall adhere to the schedule specified in 310 CMR 22.06B(2)(e) 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 310 CMR 22.06B(2)(b)3.e.

(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 310 CMR 22.06B(7) 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 (or the Department, as the case may be) 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 310 CMR 22.06B. The Department shall notify the system in writing of such a determination and explain the basis for its decision. The requirement for any small or medium size system to implement corrosion control treatment steps in accordance with 310 CMR 22.06(B)(2)(e) (including systems deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)l.) is triggered whenever any small-or medium-sized system exceeds the lead or copper action level.

(d) Treatment Steps and Deadlines for Large Systems. Except as provided in 310 CMR 22.06B(2)(b)2. and 3., large systems shall complete the following corrosion control treatment steps (described in the referenced portions of 310 CMR 22.06B(3), (7), and (8)) by the indicated dates.

1. Step 1: The system shall conduct initial monitoring as specified in 310 CMR 22.06B(7)(d)1. and (8)(b) during two consecutive six-month monitoring periods by January 1, 1993.

2. Step 2: The system shall complete corrosion control studies (310 CMR 22.06B(3)(c)) by July 1, 1994.

3. Step 3: The Department shall designate optimal corrosion control treatment (310 CMR 22.06B(3)(d)) by January 1, 1995.

4. Step 4: The system shall install optimal corrosion control treatment (310 CMR 22.06B(3)(e)) by January 1, 1997.

5. Step 5: The system shall complete follow-up sampling (310 CMR 22.06B(7)(d)2. and (8)(c)) by January 1, 1998.

6. Step 6: The Department shall review installation of treatment and designate optimal water quality control parameters (310 CMR 22.06B(3)(f)) by July 1, 1998.

7. Step 7: The system shall operate in compliance with the Department-specified optimal water quality control parameters (310 CMR 22.06B(3)(g)) and continue to conduct tap sampling (310 CMR 22.06B(7)(d)3. and (8)(d)).

22.06B: continued

(e) Treatment Steps and Deadlines for Small and Medium-size Systems. Except as provided in 310 CMR 22.06B(2)(b), small and medium-size systems shall complete the following corrosion control treatment steps (described in the referenced portions of 310 CMR 22.06B(3), (7) and (8)) by the indicated time periods.

1. Step 1: The system shall conduct initial tap sampling (310 CMR 22.06B(7)(d)1. and 310 CMR 22.06B(8)(b)) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under 310 CMR 22.06B(7)(d)4. A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (310 CMR 22.06B(3)(a)) within six months after the end of the monitoring period during which it exceeds one of the action levels.

2. Step 2: Within 12 months after the end of a monitoring period during which a system exceeds the lead or copper action level, the Department may require the system to perform corrosion control studies (310 CMR 22.06B(3)(b)). If the Department does not require the system to perform such studies, the Department shall specify optimal corrosion control treatment (310 CMR 22.06B(3)(d)) within the following timeframes:

a. 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;

b. 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 (310 CMR 22.06B(3)(c)) 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 control treatment (310 CMR 22.06B(3)(d)) within six months after completion of step 3.

5. Step 5: The system shall install optimal corrosion control treatment (310 CMR 22.06B(3)(e)) within 24 months after the Department designates such treatment.

6. Step 6: The system shall complete follow-up sampling (310 CMR 22.06B(7)(d)2. and 310 CMR 22.06B(8)(c)) 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 (310 CMR 22.06B(3)(f)) within six months after completion of step 6.

8. Step 8: The system shall operate in compliance with the Department-designated optimal water quality control parameters (310 CMR 22.06B(3)(g)) and continue to conduct tap sampling (310 CMR 22.06B(7)(d)3. and (8)(d)).

(3) Description of Corrosion Control Treatment Requirements. Each system shall complete the corrosion control treatment requirements described in 310 CMR 22.06B(3)(a) through (h) which are applicable to such system under 310 CMR 22.06B(2).

(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 310 CMR 22.06B(3)(c)1. 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 310 CMR 22.06B(8)(b) to assist the Department in reviewing the system's recommendation.

(b) Department Decision to Require Studies of Corrosion Control Treatment (Applicable to Small and Medium-size Systems). The Department may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under 310 CMR 22.06B(2)(c) 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:

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a. alkalinity and pH adjustment;
b. calcium hardness adjustment; and
c. 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 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 310 CMR 22.06B(3)(c)3. before and after evaluating the corrosion control treatments listed in 310 CMR 22.06(B)(3)(c)1. through c.:

a. lead;
b. copper;
c. pH;
d. alkalinity;
e. calcium;
f. conductivity;
g. orthophosphate (when an inhibitor containing a phosphate compound is used);
h. silicate (when an inhibitor containing a silicate compound is used);
i. water temperature.

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:

a. 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
b. data and 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 310 CMR 22.06B(3)(c)1. through 5.

(d) Department Designation of Optimal Corrosion Control Treatment.

1. Based upon consideration of available information including, where applicable, studies performed under 310 CMR 22.06B(3)(c) 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 310 CMR 22.06B(3)(c)1. When designating optimal treatment the Department shall consider the effects that additional corrosion control treatment may 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 310 CMR 22.06B(3)(d).

(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 determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the Department in 310 CMR 22.06B(3)(d). 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:

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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 above 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 optimum corrosion control treatment, including maintaining water quality control parameters at or above minimum values or within ranges designated by the Department under 310 CMR 22.06B(3)(f), in accordance with 310 CMR 22.06B(3)(g) for all samples collected under 310 CMR 22.06B(8)(d) through (f). Compliance with the requirements of 310 CMR 22.06B(3)(g) shall be determined every six months, as specified under 310 CMR 22.06B(8)(d). A water system is out of compliance with the requirements of 310 CMR 22.06B(3)(g) for a six-month period if it has excursions for any Department-specified parameter for more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality control 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.

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.
2. On the 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 was measured at the sample site. To minimize the number of days counted as excursions, a system should take a confirmation sample as soon as possible when a daily value is below the minimum value or outside the range designated by the Department. The Department has the discretion to delete results of obvious sampling errors from this calculation.

(h) Modification of Department Treatment Decisions. Upon its own initiative or in response to a reasonable request by a water system or other interested party, the Department may modify its determination of the optimal corrosion control treatment under 310 CMR 22.06B(3)(d) or optimal water quality control parameters under 310 CMR 22.06B(3)(d)(f). 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.

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(4) Source Water Treatment Requirements. Systems shall complete the applicable source water monitoring and treatment requirements (described in the referenced portions of 310 CMR 22.06B(3)(b), (7) and (9)) 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 (310 CMR 22.06B(9)(b)) and make a treatment recommendation to the Department (310 CMR 22.06B(4)(b)1.) no 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 (310 CMR 22.06B(4)(b)2.) within six 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 (310 CMR 22.06B(4)(b)3.) within 24 months after completion of Step 2.

4. Step 4: The system shall complete follow-up tap water monitoring (310 CMR 22.06B(7)(d)2.) and source water monitoring (310 CMR 22.06B(9)(c)) 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 (310 CMR 22.06B(4)(b)4.) within six months after completion of Step 4.

6. Step 6: The system shall operate in compliance with the Department-specified maximum permissible lead and copper source water levels (310 CMR 22.06B(4)(b)4.) and continue source water monitoring (310 CMR 22.06B(9)(d)).

(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 310 CMR 22.06B(4)(b)2. 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 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 310 CMR 22.06B(4)(b)2.

4. Department Review of Source Water Treatment and Specification of Maximum Permissible Source Water Levels. The Department shall review the source water sample analysis 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 source water lead and copper levels below 0.005 mg/L and 0.65 mg/L respectively at each sampling point monitored in accordance with 310 CMR 22.06B(9). The system is out of compliance with 310 CMR 22.06B(9) if the level of lead or copper at any source water sampling point is greater than 0.005 mg/L for lead or 0.65 mg/L for copper.

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6. Modification of Department Treatment Decisions. Upon its own initiative or in response to a request by a water system or other interested party, the Department may modify its determination of the source water treatment under 310 CMR 22.06B(4)(b)2., or maximum permissible lead and copper concentrations for finished water entering the distribution system under 310 CMR 22.06B(4)(b)4. 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 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.

(5) Lead Service Line Replacement Requirements.

(a) Systems that fail to meet the lead action level in tap samples taken pursuant to 310 CMR 22.06B(7)(d)2., after installing corrosion control and/or source water treatment (whichever sampling occurs later), shall replace lead service lines in accordance with the requirements of 310 CMR 22.06B(5). Such systems shall submit a lead service line replacement plan to the Department for approval within 60 days of the end of the monitoring period unless otherwise approved by the Department. If a system is in violation of 310 CMR 22.06B(2) or (4) for failure to install source water or corrosion control treatment, the Department may require the system to commence lead service line replacement under 310 CMR 22.06B(5) after the date by which the system was required to conduct monitoring under 310 CMR 22.06B(7)(d)2. has passed.

(b) 1. A water system shall replace annually at least 7% 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 310 CMR 22.06B(7)(a) 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 tap sampling referenced in 310 CMR 22.06B(5)(a). If monitoring is required annually or less frequently, the end of the monitoring period is September 30th 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 in 310 CMR 22.06B(5)(f) must do the following:

a. 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 310 CMR 22.06B(5)(c).

b. 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% 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).

c. 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.

(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 310 CMR 22.06B(7)(b)3. is less than or equal to 0.015 mg/L.

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(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 310 CMR 22.06B(7)(b)3., 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 310 CMR 22.06B(5)(d)1. to the residents of individual dwellings by mail or by 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 310 CMR 22.06B(5), taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The Department shall make this determination in writing and notify the system of its finding within six months after the system is triggered into lead service line replacement based on monitoring referenced in 310 CMR 22.06B(5)(a).

(f) Any system may cease replacing lead service lines whenever first draw samples collected pursuant to 310 CMR 22.06B(7)(d)3. meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the Department. If first draw samples collected in any such water system thereafter exceeds the lead action level, the system shall recommence replacing lead service lines, pursuant to 310 CMR 22.06B(5)(b)2.

(g) To demonstrate compliance with 310 CMR 22.06B(5)(a) through (d), a system shall report to the Department the information specified in 310 CMR 22.06B(11)(e).

(6) Public Education and Supplemental Monitoring Requirements. All water systems must deliver a consumer notice of lead and copper tap water monitoring results to persons served by the water system at sites that are tested, as specified in 310 CMR 22.06B(6)(c). A water system that exceeds the lead action level based on tap water samples collected in accordance with 310 CMR 22.06B(7) shall deliver the public education materials contained in 310 CMR 22.06B(6)(a) in accordance with the requirements in 310 CMR 22.06B(6)(b). Water systems that exceed the lead and/or copper action level must sample the tap water of any customer who requests it in accordance with 310 CMR 22.06B(6)(c). 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.

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(a) Content of Written Public Education Materials.

1. Community Water System 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 in 310 CMR 22.06(B)(a)1.a. through f. In addition, language in 310 CMR 22.06B(6)(a)1.a. through b. and (a)1.f. must be included in the materials, exactly as written, except for the text in brackets in 310 CMR 22.06B(6)(a)1.a., b. and f. 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 310 CMR 22.06(B)(a)1.a. through f. 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. Unless otherwise approved, the Department shall require the system to obtain approval of the content of written public materials prior to delivery.

a. 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.

b. 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.

c. 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).

d. 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 exposure to lead in drinking water, such as alternative sources or treatment of water.

(v) Suggest that parents have their child's blood tested for lead.

e. 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/building in this area.

f. 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 310 CMR 22.06B (6)(a)1., community water systems must:

a. Tell consumers how to get their water tested.

b. Discuss lead in plumbing components and the difference between low lead and lead free.

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(b) Delivery of 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 310 CMR 22.06B(7), and that is not already conducting public education tasks under 310 CMR 22.06B(6)(b), must conduct the public education tasks under 310 CMR 22.06B(6) within 60 days after the end of the monitoring period in which the exceedance occurred:

a Deliver printed materials meeting the content requirements of 310 CMR 22.06B(6)(a) to all bill paying customers.

b. (i) Contact customers who are most at risk by delivering education materials that meet the content requirements of 310 CMR 22.06B(6)(a) 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 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 310 CMR 22.06B(6)(a) to all organizations on the provided lists.

(ii) Contact customers who are most at risk by delivering materials that meet the content requirements of 310 CMR 22.06B(6)(a) to the following organizations listed in A through F 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:

A. Public and private schools or school boards;
B. Women, Infants and children (WIC) and Head Start programs;
C. Public and private hospitals and medical clinics;
D. Pediatricians;
E. Family Planning clinics;
F. 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 310 CMR 22.06B(6)(a) 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 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.

A. Licensed childcare centers;
B. Public and private preschools;
C. Obstetricians-Gynecologists and Midwives.

c. 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 or visit [INSERT NAME OF YOUR WATER SYSTEM OR 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.

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d. Post material meeting the content requirements of 310 CMR 22.06B(6)(a) on the water system's Web site if the system serves a population greater than 100,000.

e. Submit a press release to newspaper, television and radio stations.

f. In addition to the requirements of 310 CMR 22.06B(6)(b)2.a. through e., systems must implement at least three activities from one or more categories listed in 310 CMR 22.06B(6)(b)2.f.(i) through (iv). 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 Information Display.

(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.

(iv) Other Methods approved by the Department.

g. For systems that are required to conduct monitoring annually or less frequently the end of the monitoring period is September 30th 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 310 CMR 22.06B(6)(b)2. as described in 310 CMR 22.06B(6)(b)3.a. through d.

a. A community water system shall repeat tasks contained in 310 CMR 22.06B(6)(b)2.a., b., and d. every 12 months.

b. A community water system shall repeat tasks contained in 310 CMR 22.06B(6)(b)2.c. with each billing cycle.

c. A community water system serving a population greater than 100,000 shall post and retain material on a publicly accessible Web site pursuant to 310 CMR 22.06B(6)b)2.d.

d. The community water system shall repeat the task in 310CMR 22.06B(6)(b)2.e. twice every 12 months on a schedule agreed upon with the Department. The Department can allow activities in 310 CMR 22.06B(6)(b)2.e. twice every 12 months on a schedule agreed upon with the Department. The Department can allow activities in 310 CMR 22.06B(6)(b)2.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.

4. Within 60 days after the end of the monitoring period in which the exceedance occurred, a non-transient non-community water system shall deliver the public education materials specified by 310 CMR 22.06B(6)(a) (unless it already is repeating public education tasks pursuant to 310 CMR 22.06B(6)(a)) as follows:

a. Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the systems; and

b. 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.

c. For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30th 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 310 CMR 22.06B(6)(b)4. at least once during each calendar year in which the system exceeds the lead action level. The Department can allow activities in 310 CMR 22.06B(6)(b)4. 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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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 310 CMR 22.06B(7). Such a system shall recommence public education in accordance with 310 CMR 22.06B(6)(b)6. 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 310 CMR 22.06B(6)(a)1. in *lieu* of the text in 310 CMR 22.06B(6)(a)1. and 2. and to perform the tasks listed in 310 CMR 22.06B(6)(b)4. and 5. in *lieu* of the tasks in 310 CMR 22.06B(6)(b)2. and 3. if:

a. 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

b. 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:

a. With respect to the requirements of 310 CMR 22.06B(6)(b)2.f., a system serving 3,300 or fewer must implement at least one of the activities listed in 310 CMR 22.06B(6)(b)2.f.

b. With respect to the requirements of 310 CMR 22.06B(6)(b)2.b., a system serving 3,300 or fewer people may limit the distribution of the public education materials required under 310 CMR 22.06B(6)(b)2.b. to facilities and organizations served by system that are most likely to be visited regularly by pregnant women and children.

c. With respect to the requirements of 310 CMR 22.06B(6)(b)2.e., the Department may waive this requirement for systems serving 3,300 or fewer persons as long as the system distributes notices to every household served by the system.

(c) Notification of Results.

1. Reporting Requirement. All water systems must provide a notice of the individual tap results from lead and copper tap water monitoring carried out under the requirements of 310 CMR 22.06B(7) 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 310 CMR 22.02.

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.

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(7) Monitoring Requirements for Lead and Copper in Tap Water.

(a) Sample Site Location.

1. By the applicable date for commencement of monitoring under 310 CMR 22.06B(7)(d)1., each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of 310 CMR 22.06B(7), and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in 310 CMR 22.06B(7)(c). All sites from which first draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants. Once the sampling sites are selected they must be submitted to the Department on the required form for approval. All samples must be collected in accordance with the system's Department-approved sampling plan.

2. A water system shall use the information on lead, copper, and galvanized steel that it is required to collect under 310 CMR 22.19(4) and (5) when conducting a materials evaluation. When an evaluation of the information collected pursuant to 310 CMR 22.19(4) and (5) is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in 310 CMR 22.06B(7)(a), the water system shall review 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 where possible in the course of its normal operations (*e.g.*, checking service line materials when reading water meters or performing maintenance activities):

a. 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;

b. 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

c. 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. The sampling sites selected for a community water system's sampling pool ("tier 1 sampling sites") shall consist of single family structures that:

a. contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

b. are served by a lead service line. When multiple-family residences comprise at least 20% of the structures served by a water system, the system may include these types of structures in its sampling pool.

4. Any community water system with insufficient tier 1 sampling sites shall complete its sampling pool with "tier 2 sampling sites", consisting of buildings, including multiple-family residences that:

a. contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

b. 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 310 CMR 22.06B(7)(a)5., 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.

6. The sampling sites selected for a non-transient non-community water system ("tier 1 sampling sites") shall consist of buildings that:

a. contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

b. are served by a lead service line.

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7. A non-transient non-community water system with insufficient tier 1 sites that meet the targeting criteria in 310 CMR 22.06B(7)(a)6. 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 310 CMR 22.06B(7)(a)7., 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% of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50% 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.

9. In addition to the samples required by 310 CMR 22.06B(7) the Department requires community water supplies to collect lead and copper samples from at least two schools. Each school will have two sampling sites from which a 250 ml sample will be taken, one from a kitchen tap and one from a drinking water source such as a water fountain.

(b) Sample Collection Methods.

1. All tap samples for lead and copper collected in accordance with this subpart, with the exception of lead service line samples collected under 310 CMR 22.06B(5)(c) to determine whether or not a lead service line should be replaced and samples collected under 310 CMR 22.06B(7)(b)3., shall be first-draw samples. All samples must be collected in accordance with the system's Department-approved sampling plan.

2. Each first-draw tap sample for lead and copper shall be one liter 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 non-residential 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 310 CMR 22.06B(7)(b)5. shall be one liter in volume an 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 310 CMR 22.06B(7)(b)2. To avoid potential problems of residents handling nitric acid, acidification of first draw samples may be done up to 14 days after the sample has been 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, but not more than 12 hours. Lead service line samples, for the purpose of determining whether or not a line should be replaced, shall be collected in one of the following three ways:

a. 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 the lead service line;

b. tapping directly into the lead service line; or

c. 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 a 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.

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5. A non-transient non-community water system, or a community water system that meets the criteria of 310 CMR 22.06B(6)(a) and (b), that does not have enough taps that can supply first-draw samples, as defined in 310 CMR 22.06B, may apply to the Department in writing to substitute non-first-draw samples. Such systems shall 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 State 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 310 CMR 22.06B(7)(d) from the number of sites listed in the second column (Standard Monitoring) of the table in 310 CMR 22.06B(7)(c). A system conducting reduced monitoring under 310 CMR 22.06B(7)(d)4. shall collect at least one sample from the number of sites specified in the third column (Reduced Monitoring) of the table in 310 CMR 22.06B(7)(c). 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 310 CMR 22.06B(7)(a) to reach the required number of sample sites listed in 310 CMR 22.06B(7)(c), 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 310 CMR 22.06B(7)(c), provided that 100% 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.

System Size (No. People Served)	Number of sites (Standard Monitoring)	Number of sites (Reduced Monitoring)
>100,000	100	50
10,001-100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
≤100	5	5

(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:

System Size (No. People Served)	First Six-month Monitoring Period Begins On
>50,000	January 1, 1992
3,301 to 50,000	July 1, 1992
≤3,300	July 1, 1993

a. All large systems shall monitor during two consecutive six-month periods.

b. 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 310 CMR 22.06B(2), in which case the system shall continue monitoring in accordance with 310 CMR 22.06B(7)(d)2., or

(ii) the system meets the lead and copper action levels during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with 310 CMR 22.06B(7)(d)4.

2. Monitoring after Installation of Corrosion Control and Source Water Treatment.

a. Any large system which installs optimal corrosion control treatment pursuant to 310 CMR 22.06B(2)(d)4. shall monitor during two consecutive six-month monitoring periods by the date specified in 310 CMR 22.06B(2)(d)5.

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b. Any small or medium-size system which installs optimal corrosion control treatment pursuant to 310 CMR 22.06B(2)(e)5. shall monitor during two consecutive six-month monitoring periods by the date specified in 310 CMR 22.06B(2)(e)6.

c. Any system which installs source water treatment pursuant to 310 CMR 22.06B(4)(a)3. shall monitor during two consecutive six-month monitoring periods by the date specified in 310 CMR 22.06B(4)(a)4.

3. Monitoring after Department Specifies Water Quality Parameter Values for Optimal Corrosion Control. After the Department specifies the values for water quality control parameters under 310 CMR 22.06(3)(f), a large water 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 under 310 CMR 22.06B(3)(f).

4. Reduced Monitoring.

a. 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 310 CMR 22.06B(7)(c), and reduce the frequency of lead and copper tap sampling to once per year. A small or medium water system collecting fewer than five samples as specified in 310 CMR 22.06B(7)(c), 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 or other period as specified by the Department. In no case can the system reduce the number of samples required below the minimum of one sample per available tap. This reduced sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. In order to reduce its monitoring frequency or sites, the public water system must obtain prior written approval from the Department.

b. Any large water system that meets the lead and copper action levels and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Department under 310 CMR 22.06B(3)(f) during each of two consecutive six-month monitoring periods may reduce the frequency of monitoring for lead and copper to once per year and to reduce the number of lead and copper samples in accordance with 310 CMR 22.06B(7)(c) 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 310 CMR 22.06(B)(11), and shall notify the system in writing when it determines the system is eligible to commence reduced monitoring pursuant to 310 CMR 22.06B(7)(d)4. 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.

c. A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may request in writing the Department's approval to reduce the frequency of monitoring for lead and copper from annually to once every three years. Any large water system that meets the lead and copper action levels and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Department under 310 CMR 22.06B(3)(f) during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper 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 310 CMR 22.06B(11) and shall notify the system in writing when it determined 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.

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d. A water system that reduces the number and frequency of lead and copper tap sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in 310 CMR 22.06B(7)(a). 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 310 CMR 22.06B(7)(d)4.d.(i).

(i) The Department, at its discretion, 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 shall 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 310 CMR 22.06B(7)(d)4.d.(i), shall 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 310 CMR 22.06B(7)(d)4.d.(i), shall 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 shall be collected annually or triennially, as required by 310 CMR 22.06B(7)(d)4.d. Small systems with waivers, granted pursuant to 310 CMR 22.06B(7)(g), that have been collecting samples during the months of June through September and choose to alter their sample collection period under 310 CMR 22.06B(7)(d)4.d.(i) shall collect their next round of samples before the end of the nine-year period.

e. Any water system that demonstrates for two consecutive six-month monitoring periods that the tap water lead level computed under 310 CMR 22.06B(1)(c)3. is less than or equal to 0.005 mg/L and the tap water copper level computed under 310 CMR 22.06B(1)(c)3. is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with 310 CMR 22.06B(7)(c) and reduce the frequency of sampling to once every three calendar years. This reduction in frequency of sampling requires written approval by the Department.

f. 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 310 CMR 22.06B(7)(c) and collect the number of samples specified for standard monitoring under 310 CMR 22.06B(7)(c). Such system shall also conduct water quality parameter monitoring in accordance with 310 CMR 22.06B(8)(b), (c) or (d) (as appropriate) during the monitoring period in which it exceeded the action level. Any such small or medium system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in 310 CMR 22.06B(7)(c) after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of 310 CMR 22.06B(7)(d)4.a. 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 310 CMR 22.06B(7)(d)4.c. or e.

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g. Any large 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 310 CMR 22.06B(3)(f) for more than nine days in any six-month period specified in 310 CMR 22.06B(8)(d) shall conduct tap water sampling for lead and copper at the frequency specified in 310 CMR 22.06B(7)(d)3., collect the number of samples specified for standard monitoring under 310 CMR 22.06B(7)(c), and shall resume monitoring for water quality parameters within the distribution system in accordance with 310 CMR 22.06B(8)(d). This standard tap water sampling shall begin no later than the six-month period beginning January 1st 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 310 CMR 22.06B(7)(c) after it has completed two subsequent six-month rounds of monitoring that meet the criteria of 310 CMR 22.06B(7)(d)4.b. 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.

(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 310 CMR 22.06B(7)(d)4.c. or e. 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 310 CMR 22.06B(8)(e)1. and the frequency with which it collects such samples in accordance with 310 CMR 22.06B (8)(e)2. Such a system may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of 310 CMR 22.06B(8)(e)2., that it has re-qualified for triennial monitoring.

h. Any water system subject to a reduced monitoring frequency under 310 CMR 22.06B(7)(d)4. shall notify the Department in writing in accordance with 310 CMR 22.06B(11)(a)3. of any upcoming long-term change in treatment or addition of a new source as described in 310 CMR 22.06B(11)(a)3. 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 310 CMR 22.06B(7)(d)3. and collect the number of samples specified for standard monitoring under 310 CMR 22.06B(7)(c) or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation 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 310 CMR 22.06B shall be considered by the system and the Department in making any determinations (*i.e.*, calculating the 90th percentile lead or copper level) under 310 CMR 22.06B(7).

(f) Invalidation of Lead or Copper Tap Water Samples. A sample invalidated under 310 CMR 22.06B(7)(f) does not count toward determining lead or copper 90th percentile levels under 310 CMR 22.06B(1)(c)3. or toward meeting the minimum monitoring requirements of 310 CMR 22.06B(7)(c).

1. The Department may invalidate a lead or copper tap water sample at least if one of the following conditions is met.

a. The laboratory establishes that improper sample analysis caused erroneous results.

b. The Department determines that the sample was taken from a site that did not meet the site selection criteria of 310 CMR 22.06B(7).

c. The sample container was damaged in transit.

d. There is substantial reason to believe that the sample was subject to tampering.

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2. The system shall 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 310 CMR 22.06B(7)(f)1., the decision and the rationale for the decision shall 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 shall collect replacement samples for any samples invalidated under 310 CMR 22.06B(7) if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of 310 CMR 22.06B(7)(c). Any such replacement samples shall 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 that meets the criteria of 310 CMR 22.06B(7)(g) may apply to the Department to reduce the frequency of monitoring for lead and copper under 310 CMR 22.06B(7) to once every nine years (*i.e.*, a full waiver) if it meets all of the materials criteria specified in 310 CMR 22.06B(7)(g)1. and all of the monitoring criteria specified in 310 CMR 22.06B(7)(g)2. If Department regulations permit, any small system that meets the criteria in 310 CMR 22.06B(7)(g)1. and 2. 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 shall 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 310 CMR 22.06(7)(g)1., as follows:

a. 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 shall 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, § 1417(e)).

b. 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 shall 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 shall have completed at least one six-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 310 CMR 22.07B(7)(c) 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.

a. Lead Levels. To qualify for a full waiver, or a lead waiver, the system shall demonstrate that the 90th percentile lead level does not exceed 0.005 mg/L.

b. Copper Levels. To qualify for a full waiver, or a copper waiver, the system shall demonstrate that the 90th percentile copper level does not exceed 0.65 mg/L.

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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 shall continue monitoring for lead and copper at the tap as required by 310 CMR 22.06B(7)(d)1. through 4., as appropriate, until it receives written notification from the Department that the waiver has been approved.

4. Monitoring Frequency for Systems with Waivers.

a. A system with a full waiver shall conduct tap water monitoring for lead and copper in accordance with 310 CMR 22.06B(7)(d)4.d. at the reduced number of sampling sites identified in 310 CMR 22.06B(7)(c) at least once every nine years and provide the materials certification specified in 310 CMR 22.06B(7)(g)1. 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.

b. A system with a partial waiver shall conduct tap water monitoring for the waived contaminant in accordance with 310 CMR 22.06B(7)(d)4.d. at the reduced number of sampling sites specified in 310 CMR 22.06B(7)(c) at least once every nine years and provide the materials certification specified in 310 CMR 22.06B(7)(g)1. pertaining to the waived contaminant along with the monitoring results. Such a system also shall continue to monitor for the non-waived contaminant in accordance with requirements of 310 CMR 22.06B(7)(d)1. through 4., as appropriate.

c. Any water system with a full or partial waiver shall notify the Department in writing in accordance with 310 CMR 22.06B(11)(a)3. of any upcoming long-term change in treatment or addition of a new source, as described in 310 CMR 22.06B(11). 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.

d. 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 310 CMR 22.06B(7)(g)4., the waiver will be renewed automatically, unless any of the conditions listed in 310 CMR 22.06B(7)(g)5.a. through c. 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 310 CMR 22.06B(7)(g)1. and 2.

a. A system with a full waiver or a lead waiver no longer satisfies the materials criteria of 310 CMR 22.06B(7)(g)1.a. or has a 90th percentile lead level greater than 0.005 mg/L.

b. A system with a full waiver or a copper waiver no longer satisfies the materials criteria of 310 CMR 22.06B(7)(g)1.b. or has a 90th percentile copper level greater than 0.65 mg/L.

c. 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:

a. If the system exceeds the lead and/or copper action level, the system shall implement corrosion control treatment in accordance with the deadlines specified in 310 CMR 22.06B(2)(e), and any other applicable requirements of 310 CMR 22.06B.

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b. If the system meets both the lead and the copper action level, the system shall 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 310 CMR 22.06B(7)(c).

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:

a. If the system has demonstrated that it is both free of lead-containing and copper-containing materials, as required by 310 CMR 22.06B(7)(g)1. and that its 90th percentile lead levels and 90th percentile copper levels meet the criteria of 310 CMR 22.06B(7)(g)2., the waiver remains in effect so long as the system continues to meet the waiver eligibility criteria of 310 CMR 22.06B(7)(g)5. The first round of tap water monitoring conducted pursuant to 310 CMR 22.06B(7)(g)4. shall be completed no later than nine years after the last time the system has monitored for lead and copper at the tap.

b. If the system has met the materials criteria of 310 CMR 22.06B(7)(g)1. but has not met the monitoring criteria of 310 CMR 22.06B(7)(g)2., the system shall conduct a round of monitoring for lead and copper at the tap demonstrating that it meets the criteria of 310 CMR 22.06B(7)(g)2. no later than September 30, 2000. Thereafter, the waiver shall remain in effect as long as the system meets the continued eligibility criteria of 310 CMR 22.06B(7)(g)5. The first round of tap water monitoring conducted pursuant to 310 CMR 22.06B(7)(g)4. shall be completed no later than nine years after the round of monitoring conducted pursuant to 310 CMR 22.06B(7)(g)2.

(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 310 CMR 22.06B(8). The requirements of 310 CMR 22.06B(8) are summarized in the table at the end of 310 CMR 22.06B.

(a) General Requirements.

1. Sample Collection Methods.

a. 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 310 CMR 22.06B(8) is not required to be conducted at taps targeted for lead and copper sampling under 310 CMR 22.06B(7)(a). (Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for coliform sampling under 310 CMR 22.05.)

b. 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 shall 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.

a. Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under 310 CMR 22.06B(8)(b) through (e) from the following number of sites.

System Size (No. of 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

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b. Except as provided in 310 CMR 22.06B(8)(c)3. 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 310 CMR 22.06B(8)(b). During each monitoring period specified in 310 CMR 22.06B(8)(c) through (e), systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system.

(b) Initial Sampling. All large water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in 310 CMR 22.06B(7)(d)1. All small and medium-size systems shall measure the applicable water quality parameters at the locations specified below during each six-month monitoring period specified in 310 CMR 22.06B(7)(d)1. during which the system exceeds the lead or copper action level.

1. At taps:
   a. pH;
   b. alkalinity;
   c. orthophosphate, when an inhibitor containing a phosphate compound is used;
   d. silica, when an inhibitor containing a silicate compound is used;
   e. calcium;
   f. conductivity; and
   g. water temperature.
2. At each entry point to the distribution system: all of the applicable parameters listed in 310 CMR 22.06B(8)(b)1.

(c) Monitoring after Installation of Corrosion Control. Any large system which installs optimal corrosion control treatment pursuant to 310 CMR 22.06B(2)(d)4. shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in 310 CMR 22.06B(7)(d)2.a. Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in 310 CMR 22.06B(7)(d)2.b. in which the system exceeds the lead or copper action level.

1. At taps, two samples for:
   a. pH;
   b. alkalinity;
   c. orthophosphate, when an inhibitor containing a phosphate compound is used;
   d. silica, when an inhibitor containing a silicate compound is used;
   e. calcium, when calcium carbonate stabilization is used as part of corrosion control.
2. Except as provided in 310 CMR 22.06B(8)(c)3., at each entry point to the distribution system, one sample every two weeks (bi-weekly) for:
   a. pH;
   b. 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
   c. 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).
3. Any ground water system can limit entry point sampling described in 310 CMR 22.06B(8)(c)2. 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 shall 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 310 CMR 22.06B(8)(c)3., 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.

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(d) Monitoring after 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 310 CMR 22.06B(3)(f) all large systems shall measure the applicable water quality parameters in accordance with 310 CMR 22.06B(8)(c) and determine compliance with the requirements of 310 CMR 22.06B(3)(g) every six months with the first six-month period to begin on either January 1st or July 1st, whichever comes first, after the Department specifies the optimal values under 310 CMR 22.06B(3)(f). Any small or medium-size system shall conduct such monitoring during each six-month period specified in 310 CMR 22.06B(7)(d)3. 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 310 CMR 22.06B(7)(d)4. at the time of the action level exceedance, the start of the applicable six-month monitoring period under 310 CMR 22.06B(8)(d) shall coincide with the end of the applicable monitoring period under 310 CMR 22.06B(7)(d)4. Compliance with Department-designated optimal water quality parameter values shall be determined as specified under 310 CMR 22.06B(3)(g).

(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 310 CMR 22.06B(8)(d) shall continue monitoring at the entry point(s) to the distribution system as specified in 310 CMR 22.06B(8)(c)2. Such system may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period.

System Size (No. of People Served)	Reduced No. of Sites for Water Quality Parameters
>100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
≤100	1

2. a. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Department under 310 CMR 22.06B(3)(f) during three consecutive years of monitoring under 310 CMR 22.06B(8)(e)2.a. may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in 310 CMR 22.06B(8)(e)1., 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 the water quality parameters reflecting optimal corrosion control treatment specified by the Department under 310 CMR 22.06B(3)(f), during three consecutive years of annual monitoring under 310 CMR 22.06B(8)(e)2. a. may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in 310 CMR 22.06B(8)(e)1. 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.

b. A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in 310 CMR 22.06B(8)(e)1. 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 310 CMR 22.06B(10)(a)1.b., that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L for copper in 310 CMR 22.06B(1)(c)2., 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 310 CMR 22.06B(3)(f). Monitoring conducted every three years shall be done no later than every third calendar year.

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3. A water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

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 under 310 CMR 22.06B(3)(f) for more than nine days in any six-month period specified in 310 CMR 22.06B(3)(g) shall resume distribution system tap water sampling in accordance with the number and frequency requirements in 310 CMR 22.06B(8)(c). Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in 310 CMR 22.06B(8)(e)1. after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of 310 CMR 22.06B(8)(e)1. 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 310 CMR 22.06B(8)(e)2.a. or b.

(f) Additional Monitoring by Systems. The results of any monitoring conducted in addition to the minimum requirements of 310 CMR 22.06B(8) shall be considered by the system and the Department in making any determinations (*i.e.*, determining concentrations of water quality parameters) under 310 CMR 22.06B(3) or (8).

(g) For the purposes of determining compliance with 310 CMR 22.06B, samples may be considered only if they have been analyzed by a certified laboratory, except that measurements for alkalinity, calcium, conductivity, orthophosphate, pH, and silica may be performed by a Massachusetts certified operator.

(9) Monitoring Requirements for Lead and Copper in Source Water.

(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 310 CMR 22.06B(7) shall collect lead and copper source water samples in accordance with the following requirements regarding sample location, number of samples, and collection methods:

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 (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.

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 (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 310 CMR 22.06B(9)(a)1.b., surface water systems include systems with a combination of surface and ground sources.

c. If a system draws water from more than one source and the sources are combined before distribution, the system shall 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).

d. The Department may reduce the total number of samples which shall be analyzed by allowing the use of compositing. Compositing of samples shall 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.

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2. Where the results of sampling indicate an exceedance of 5ppb, the maximum permissible source water levels established under 310 CMR 22.06B(4)(b)4., 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) at the same sampling point. If a Department-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 levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL.

(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 30th 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 310 CMR 22.06B(4)(a)3. 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 310 CMR 22.06B(4)(a)4.

(d) Monitoring Frequency after the Department Determines that Source Water Treatment is not Needed.

1. A system shall monitor at the frequency specified in 310 CMR 22.06B(9)(d)1. and 2. in cases where the Department determines that the system is not required to install source water treatment under 310 CMR 22.06B(4)(b)2.

a. A water system using only groundwater shall collect samples once during the three-year compliance period (as that term is defined in 310 CMR 22.02) in effect when the applicable Department determination under 310 CMR 22.06B(9)(d)1. is made. Such systems shall collect samples once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.

b. A water system using surface water (or a combination of surface and groundwater) shall collect samples once during each year, the first annual monitoring period to begin on the date on which the applicable Department determination is made under 310 CMR 22.06B(9)(d)1.

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 310 CMR 22.06B(9)(d)1.a. or b. A water system using surface water (or a combination of surface 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 310 CMR 22.06B(9)(d)1.

(e) Reduced Monitoring Frequency.

1. A water system using only ground water may reduce the monitoring frequency for lead and/or copper in source water to once during each nine-year compliance cycle (as that term is defined in 310 CMR 22.02) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

a. 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 310 CMR 22.06B(4)(b)4. during at least three consecutive compliance periods under 310 CMR 22.06B(9)(d)1.; or

b. 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 310 CMR 22.06B(9)(d)1., 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.

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2. A water system using surface water (or a combination of surface and ground waters) may reduce the monitoring frequency in 310 CMR 22.06B(9)(d)1. to once during each nine-year compliance cycle (as defined in 310 CMR 22.02 provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

a. 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 310 CMR 22.06B(4)(b)4. for at least three consecutive calendar years; or

b. The Department has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive calendar 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 310 CMR 22.06B(4)(a)5.

(10) Analytical Methods.

(a) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica, and temperature shall be conducted using the following methods:

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ANALYTICAL METHODS
Reference (Method Number)

Contaminant	Methodology[9]	EPA[1]	ASTM[2]	SM[3]	SM Online[11]	USGS[4]	Other
Lead	Atomic absorption; furnace technique		D3559-96, 03D	3113B	3113B-99		
	Inductively-coupled plasma; mass spectrometry	200.8					
	Atomic absorption; platform furnace technique	200.9					
	Differential Pulse Anodic Stripping Voltameter						Method 1001[10]
Copper	Atomic absorption; furnace technique		D1688-95, 02C	3113B	3113B-99		
	Atomic absorption; direct aspiration		D1688-95, 02A	3111B	3113B-99		
	Inductively-coupled plasma	200.75		3120B	3120B-99		
	Inductively-coupled plasma; mass spectrometry	200.86					
	Atomic absorption; platform furnace	200.97					
Magnesium	Atomic absorption; furnace		D 511-93 03B	3111B	311B-99		
	ICP	200.7		3120B	3120B-99		
	Complexation Titrimetric Methods		D 511-93, 3A	3500-Mg E 3500 Mg B	3500MB-97		
	Ion Chromatography		D6919-03				
pH	Electrometric	150.1 150.2	D1293-95, 99	4500-H^+B	4500- H^+B-00		
Conductivity	Conductance		D1125-95 (Re-approved 1999) A	2510B	2510B-97		
Calcium	EDTA titrimetric		D511-9303 A	3500- Ca-D Ca B	3500- Ca B-97		
	Atomic absorption; direct aspiration		D511-9303 B	3111B	3111 B-99		
	Inductively-coupled plasma	200.7		3120B	3120 B-99		
Alkalinity	Titrimetric		D1067-02 B	922320B	2320 B-97		
	Electrometric titration					I-1030-85	
Ortho-phosphate, unfiltered, no digestion or hydrolysis	Colorimetric, automated, ascorbic acid	365.18		4500-P-F			
	Colorimetric, ascorbic acid, single reagent		D515-88A	4500-P-E			
	Colorimetric, phosphomolybdate; automated-segmented flow; automated discrete					I-1601-85 I-2601-90 I-2598-85	
	Ion Chromatography	300.08	D4327-97, 03	4110B	4110 B-00		
	Capillary Ion Electro-Phoresis	300.1	D6508, Rev. 2 -39				
Silica	Colorimetric, molybdate blue; automated-segmented flow					I-1700-85 I-2700-85	
	Colorimetric Molybdosilicate		D859-9400	4500-Si-D (18^{th},19^{th}) 4500-SiO_2 C (20^{th} ed.)	4500-SiO_2 C-97		

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ANALYTICAL METHODS (continued)

Contaminant	Methodology[9]	EPA[1]	ASTM[2]	SM[3]	SM Online[11]	USGS[4]	Other
	Heteropoly blue			4500-Si-E (18th,19th) 4500-SiO2 D (20th ed.)	4500- SiO2 D-97		
	Automated method for molybdate-reactive silica			4500-Si- F (18th, 19th) 4500-SiO_2 E (20th ed.)	4500- SiO2 D-97		
	Inductively-coupled plasma	200.75		3120B	3120 B-99		
Temperature	Thermometric			2550			

[1] The procedures 239.2, 220.2, 220.1, 150.1, 150.2, 120.1, 215.2, 310.1, 365.1, 365.3, 365.2, and 370.1 are incorporated by reference and shall be done in accordance with "Methods for Chemical Analysis of Water and Wastes", EPA Environmental Monitoring and Support Laboratory, Cincinnati, OH (EPA-600/4-79-020), Revised March 1983, pp. 239.2-1 through 239.2-2 and metals-1 through metals-19, 220.2-1 through 220.2-2 and metals-1 through metals-19, 220.1-1 through 220.1-2 and metals-1 through metals-19, 150.1-1 through 150.1-3, 150.2-1 through 150.2-3, 120.1-1 through 120.1-3, 215.2-1 through 215.2-3, 215.1-1 through 215.1-2, 310.1-1 through 310.1-3, 365.1-1 through 365.1-9, 365.3-1 through 365.3-4, 365.2-1 through 365.2-6, and 370.1-1 through 370.1-5, respectively. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from ORD Publications, CERI, EPA, Cincinnati, OH 45268. Copies may be inspected at the United Departments Environmental Protection Agency, 401 M Street, SW., Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, D.C.

[2] The procedures D3559-96D, D1688-95C, D1688-95A, D1293-95B, D1125-82B, D511-88A, D511-88B, D1067-88B, D515-88A, D4327-97, and D859-88 are incorporated by reference and shall be done in accordance with *Annual Book of ASTM Standards*, 1994, 1996, or 1999, 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; D355990D, 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.

[3] The procedures 3113, 3111-B, 3120, 4500-H^+, 2510, 3500-Ca-D, 3120, 2320, 4500-P-F, 4500-P-E, 4110, 4500-Si-D, 4500-Si-E, 4500-Si-F, and 2550 are incorporated by reference and shall be done in accordance with *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 3111B and 3113B in the 20th edition may not be used. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be obtained from the American Water Works Association, Customer Services, 6666 West Quincy Avenue, Denver, Co 80235, Phone (303) 794-7711. Copies may be inspected at the United Departments Environmental Protection Agency, 401 M Street, SW., Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, D.C.

[4] The procedures I-1030-85, I-1601-85, I-2601-85, I-2598-85, I-1700-85, and I-2700-85 are incorporated by reference and shall be done in accordance with "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments", 3rd edition, U.S. Department of Interior , U.S. Geological Survey, 1989, pp. 55-56, 381-382, 383-385, 387-388, 415-416, and 417-419, respectively. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies may be purchased from the Books and Open-file Reports Section, U.S. Geological Survey, Federal Center, Box 25425, Denver, Co 80225. Copies may be inspected at the United Departments Environmental Protection Agency, 401 M Street, SW., Room EB-15, Washington, D.C. 20460 or at the Office of the Federal Register, 1100 L Street, NW., Room 8401, Washington, D.C.

[5] *Determination of Metals and Trace Elements in Water and Wastes by Inductively-Coupled Plasma--Atomic Emission Spectrometry*, Revision 3.3, April 1991, *Methods for the Determination of Metals in Environmental Samples*, Office of Research and Development, Washington, DC 20460, EPA/4-91/010, June 1991.

[6] *Determination of Trace Elements in Water and Wastes by Inductively-Coupled Plasma--Mass Spectrometry*, Revision 4.4, April 1991, *Methods for the Determination of Metals in Environmental Samples*, Office of Research and Development, Washington, DC 20460, EPA/600/4-91/010, June, 1991.

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ANALYTICAL METHODS (continued)

[7] *Determination of Trace Elements by Stabilized Temperature Graphite Furnace Atomic Absorption Spectrometry*, Revision 1.2, April 1991, *Methods for the Determination of Metals in Environmental Samples*, Office of Research and Development, Washington, DC 20460, EPA/600/4-91/010, June 1991.

[8] *Determination of Inorganic Ions in Water by Ion Chromatography*, Method 300.0, December 1989, U.S. EPA EMSL. This document is available from U.S. EPA, EMSL, Cincinnati, OH 45268.

[9] For analyzing lead and copper, the technique applicable to total metals shall be used and samples cannot be filtered. Samples that contain less than one NTU (nephelometric turbidity unit) and are properly preserved (conc HNO^3 TO pH <2) may be analyzed directly (without digestion) for total metals: otherwise, digestion is required. Turbidity shall be measured on the preserved samples just prior to when metals analysis is initiated. When digestion is required, the "total recoverable" technique as defined in the method shall be used.

[10] The description for Method 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.

[11] 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.

1. Analyses under 310 CMR 22.06B(9) shall only be conducted by laboratories that have been certified by EPA or the Department as stated in 310 CMR 22.11A. To obtain certification to conduct analyses for lead and copper, laboratories shall:
   a. Analyze performance evaluation samples which include lead and copper provided by a laboratory certified by the National Institute of Standards and Technology (NIST); and
   b. quantitative acceptance limits as follows:
      (i) Lead: ±30% of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.005 mg/L. The Practical Quantitation Level, or PQL, for lead is 0.005 mg/L.
      (ii) Copper: ±10% of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.050 mg/L. The Practical Quantitation Level, or PQL, for copper is 0.05 mg/L.
   c. If the laboratory will be processing source water composite samples under 310 CMR 22.06B(9)(a)1.d., achieve method detection limits for lead of 0.001 mg/L according to the procedures in Appendix B of Part 136 of 40 CFR.
   d. Be currently certified by EPA or the Department to perform analyses to the specifications described in 310 CMR 22.06B(10)(a)1.
2. The Department has the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected an analyzed in accordance with the requirements of 310 CMR 22.06B(10)(a).
3. All lead levels measured between the PQL and the MDL shall 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 shall be reported as zero.
4. All copper levels measured between the PQL and the MDL shall 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 shall be reported as zero.

(11) Reporting Requirements. All water systems shall report all of the following information to the Department in accordance with 310 CMR 22.06B(11).

(a) Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring

1. Except as provided in 310 CMR 22.06B(11)(a)1.h., a water system shall report the information specified below for all tap water samples specified in 310 CMR 22.06B(7) and for all water quality parameter samples specified in 310 CMR 22.06B(8) within the first ten days following the end of each applicable monitoring period specified in 310 CMR 22.06B(7) and (8) (*i.e.*, every six-months, annually, every three years, or every nine 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 310 CMR 22.06B(7) and (8).
   a. The results of all tap samples for lead and copper including the location of each site and the criteria under 310 CMR 22.06B(7)(a)3. through 6., and/or 7. under which the site was selected for the system's sampling pool;

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b. Documentation for each sample tap water lead or copper sample for which the water system requests invalidation pursuant to 310 CMR 22.06B(7)(f)2.;

c. the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with 310 CMR 22.06B(11)(c)3. Unless the Department calculates the systems 90th percentile lead and copper levels under 310 CMR 22.06B(11)(h);

d. with the exception of initial tap sampling conducted pursuant to 310 CMR 22.06B(7)(d)1., the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

e. the results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under 310 CMR 22.06B(8)(b) through (e);

f. the results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under 310 CMR 22.06B(8)(b) through (e).

g. A water system shall report the results of all water quality parameter samples collected under 310 CMR 22.06B(8)(c) through (f) during each six-month monitoring period specified in 310 CMR 22.06B(8)(d) within the first ten 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 310 CMR 22.06B(6)(b)7., that does not have enough taps that can provide first-draw samples, the system shall either:

a. Provide written documentation to the Department identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under 310 CMR 22.06B(7)(b)5. by the start of the first applicable monitoring period under 310 CMR 22.06B(7)(d) 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 310 CMR 22.06B(7)(b)5.; or

b. 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 310 CMR 22.06B(7)(b)5. and include this information with the lead and copper tap sample results required to be submitted pursuant to 310 CMR 22.07B(11)(a)1.a.

3. a. At a time specified by the Department, or if no specific time is designated by the Department, then as early as possible but no later than 60 days prior to the addition of a new source or any long-term change in water treatment, a water system deemed to have optimized corrosion control under 310 CMR 22.06B(2)(b)3., a water system subject to reduced monitoring pursuant to 310 CMR 22.06B(7)(d)4., or a water system subject to a monitoring waiver pursuant to 310 CMR 22.06B(7)(g), shall submit a demonstration study to the Department describing the change or addition. The Department must review and approve the addition of a new source or the long-term change in treatment including a demonstration study 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 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 or seasonal variations.

b. For any short-term changes in corrosion control treatment practices, the public water system must notify the Department within 24 hours of making such changes. If the changes persist longer than seven days, then it will constitute a Treatment Technique Violation and the public water system shall provide public notification in accordance with 310 CMR 22.16(3).

22.06B: continued

4. Any small system applying for a monitoring waiver under 310 CMR 22.06B(7)(g), or subject to a waiver granted pursuant to 310 CMR 22.06B(7)(g)3., shall provide the following information to the Department in writing by the specified deadline:

a. By the start of the first applicable monitoring period in 310 CMR 22.06B(7)(d), any small water system applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of 310 CMR 22.06B(7)(g)1. and 2.

b. No later than nine years after the monitoring previously conducted pursuant to 310 CMR 22.06B(7)(g)2. or 4.a., each small system desiring to maintain its monitoring waiver shall provide the information required by 310 CMR 22.06B(7)(g)4.a. and b.

c. 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.

d. 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 310 CMR 22.06B(7)(g)2. shall provide the information required by 310 CMR 22.06B(7)(g)2.

5. Each ground water system that limits water quality parameter monitoring to a subset of entry points under 310 CMR 22.06B(8)(c)3. 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 310 CMR 22.06B(9), within the first ten days following the end of each source water monitoring period (*i.e.*, annually, per compliance period, per compliance cycle) specified in 310 CMR 22.06B(9).

2. With the exception of the first round of source water sampling conducted pursuant to 310 CMR 22.06B(9)(b), the system shall specify any site 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 310 CMR 22.06B(2), systems shall report the following information:

1. for systems demonstrating that they have already optimized corrosion control, information required in 310 CMR 22.06B(2)(b)2. or 3.

2. for systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under 310 CMR 22.06B(3)(a).

3. for systems required to evaluate the effectiveness of corrosion control treatments under 310 CMR 22.06B(3)(c) the information required by 310 CMR 22.06B(3)(c).

4. for systems required to install optimal corrosion control designated by the Department under 310 CMR 22.06B(3)(d), a letter certifying that the system has completed installing that treatment.

(d) Source Water Treatment Reporting Requirements. By the applicable dates in 310 CMR 22.06B(4), systems shall provide the following information to the Department:

1. if required under 310 CMR 22.06B(4)(b)1., their recommendation regarding source water treatment;

2. for systems required to install source water treatment under 310 CMR 22.06B(4)(b)2., 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. Systems shall report the following information to the Department to demonstrate compliance with the requirements of 310 CMR 22.06B(5):

22.06B: continued

1. No later than 12 months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in 310 CMR 22.06B(5)(a), the system shall demonstrate in writing to the Department that it has conducted a materials evaluation, including the evaluation in 310 CMR 22.06B(7)(a), to identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level, and shall provide the Department with the system's schedule for replacing annually at least 7% of the initial number of lead service lines in its distribution system.

2. No later than 12 months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in 310 CMR 22.06B(5)(a), and every 12 months thereafter, the system shall demonstrate to the Department in writing that the system has either:

a. replaced in the previous 12 months at least 7% of the initial lead service lines (or a greater number of lines specified by the Department under 310 CMR 22.06B(5)(f) in its distribution system, or

b. conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to 310 CMR 22.06B(7)(b)3., 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 310 CMR 22.06B(5)(c) shall equal at least 7% of the initial number of lead lines identified under 310 CMR 22.06B(11)(e)1. (or the percentage specified by the Department under 310 CMR 22.06B(5)(e).

3. The annual letter submitted to the Department under 310 CMR 22.06B(11)(e)2. shall contain the following information:

a. the number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule;

b. the number and location of each lead service line replaced during the previous year of the system's replacement schedule;

c. if measured, 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 310 CMR 22.06B(5) 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 310 CMR 22.06B(6) shall, within ten days after the end of each period in which the system is required to perform public education tasks in accordance with 310 CMR 22.06B(6)(b), send written documentation to the Department that contains:

a. A demonstration that the system has delivered the public education materials that meet the content requirements in 310 CMR 22.06B(6)(a) and the delivery requirements in 310 CMR 22.06B(6)(b); and

b. 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 310 CMR 22.06B(11)(f)1.b. need not resubmit the information required by 310 CMR 22.06B(11)(f)1.b., 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 90 days following the end of the monitoring period, each system shall 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 310 CMR 22.06B(6)(c).

22.06B: continued

(g) Reporting of Additional Monitoring Data. Any system which collects sampling data in addition to that required by this subpart shall report the results to the Department within the first ten days following the end of the applicable monitoring period under 310 CMR 22.06B(7) through (9) during which the samples are collected.

(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 310 CMR 22.06B(11)(a)1.d. 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 310 CMR 22.06B(h)2.a., and has specified a date before the end of the applicable monitoring period by which the system shall 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 310 CMR 22.06B(11)(h)1.:
   a. The results of all tap samples for lead and copper including the location of each site and the criteria under 310 CMR 22.06B(7)(a)3. through 6. and/or 7. under which the site was selected for the system's sampling pool, pursuant to 310 CMR 22.06B(11)(a)1.a.; and
   b. 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 310 CMR 22.06B 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 310 CMR 22.06B(2) through (9). Each water system shall retain the records required by 310 CMR 22.06B for no fewer than 12 years.

22.06B: continued

Summary of Monitoring Requirements for Water Quality Parameters[1]

Monitoring Period	Parameters[2]	Location	Frequency
Initial Monitoring.	pH, alkalinity, orthophosphate or silica[3], calcium, conductivity, temperature.	Taps and at entry point(s) to distribution system.	Two samples every six months.
After Installation of Corrosion Control.	pH, alkalinity, orthophosphate or silica[3], calcium[4].	Taps.	Two samples every six 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[6].	No less frequently than every two weeks.
After State Specifies Parameter Values for Optimal Corrosion Control.	pH, alkalinity, orthophosphate or silica[3], calcium[4].	Taps.	Two Samples every six 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[6].	No less frequently than every two weeks.
Reduced Monitoring.	pH, alkalinity, orthophosphate or silica[3], calcium[4].	Taps.	Two samples every six months, annually[7] or every three 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[6].	No less frequently than every two weeks.

[1] Table is for illustrative purposes; consult the text of 310 CMR 22.06B(12) 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 shall be measured only when an inhibitor containing a phosphate compound is used. Silica shall be measured only when an inhibitor containing silicate compound is used.

[4] Calcium shall 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) shall 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 three 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 three years if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during three 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 State under 40 CFR 141.82(f) as representing optimal corrosion control during two consecutive six-month monitoring periods.

22.06C: Compliance with Secondary Maximum Contaminant Level and Public Notification for Fluoride

Community water systems sampling pursuant to 310 CMR 22.06 which exceed the secondary maximum contaminant level for fluoride, but do not exceed the maximum contaminant level for fluoride, shall comply with 310 CMR 22.16(4).

Secondary Maximum Contaminant Level for Fluoride - 2.0 mg/l

22.07A: Synthetic Organic Chemicals (SOC) Sampling and Analytical Requirements

(1) Synthetic Organic Chemicals MCLs. The following maximum contaminant levels for organic contaminants apply to community water systems and non-transient, non-community water systems.

	CAS No.	Contaminant	MCL (mg/l)
(a)	15972-60-8	Alachlor	0.002
(b)	Reserved		
(c)	Reserved		
(d)	Reserved		
(e)	1912-24-9	Atrazine	0.003
(f)	1563-66-2	Carbofuran	0.04
(g)	57-74-9	Chlordane	0.002
(h)	96-12-8	Dibromochloropropane	0.0002
(i)	94-75-7	2,4-D	0.07
(j)	72-20-80	Endrin	0.002
(k)	106-93-4	Ethylene dibromide	0.00002
(l)	76-44-8	Heptachlor	0.0004
(m)	1024-57-3	Heptachlor epoxide	0.0002
(n)	58-89-9	Lindane	0.0002
(o)	72-43-5	Methoxychlor	0.04
(p)	1336-36-3	Polychlorinated biphenyls	0.0005
(q)	87-86-5	Pentachlorophenol	0.001
(r)	8001-35-2	Toxaphene	0.003
(s)	93-72-1	2,4,5-TP	0.05
(t)	50-32-8	Benzo(a)pyrene	0.0002
(u)	75-99-0	Dalapon	0.2
(v)	103-23-1	Di(2-ethylhexyl) adipate	0.4
(w)	117-81-7	Di(2-ethylhexyl) phthalate	0.006
(x)	88-85-7	Dinoseb	0.007
(y)	85-00-7	Diquat	0.02
(z)	145-73-3	Endothall	0.1
(aa)	1071-53-6	Glyphosate	0.7
(bb)	118-74-1	Hexachlorobenzene	0.001
(cc)	77-47-4	Hexachlorocyclopentadiene	0.05
(dd)	23135-22-0	Oxamyl (Vydate)	0.2
(ee)	1918-02-1	Picloram	0.5
(ff)	122-34-9	Simazine	0.004
(gg)	1746-01-6	2,3,7,8-TCDD(Dioxin)	$3x10^{-8}$

(2) SOC Sampling Requirements. Beginning with the initial compliance period, analysis of the contaminants listed in 310 CMR 22.07A(1)(a) through (gg) for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows:

(a) SOC Ground Water Monitoring Protocols. 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 (sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(b) SOC Surface Water Monitoring Protocols. Surface water systems [Note: For purposes of 310 CMR 22.07A(2)(b), surface water systems include systems with a combination of surface and ground sources.) 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 (sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(c) Multiple Sources. 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 of normal operating conditions (*i.e.*, when water representative of all sources is being used).

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(d) Consecutive System Monitoring. Public water systems that obtain water from another public water system are exempt from conducting compliance monitoring for the purchased portion of the system for the organic chemicals (SOC) under 310 CMR 22.07A, provided that the system from which the water is obtained has conducted the analyses required under 310 CMR 22.07A, unless otherwise specified by the Department.

(3) SOC Monitoring Frequency.

(a) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in 310 CMR 22.07A(1) during each compliance period beginning with the compliance period starting January 1, 1993.

(b) 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.

(c) Systems serving less than or equal to 3,300 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.

(4) SOC Sampling Waivers. Each community and non-transient water system may apply to the Department for a waiver from the requirement of 310 CMR 22.07A(3). A system must reapply for a waiver for each compliance period.

Basis of an SOC Sampling Waiver. The Department may grant a waiver after evaluating the following factor(s): 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 II or IWPA, 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.

(a) Previous analytical results.

(b) 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.

(c) The environmental persistence and transport of the pesticide or PCBs.

(d) 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 and other protective measures considered relevant by the Department.

(e) Elevated nitrate levels at the water supply source.

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

(5) Detection of an SOC. If an organic contaminant listed in 310 CMR 22.07A(1) is detected (as defined by 310 CMR 22.07A(16) in any sample, then:

(a) Each system shall report to the Department within seven days and shall monitor quarterly at each sampling point which resulted in a detection.

(b) The Department may decrease the quarterly monitoring requirement specified in 310 CMR 22.07A(5)(a) provided it has determined that the system is reliably and consistently 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.

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(c) After the Department determines the system is reliably and consistently below the maximum contaminant level the Department may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.

(d) Systems which have three consecutive annual samples with no detection of a contaminant may apply to the Department for a waiver as specified in 310 CMR 22.07A(4).

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

(6) MCL Violation and Reliably/consistently below the MCL. Systems which violate the requirements of 310 CMR 22.07A(1) as determined by 310 CMR 22.07A(9) must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the Department determines the system is reliably and consistently below the MCL, as specified in 310 CMR 22.07A(9), the system shall monitor at the frequency specified in 310 CMR 22.07A(5)(c).

(7) SOC Confirmation Sampling. 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 as specified by 310 CMR 22.07A(9). The Department has discretion to delete results of obvious sampling errors from this calculation.

(8) Composite SOC Sampling. The total number of samples which must be analyzed may be reduced by compositing samples. 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 and none of the samples to be composited are representative of multiple sources. Compositing of samples must be approved by the Department and must be done in the laboratory and analyzed within the holding times specified by EPA-814B-92-002, Change 2 - September 1992 *Manual for the Certification of Laboratories Analyzing Drinking Water*, third edition. Compositing of sources with previous detections greater than the detection limit is not allowed, unless otherwise authorized by the Department.

(a) If the concentration in the composite sample exceeds the detection limit for one or more contaminants listed in 310 CMR 22.07A(1), then a follow-up sample must be taken and analyzed from each sampling point included in the company within 14 days after completion of the composite analysis or before the holding time of the initial sample is exceeded, whichever is sooner.

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

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

(9) SOC Compliance Calculations. Compliance with 310 CMR 22.07A(1) 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.

(a) Greater than Annual. For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.

(b) Annual or Less. Each supplier of water monitoring annually or less frequently whose sample result exceeds the regulatory detection level as defined by 310 CMR 22.07A(16) must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

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(c) 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.

(d) If a supplier of water fails to collect the required number of samples, compliance will be based on the total number of samples collected.

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

(f) Average Exceeding SOC MCLs. When the average of four analyses made pursuant to 310 CMR 22.07A(5), rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the Department pursuant to 310 CMR 22.15 and give public notice to the public pursuant to 310 CMR 22.16. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as condition to variance, exemption or enforcement action shall become effective.

(10) SOC Analytical Methods. Analysis for the contaminants listed in 310 CMR 22.07A(1) shall be conducted using the following EPA methods or their equivalent as approved by EPA. Methods 508A and 515.1 are contained in *Methods for the Determination of Organic Compounds in Drinking Water*, EPA-600/4-88-039, December 1988, Revised, July 1991, Methods 547, 550 and 550.1 are in, *Methods for the Determination of Organic Compounds in Drinking Water - Supplement I*, EPA/600-4-90-020, July 1990. Methods 548.1, 549.1, 552.1 and 555 are in, *Methods for the Determination of Organic Compounds in Drinking Water - Supplement II*, EPA/600/R-92/129, August 1992. Methods 502.2, 504.1, 505, 506, 507, 508, 508.1, 515.2, 524.2, 525.2, 531.1, 551.1 and 552.2 are in *Methods for the Determination of Organic Compounds in Drinking Water – Supplement III*, EPA/600/R-95-131, August 1995. Method 1613 is titled "Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope-Dilution HRGC/HRMS", EPA/821-B-94-005, October 1994. These documents are available from the National Technical Information Service, NTIS PB91-231480, PB91-146027, PB92-27703, PB95-261616 and PB95-104774 (respectively), U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. The phone number is 800-553-6847. The phone number is 513-569-7586. Method 6610 is contained in *Standard Methods for the Examination of Water and Wastewater* 18th Edition Supplement, 1994, or with the 19th edition (1995) or 20th edition (1998), any of these three editions may be used. Method 6651 is contained in *Standard Methods for the Examination of Water and Wastewater* 18th Edition, (1992), 19th edition (1995), or 20th edition (1998); any of these three editions may be used. The APHA documents are available from American Public Health Association, 1015 Fifteenth Street NW, Wash., D.C. 20005. Other required analytical test procedures germane to the conduct of these analyses are contained in Technical Notes on Drinking Water Methods, EPA/600/R-94-173, October 1994, NTIS PB95-104766. EPA Methods 515.3 and 549.2 are available from U.S. Environmental Protection Agency, National Exposure Research Laboratory [NERL]-Cincinnati, 26 West Martin Luther King Drive, Cincinnati, OH 45268 ASTM Methods D 5317-93, 98 (Reapproved 2003) is available in the Annual Book of ASTM Standards, (1999), Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, any edition containing the cited version of the methods may be used. EPA Methods 515.4, "Determination of Chlorinated Acids in Drinking Water by Liquid-Liquid Microextraction, Derivatization and Fast Gas Chromatrography with Electron Capture Detection", Revision 1.0, April 2000, EPA/815/B-00/001 and EPA Methods 552.3, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection", Revision 1.0, July 2003, EPA 815-B-03-002, can be accessed and downloaded directly online at http://www.epa/gov/safewater/methods/sourcalt.html. Syngenta Method AG-625, "Atrazine in Drinking Water by Immunoassay", February 2001, is available from Syngenta Crop Protection, Inc., 410 Swing Road, P.O. Box 18300, Greensboro, NC 27419. Telephone: 336-632-6000. Method 531.2 "Measurement of N-methylcarbamoyloximes and N-methylcarbamoyloximes and N-methylcarbamates in Water by Direct Aqueous Injection HPLC with Postcolumn Derivatization", Revision 1., September 2001, EPA 815-B-01-002, can be accessed and downloaded directly online at *http://www.epa.gov/safewater/methods/sourcult.htnml.*

22.07A: continued

Contaminant	EPA Method	SM	ASTM	Other
2,3,7,8-TCDD(dioxin)	1613			
2,4-D[3] (as acid, salts and esters)	515.2,555,515.1, 515.3, 515.4		D5317-93,98 (Reapproved 2003).	
2,4,5-TP[3] (Silvex)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003).	
Alachor[1]	505, 507, 525.2, 508.1, 551.1			
Atrazine[1]	505, 507, 525.2, 508.1, 551.1			Syngenta AG-625[4]
Benzo(a)pyrene	525.2, 550, 550.1			
Carbofuran	531.1, 531.2	6610		
Chlordane	505, 508, 525.2, 508.1			
Dalapon	552.1, 515.1, 515.3, 552.2, 515.4			
Di(2-ethylhexyl)adipate	506, 525.2			
Di(2-ethylhexyl)phthalate	506, 525.2			
Dibromochloropropane (DBCP)	504.1, 551.1			
Dinoseb[3]	515.2, 555, 515.1, 515.3, 515.4			
Diquat	549.2			
Endothall	548.1			
Endrin	505, 508, 525.2, 508.1, 551.1			
Ethylene dibromide (EDB)	504.1, 551.1	6651		
Glyphosate	547			
Heptachlor	505, 508, 525.2, 508.1, 551.1			
Heptachlor Epoxide	505, 508, 525.2, 508.1, 551.1			
Hexachlorobenzene	505, 508, 525.2, 508.1, 551.1			
Hexachloro-cyclopentadiene	505, 508, 525.2, 508.1, 551.1			
Lindane	505, 508, 525.2, 508.1, 551.1			
Methoxychlor	505, 508, 525.2, 508.1, 551.1			
Oxamyl	531.1, 531,2	6610		
PCBs(as decachlorobiphenyl)[2]	508A			
PCBs (as Aroclors)[2]	505, 508,508.1,525.2			
Pentachlorophenol	515.2,525.2,555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003).	
Picloram[3]	515.2,555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003).	
Simazine[1]	505,507,525.2, 508.1,551.1			
Toxaphene	505,508,508.1, 525.2			

Footnotes

[1] Substitution of the detector specified in Methods 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.

22.07A: continued

[2] PCBs are qualitatively identified as Arolcolrs 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.

[3] 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 Methods D5317-93,98 (Reapproved 2003).

[4] 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 ½ the maximum contaminant level (MCL) (in other words, greater than 0.0015mg/L or 1.5 ug/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.

(11) Analysis for PCBs shall be conducted as follows:

(a) Each system that monitors for PCBs shall analyze each sample using either Method 508.1, 525.2, 508 or 505. The mean of the method detection limits of all Aroclors shall be 0.00025mg/l except for Aroclor 1221 which is 0.02 mg/l. Users of Method 505 may have more difficulty in achieving the required Aloclor detection limits than using methods 508.1, 525.2 or 508.

1. A lab may conduct a scan for Aroclors using any one of the four methods mentioned in 310 22.07A(11)(a).
2. A lab that is certified for any of the four methods listed in 310 22.07A(11)(a) is eligible to conduct the scan for Aroclors.

(b) If PCBs (as one of seven Aroclors) are detected as designated in 310 CMR 22.07A(11)(a) the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

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

(12) Grandfathered SOC Data: The Department may allow the use of monitoring data collected after January 1, 1990, for purposes of satisfying the initial monitoring requirement of 310 CMR 22.07A(2), if in the opinion of the Department, the data are generally consistent with the requirements of 310 CMR 22.07A(2). A single sample rather than four quarterly samples may be allowed by the Department to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(13) Increased SOC Sampling: 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).

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

(15) Designated Sampling Schedules: Each public water system shall monitor at the time designated by the Department within each compliance period.

22.07A: continued

(16) SOC Detection Limits: Detection as used in 310 CMR 22.07A(5) shall be defined as greater than or equal to the following concentrations for each contaminant. (Please refer to the Guidelines and Policies for further information regarding detection limits).

SOC DETECTION LIMITS

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-ethythexyl) adipate	0.0006
Di (2-ethylhexyl) phthalate	0.0006
Dinoseb	0.0002
Diquat	0.0004
2,4-D	0.0001
Endothall	0.009
Endrin	0.00001
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
Toxaphene	0.001
2,3,7,8-TCDD (Dioxin)	0.000000005
2,4,5-TP (Silvex)	0.0002

22.07A: continued

(17) SYNTHETIC ORGANIC BATs. The EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1412, has identified as indicated in the Table below either granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in 310 CMR 22.07A(1):

BAT FOR ORGANIC CONTAMINANTS LISTED IN 310 CMR 22.07A(1)

CAS #	Chemical	GAC	PTA	OX
15972-60-8	Alachlor	X		
116-06-3	Aldicarb	X		
1646-88-4	Aldicarb sulfone		X	
1646-87-3	Aldicarb sulfoxide		X	
1912-24-9	Atrazine	X		
50-32-8	Benzo[a)pyrene	X		
1563-66-2	Carbofuran		X	
57-74-9	Chlordane	X		
75-99-0	Dalapon	X		
96-12-8	Dibromochloropropane (DBCP)	X	X	
75-09-2	Dichloreomethane		X	
103-23-1	Di (2-ethylhexyl) adipate	X	X	
117-81-7	Di (2-ethylhexyl) phthalate	X		
88-85-7	Dinoseb	X		
85-00-7	Diquat	X		
94-75-7	2,4-D	X		
72-20-8	Endrin	X		
145-73-3	Endothall	X		
106-93-4	Ethylene Dibromide (EDB)	X	X	
1071-583-6	Glyphosate			X
76-44-8	Heptachlor	X		
1024-57-3	Heptachlor epoxide	X		
118-74-1	Hexachlorobenzene	X		
77-47-3	Hexachlorocyclopentadiene	X	X	
58-89-9	Lindane	X		
72-43-5	Methoxychlor	X		
1336-36-3	Polychlorinated biphenyls(PCB)		X	
23135-22-0	Oxamyl (Vydate)	X		

22.07A: continued

BAT FOR ORGANIC CONTAMINANTS LISTED IN 310 CMR 22.07A(1)

CAS #	Chemical	GAC	PTA	OX
87-86-5	Pentachlorophenol	X		
1918-02-1	Picloram	X		
93-72-1	2,4,5-TP (Silvex)	X		
122-34-9	Simazine	X		
120-82-1	1,2,4-Trichlorobenzene	X	X	
79-00-5	1,1,2-Trichloroethane	X	X	
1746-01-6	2,3,7,8-TCDD(Dioxin)	X		
8001-35-2	Toxaphene	X	X	

(18) New Systems/Sources. Each new supplier of water or supplier of water that uses a new source of water that begins operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the Department. The supplier of water 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 in 310 CMR 22.07A.

22.07B: Maximum Contaminant Levels (MCLs) for Volatile Organic Compounds (VOC)

(1) Volatile Organic MCLs. The following maximum contaminant levels for organic contaminants apply to community and non-transient, non-community water systems.

	CAS No.	Contaminant	MCL (mg/l)
(a)	75-01-4	Vinyl chloride	0.002
(b)	71-43-2	Benzene	0.005
(c)	56-23-5	Carbon tetrachloride	0.005
(d)	107-06-2	1,2-Dichloroethane	0.005
(e)	79-01-6	Trichloroethylene	0.005
(f)	106-46-7	para-Dichlorobenzene	0.005
(g)	75-35-4	1,1-Dichloroethylene	0.007
(h)	71-55-6	1,1,1-Trichloroethane	0.2
(i)	156-59-2	cis-1,2-Dichloroethylene	0.07
(j)	78-87-5	1,2-Dichloropropane	0.005
(k)	100-41-4	Ethylbenzene	0.7
(l)	108-90-7	Monochlorobenzene	0.1
(m)	95-50-1	o-Dichlorobenzene	0.6
(n)	100-42-5	Styrene	0.1
(o)	127-18-4	Tetrachloroethylene	0.005
(p)	108-88-3	Toluene	1
(q)	156-60-5	trans-1,2-Dichloroethylene	0.1
(r)	1330-20-7	Xylenes (total)	10
(s)	75-09-2	Dichloromethane	0.005
(t)	120-82-1	1,2,4-Trichlorobenzene	0.07
(u)	79-00-5	1,1,2-Trichloroethane	0.005

(2) VOC Sampling Requirements. Beginning with the initial compliance period analysis of the contaminants listed in 310 CMR 22.07B(1) for the purpose of determining compliance with the maximum contaminant level the monitoring shall be conducted as follows:

(a) VOC Ground Water Monitoring Protocols. 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 (sampling point). If conditions warrant, 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 the Department determine that conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

22.07B: continued

(b) VOC Surface Water Monitoring Protocols. Surface water systems (or combined surface/ground) 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 (sampling point). If conditions warrant, 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.

(c) Multiple Sources. 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 of normal operating conditions (*i.e.*, when water representative of all sources is being used).

(d) Initial VOCs Sampling Frequency. Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in 310 CMR 22.07B(1) during each compliance period, beginning in the initial compliance period.

(e) VOC Grandfathered Data with No Detects - Reduced Monitoring. If the initial monitoring for contaminants listed in 310 CMR 22.07B(1) as allowed in 310 CMR 22.07B(10), has been completed by December 31, 1992, and the system did not exceed the detection levels in 310 CMR 22.07B(4) any contaminant listed in 310 CMR 22.07B(1), then each ground and surface water system shall take one sample annually beginning with the initial compliance period.

(f) Reduced VOC Sampling - Annually. Groundwater and surface water systems which do not detect one of the contaminants listed in 310 CMR 22.07B(1) after conducting the initial round of monitoring required in 310 CMR 22.07B(2)(a) and (b) shall take one sample annually.

(3) VOC Sampling Waivers. Each community and non-transient non-community system which does not detect a contaminant listed in 310 CMR 22.07B(1) may apply to the Department for a waiver from the requirements of 310 CMR 22.07B(2)(d), (f) and (10) after completing the initial monitoring. (For the purposes of 310 CMR 22.07B, detection is defined as $\geq$0.0005 mg/l.) A waiver shall be effective for no more than three years (one compliance period).

(a) Basis of a VOC Sampling Waiver. A Department may grant a waiver after evaluating the following factor(s):

1. 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 State reveals no previous use of the contaminant within the watershed or Zone II or IWPA, a waiver may be granted.

2. 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.

a. Previous analytical results.

b. 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.

c. The environmental persistence and transport of the contaminants.

d. The number of persons served by the public water system and the proximity of a smaller system to a larger system.

e. How well the water source is protected against contamination, such as whether it is a surface or groundwater system and other protective measures considered relevant by the Department. Groundwater systems must consider factors such as depth of the well, the type of soil, and wellhead protection. Surface water systems must consider watershed protection.

22.07B: continued

(b) VOC Waiver Requirements for GW Systems. As a condition of the waiver a groundwater system must take one sample at each sampling point during the time the waiver is effective (*i.e.*, one sample during one compliance period or three years) and update its vulnerability assessment considering the factors listed in 310 CMR 22.07B(3)(a). Based on this vulnerability assessment the Department must reconfirm 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 310 CMR 22.07B(10)(a).

(c) VOC Waiver Requirements for SW Systems. Each community and non-transient non-community surface water system which does not detect a contaminant listed in 310 CMR 22.07B(1) may apply to the Department for a waiver from the requirements of 310 CMR 22.07B(2)(a) after completing the initial monitoring. Systems meeting this criteria must be determined by the Department to be non-vulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the Department.

(4) Detection of a VOC.

(a) If a contaminant listed in 310 CMR 22.07B(1) is detected at a level exceeding 0.0005 mg/l in any sample, then:

1. The system shall report to the Department within seven days and shall monitor for the contaminants listed in 310 CMR 22.07B quarterly at each sampling point which resulted in a detection.

2. The Department may decrease the quarterly monitoring requirement specified in 310 CMR 22.07B(4)(a)1. provided it has determined that the system is reliably and consistently 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. 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 or as specified by the Department.

(b) Detection of a VOC Other than Those Listed in 310 CMR 22.07B(1). Systems which detect any VOC contaminants at any level shall report the results to the Department.

(c) VOCs Reliably and Consistently below the MCL. Systems which violate the requirements of 310 CMR 22.07B(1), as determined by 310 CMR 22.07B(7), must monitor quarterly. After a minimum of four consecutive quarterly samples which show the system is in compliance as specified in 310 CMR 22.07B(7) the system demonstration and the Department determines that the system is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and time specified in 310 CMR 22.07B(4)(a)3.

(5) VOC Confirmation Samples. The Department may require a confirmation sample for positive or negative results. The results of the confirmation sample must be averaged with the first sampling result and the average is used for the compliance determination as specified by 310 CMR 22.07B(7). The Department has the discretion to delete results of obvious sampling errors from this calculation.

(6) VOC Composite Samples. The total number of samples a system must analyze may be reduced, with the Department's approval, by the compositing of samples. 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 and none of the samples to be composited are representative of multiple sources. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection. Compositing of sources with previous detections exceeding the detection limit is not allowed, unless otherwise authorized by the Department. If duplicates of the original samples taken from each sampling point used in the composit samples 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 after completing the analyses of the composited samples, provided the holding times of the samples has not been exceeded.

22.07B: continued

(a) If the concentration in the composite sample is ≥0.0005 mg/l for any contaminant listed in 310 CMR 22.07B(1), then a follow-up sample must be taken and analyzed within 14 days from each sampling point included in the composite.

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

(c) Compositing will be permitted at sampling points within a single system, unless the population served by the system is ≤3,300 persons. In systems serving ≤3,300 persons, compositing is permitted with the Department's approval among different systems provided the five-sample limit is maintained.

(d) Compositing samples prior to GC analysis.

1. Add 5 ml or equal larger amounts of each sample (up to five samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.
2. The samples must be cooled at 4°C during this step to minimize volatilization losses.
3. Mix well and draw out a 5-ml aliquot for analysis.
4. Follow sample introduction, purging, and desorption steps described in the method.
5. If less than five samples are used for compositing, a proportionately small syringe may be used.

(e) Compositing samples prior to GC/MS analysis.

1. Inject 5-ml or equal larger amounts of each aqueous sample (up to five samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.
2. The total volume of the sample in the purging device must be 25 ml.
3. Purge and desorb as described in the method.

(7) VOC Compliance Calculations. Compliance with 310 CMR 22.07B(1) 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.

(a) Greater than Annual. For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.

(b) Annually or Less. Each supplier of water 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.

(c) 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.

(d) If a supplier of water fails to collect the required number of samples, compliance will be based on the total number of samples collected.

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

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

(g) Average Exceeding VOC MCLs. When the average of four analyses made pursuant to 310 CMR 22.07B(4), rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the Department pursuant to 310 CMR 22.15 and give notice to the public pursuant to 310 CMR 22.16. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as condition to variance, exemption or enforcement action shall become effective.

22.07B: continued

(8) VOC Analytical Methods. Analysis for the contaminants listed in 310 CMR 22.07B(1) shall be conducted using the following EPA methods or their equivalent as approved by EPA.

Contaminant	EPA Method
Benzene	502.2, 524.2
Carbon tetrachloride	502.2, 524.2, 551.1
Chlorobenzene	502.2, 524.2
1,2-Dichlorobenzene	502.2, 524.2
1,4- Dichlorobenzene	502.2, 524.2
1,2- Dichloroethane	502.2, 524.2
cis-Dichloroethylene	502.2, 524.2
trans- Dichloroethylene	502.2, 524.2
Dichloromethane	502.2, 524.2
1,2-Dichloropropane	502.2, 524.2
Ethylbenzene	502.2, 524.2
Styrene	502.2, 524.2
Tetrachloroethylene	502.2, 524.2, 551.1
1,1,1-Trichlorobenzene	502.2, 524.2, 551.1
Trichloroethylene	502.2, 524.2, 551.1
Toluene	502.2, 524.2
1,2,4-Trichlorobenzene	502.2, 524.2
1,1-Dichloroethylene	502.2, 524.2
1,1,2-Trichloroethane	502.2, 524.2
Vinyl chloride	502.2, 524.2
Xylenes(total)	502.2, 524.2

(a) Methods 502.2 is in *Methods for the Determination of Organic Compounds in Drinking Water*, EPA-600/4-88-039, December 1988, Revised, July 1991.
(b) Methods 524.2, is in *Methods for the Determination of Organic Compounds in Drinking Water - Supplement III*, EPA/600/R-95/131, August 1995.
(c) Method 551.1 is in Methods for the Determination of Organic Compounds in Drinking Water –Supplement III, EPA/600/R-95-131, August 1995 and can be used to measure carbon tetrachloride, tetrachloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene.

(9) Maximum Contaminant Levels (MCLs) for Volatile Organic Compounds (VOC). (Reserved)

(10) Grandfathered VOC Data. The Department may allow the use of monitoring data collected after January 1, 1988, for purposes of complying with initial compliance period. If the data are generally consistent with the other requirements in 310 CMR 22.07B, the Department may use these data (*i.e.*, a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement of 310 CMR 22.07B(2)(d). Systems which use grandfathered samples and did not detect any contaminants listed in 310 CMR 22.07B(1) shall begin monitoring annually in accordance with 310 CMR 22.07B(2)(e) beginning with the initial compliance period.

(11) Increased VOC Sampling. The Department may increase required monitoring where necessary to detect variations within the system.

(12) VOC Sampling Schedules. Each public water system shall monitor at the time designated by the Department within each compliance period.

22.07B: continued

(13) Consecutive System Monitoring. Public water systems that obtain water from another public water system are exempt from conducting compliance monitoring for the purchased portion of the system for the volatile organic chemicals under 310 CMR 22.07B, provided that the system from which the water is obtained has conducted the analyses required under 310 CMR 22.07B, unless otherwise specified by the Department.

(14) Volatile Organic BATs. The Department hereby identifies as indicated in the Table below either granular activated carbon (GAC), packed tower aeration (PTA), or both as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in 310 CMR 22.07B(1):

BAT FOR ORGANIC CONTAMINANTS

CAS #	Chemical	GAC	PTA
71-43-2	Benzene	X	X
56-23-5	Carbon tetrachloride	X	X
95-50-1	o-Dichlorobenzene	X	X
107-06-2	1,2-Dichloroethane	X	X
156-59-2	cis-1,2-Dichloroethylene	X	X
156-60-5	trans-1,2-Dichloroethylene	X	X
75-35-4	1,1-Dichloroethylene	X	X
78-87-5	1,2-Dichloropropane	X	X
100-41-4	Ethylbenzene	X	X
108-90-7	Monochlorobenzene	X	X
106-46-7	para-Dichlorobenzene	X	X
100-42-5	Styrene	X	X
127-18-4	Tetrachloroethylene	X	X
71-55-6	1,1,1-Trichloroethane	X	X
79-01-6	Trichloroethylene	X	X
108-88-3	Toluene	X	X
75-01-4	Vinyl chloride		X
1330-20-7	Xylene	X	X

(15) New Systems/Sources. Each new supplier of water or supplier of water that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the Department. The supplier of water 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 in 310 CMR 22.07B.

22.07C: Unregulated Inorganic and Organic Chemicals Special Monitoring

(1) Monitoring for Unregulated Organic and Inorganic Contaminants. The Monitoring frequency for the contaminants listed in 310 CMR 22.07C(5), (7) and (8) shall be as follows.

(a) Sampling for Synthetic Organic Contaminants. Reserved.

(b) Sampling for Inorganic Contaminants. Reserved.

(c) Sampling for Volatile Organic Contaminants. Each community and non-transient non-community water system shall take one sample at each sampling point for each contaminant listed in 310 CMR 22.07C(5) and report the results to the Department. Monitoring shall be completed at the same time as routine VOC sampling in accordance with 310 CMR 22.07B.

22.07C: continued

(2) Sampling Locations. The sampling for the contaminants listed in 310 CMR 22.07C shall be conducted as follows:

(a) Ground Water Sampling Protocols. 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 (sampling point). Each sample shall be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(b) Surface Water Sampling Protocols. Surface water systems including, but not limited to surface water systems with a combination of surface and ground sources 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 (sampling point). Each sample shall be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(c) Multiple Sources. If the system draws water from more than one source and the sources are combined before distribution, the system shall sample at an entry point to the distribution system during periods of normal operating conditions (*i.e.*, when water representative of all sources is being used).

(d) Confirmation Sampling. The Department may require a confirmation sample for positive or negative results.

(e) Composite Sampling. The Department may reduce the total number of samples a system shall analyze by allowing the use of compositing. 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 shall be done in the laboratory and the composite sample shall be analyzed within 14 days of collection and comply with 310 CMR 22.07B(6)(a) through (e). If the population served by the system is >3,300 persons, then compositing may only be permitted by the Department at sampling points within a single system. In systems serving $\leq$3,300 persons, the Department may permit compositing among different systems provided the five-sample limit is maintained.

(3) Unregulated Inorganic and Organic Chemical Special Monitoring. (Reserved)

(4) Sampling Waivers. Each community and non-transient non-community water system may apply to the Department for a waiver from the requirements of 310 CMR 22.07C(1)(a), (b) and (c).

Basis of Sampling Waivers. The Department may grant a waiver for the monitoring requirement of 310 CMR 22.07C(5) based on the criteria specified in 310 CMR 22.07B(3)(a). Waivers for monitoring requirements of 310 CMR 22.07C(7) are based on the criteria specified in 310 CMR 22.07A(4). The Department may grant a waiver from the requirement of 310 CMR 22.07C(8) if previous analytical results indicate contamination would not occur, provided this data was collected after January 1, 1990.

(5) Unregulated VOC Contaminants. Methyl tert-butyl ether (MTBE)

(6) EPA Analytical Methods for Unregulated VOC Contaminants. Analysis for the contaminants listed in 310 CMR 22.07C(5) shall be conducted using the recommended EPA methods at 310 CMR 22.07B(8).

(7) Unregulated Synthetic Organic Contaminants and Analytical Methods. Reserved.

(8) Unregulated Inorganic Contaminants and Analytical Methods. Reserved.

(9) Repeat Monitoring. All community and non-transient, non-community water systems shall repeat the monitoring for contaminants listed in 310 CMR 22.07C(5) no less frequently than every three years or in accordance with the sampling frequencies in 310 CMR 22.07(B).

(10) Unregulated Inorganic and Organic Chemical Special Monitoring. (Reserved)

22.07C: continued

(11) Analysis under 310 CMR 22.07C shall be conducted by laboratories approved under 310 CMR 42.00: *Certification and Operation of Environmental Analysis Laboratories* using the recommended EPA methods listed at 310 CMR 22.07A(10).

22.07D: Secondary Chemical Standards

(1) Secondary Contaminants. The following contaminant levels apply to every public water systems:

Contaminant	Secondary MCL
(a) Aluminum	0.05 to 0.2 mg/l
(b) Chloride	250 mg/l
(c) Color	15 Color Units
(d) Copper	1 mg/l
(e) Corrosivity	Non-corrosive
(f) Fluoride	2.0 mg/l
(g) Foaming Agents	0.5 mg/l
(h) Iron	0.3 mg/l
(i) Manganese	0.05 mg/l
(j) Odor	3 Threshold Unit Number
(k) pH	6.5 – 8.5
(l) Silver	0.10 mg/l
(m) Sulfate	250 mg/l
(n) Total Dissolved Solids	500 mg/l
(o) Zinc	5 mg/l

(2) Monitoring for Secondary Contaminants. The monitoring frequency for the contaminants listed in 310 CMR 22.07D(1) is at the discretion of the Department.

(3) Exceeding a Secondary Maximum Contaminant Level. If the Department finds based on a health evaluation by the Department's Office of Research and Standards, that an SMCL exceedance, acting alone or in combination with other contaminants, poses an unacceptable health risk to consumers, the public water system shall take all actions necessary to reduce the SMCL concentrations to levels the Department deems safe by the deadline specified by the Department. Such public water system shall also monitor the water and provide public notice as directed by the Department and notify the Department in writing of its proposed actions.

(4) The analytical methods for Secondary Contaminants are available in the Federal Register/Vol.72, No. 47/March 12, 2007.

22.07E: Disinfection Byproducts, Disinfectant Residuals and Disinfection Byproduct Precursors

(1) MCLs for Disinfection Byproducts. The Maximum Contaminant Levels for Disinfection byproducts of 310 CMR 22.07E apply only to Community Water Systems and Non-transient Non-community Water Systems which add a chemical Disinfectant (oxidant) to the water in any part of the drinking water treatment process. The MCLs are as follows:

Disinfection Byproduct	MCL (mg/l)
Total Trihalomethanes (TTHM)	0.080
Haloacetic (Acids Five) (HAA5)	0.060
Bromate	0.010
Chlorite	1.0

Total Trihalomethanes are the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform) expressed in milligrams per liter (mg/l). Haloacetic acids are the sum of the concentrations of monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid and dibromoacetic acid expressed in milligrams per liter (mg/l).

22.07E: continued

(a) Compliance Dates for CWSs and NTNCWSs. Surface Water and Groundwater under the Direct Influence of Surface Water systems serving 10,000 or more persons must comply with 310 CMR 22.07E(1) beginning January 1, 2002. Surface Water and Groundwater under the Direct Influence of Surface Water systems serving fewer than 10,000 persons and systems using only groundwater not under the direct influence of surface water must comply with 310 CMR 22.07E(1) beginning January 1, 2004.

(b) TTHM and HAA5 - RAA Compliance.

Compliance Dates. Surface Water and Groundwater under the Direct Influence of Surface Water systems serving 10,000 or more persons must comply with 310 CMR 22.07E(1)(b) beginning January 1, 2002. Surface Water systems and Groundwater under the Direct Influence of Surface Water systems serving fewer than 10,000 persons and systems using only groundwater not under the direct influence of surface water must comply with 310 CMR 22.07E(1)(b) beginning January 1, 2004. All systems must comply with these MCLs until the date specified for Disinfection byproduct compliance in 310 CMR 22.07F(7).

(c) Stage 2 Disinfection Byproducts – LRAA Compliance.

Compliance Dates. The MCLs required under 310 CMR 22.07F for TTHM and HAA5 must be complied with as a Locational Running Annual Average at each monitoring location beginning the date specified for compliance in 310 CMR 22.07F(7)(c).

(2) MRDLs for Disinfectant Residuals. The maximum residual Disinfectant levels for the Disinfectant residuals of 310 CMR 22.07E apply to Community Water Systems and Non-transient Non-community Water Systems which add a chemical Disinfectant (oxidant) to the water in any part of the drinking water treatment process. In addition, the maximum residual Disinfectant level for chlorine dioxide applies to Transient Non-community Water Systems using chlorine dioxide as a Disinfectant or oxidant. The 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).

Notwithstanding the MRDLs in 310 CMR 22.07E(2), systems may increase residual Disinfectant levels in the Distribution System of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances including, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross connection events.

(3) Compliance Dates.

(a) Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water that serves 10,000 or more persons shall comply with the requirements of 310 CMR 22.07E beginning January 1, 2002.

(b) Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water that serves fewer than 10,000 persons and each Supplier of Water who uses only a groundwater source not under the direct influence of surface water shall comply with the requirements of 310 CMR 22.07E beginning January 1, 2004.

(c) Each Supplier of Water that plans to install granular activated carbon (GAC) or membrane technology to comply with the MCLs in 310 CMR 22.07E(1) may apply to the Department for an extension of up to 24 months past the dates in 310 CMR 22.07E(3)(a) and (b), but not beyond December 31, 2003. In granting the extension, the Department will require the system to issue public notice in accordance with 310 CMR 22.16. The notice shall include the length of the extension, the mandatory health effects language for Disinfection byproducts and the anticipated schedule for the construction and implementation of the new treatment processes. The Department may also require the Supplier of Water to perform an engineering study to optimize the current treatment processes to minimize the formation of Disinfection byproducts during the period of the extension.

22.07E: continued

(4) Disinfection Byproducts BATs.

(a) The EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1412 has identified the following as the best technology, Treatment Techniques, or other means available for achieving compliance with the Maximum Contaminant Levels for Disinfection byproducts identified in of 310 CMR 22.07E(1):

Disinfection Byproduct	Best Available Technology
TTHM	Enhanced Coagulation or Enhanced Softening or GAC10, with chlorine as the primary and residual Disinfectant.
HAA5	Enhanced Coagulation or Enhanced Softening or GAC10, with chlorine as the primary and residual Disinfectant.
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) The EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1412, 40 CFR 141, 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 310 CMR 22.07E(1) for all systems that disinfect their source water:

Disinfection byproduct	Best Available Technology
Total Trihalomethanes (TTHM) and Haloacetic (Acids Five) (HAA5).	Enhanced Coagulation or Enhanced Softening, plus GAC10; or nanofiltration with a molecular weight cutoff ≤1000 Daltons; or GAC20

(c) The EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1412, 40 CFR 141, 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 310 CMR 22.07E(1) for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

Disinfection Byproduct	Best Available Technology
Total Trihalomethanes (TTHM) and Haloacetic (Acids Five) (HAA5).	Systems serving ≥10,000: Improved Distribution System and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance Systems serving <10,000: Improved Distribution System and storage tank management to reduce residence time.

(5) Disinfectant Residuals BATs. The EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1412, 40 CMR 141, has identified the control of treatment processes to reduce Disinfectant demand and the control of Disinfection treatment processes to reduce Disinfectant levels as the best technology, Treatment Techniques, or other means available for achieving compliance with the maximum residual Disinfectant levels for Disinfectant residuals identified in 310 CMR 22.07E(2).

(6) Analytical Requirements.

(a) Each Supplier of Water shall use only the analytical method(s) specified in 310 CMR 22.07E(6), or their equivalent as otherwise approved by EPA for monitoring under 310 CMR 22.07E and 22.07F, to demonstrate compliance with the requirements of 310 CMR 22.07E and 22.07F. These methods are effective for compliance monitoring as of February 16, 1999 unless a different effective date is specified in 310 CMR 22.07E(6) or by the Department.

22.07E: continued

(b) The methods described in 310 CMR 22.07E(6)(c) through (e) are contained within the following documents: EPA Method 552.1 is in *Methods for the Determination of Organic Compounds in Drinking Water - Supplement II*, USEPA, August 1992, EPA/600/R-92/129 (available through the National Technical Information Service (NTIS), PB92-207703). EPA Methods 502.2, 524.2, 551.1, and 552.2 are in *Methods for the Determination of Organic Compounds in Drinking Water - Supplement III*, USEPA, August 1995, EPA/600/R-95/131 (available through the NTIS, PB95- 261616). EPA Method 300.0 is in *Methods for the Determination of Inorganic Substances in Environmental Samples*, USEPA, August 1993, EPA/600/R-93/100 (available through the NTIS, PB94-121811). EPA Methods 300.1 and 321.8 are in Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1, USEPA, August 2000, EPA 815-R-00-014 (available through NTIS, PB2000-106981. EPA Method 317.0, Revision 2.0, *Determination of Inorganic Oxyhalide Disinfection By-products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Postcolumn Reagent for Trace Bromate Analysis, USEPA, July 2001, EPA 815-B-01-001, EPA Method 326.0, Revision 1.0, Determination of Inorganic Oxyhalide Disinfection By-products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis*, USEPA, June 2002, EPA 815—R-03-007, 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 and EPA Method 552.3, Revision 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection, " USEPA, July 2003, EPA-815-B-03-002 can be accessed and downloaded directly on-line at http://www.epa.gov/safewater/methods/sourcalt.html. EPA Method 415.3, Revision 1.1, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water", USEPA, February 2005, EPA/600/R-05/055 can be accessed and downloaded directly on-line at www.epa.gov/nerlcwww/ordmeth.htm. Standard Methods 4500–Cl D, 4500–Cl E, 4500–Cl F, 4500–Cl G, 4500–Cl H, 4500–Cl I, 4500–ClO2 D, 4500–ClO2 E, 6251 B, and 5910 B shall be followed in accordance with Standard Methods for the Examination of Water and Wastewater, 19th or 20th Editions, American Public Health Association, 1995 and 1998, respectively. The cited methods published in either edition may be used. Standard Methods 5310 B, 5310 C, and 5310 D shall be followed in accordance with the Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater, or the Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, 1996 and 1998, respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. Standard Methods 4500–Cl D–00, 4500–Cl E–00, 4500–Cl F–00, 4500–Cl G–00, 4500–Cl H–00, 4500–Cl I–00, 4500–ClO2 E–00, 6251 B–94, 5310 B–00, 5310 C–00, 5310 D–00 and 5910 B–00 are available at http:// www.standardmethods.org or at EPA's Water Docket. 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 are IBR-approved. ASTM Methods D 1253–86 and D 1253–86 (Reapproved 1996) shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 1996 or any ASTM edition containing the IBR-approved version of the method may be used. ASTM Method D1253–03 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2004 or any ASTM edition containing the IBR-approved version of the method may be used. ASTM Method D 6581–00 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2001 or any ASTM edition containing the IBR-approved version of the method may be used; copies may be obtained from the American Society for Testing and Materials International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

22.07E: continued

(c) Disinfection Byproducts.

1. Each Supplier of Water shall measure Disinfection byproducts by the methods (as modified by the footnotes) listed in the following table:

APPROVED METHODS FOR DISNFECTION BYPRODUCT COMPLIANCE MONITORING

Contaminant and methodology[1]	EPA method	Standard Method	SM online[9]	ASTM method[3]
TTHM P&T/GC/ElCD& PID P&T/GC/MS LLE/GC/ECD	 502.2[4] 524.2, 524.3[10], 524.4[15], 551.1			
HAA5 LLE (diazomethane)/GC/ECD SPE (acidic methanol)/GC/ECD LLE (acidic methanol)/GC/ECD Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS) HAA5 LLE(diazomethane)/GC/ECD SPE	 ---------- 552.1[5] 552.2, 552.3	 6251 B[2, 5, 11]	 6251 B-94	
Bromate Ion chromatography Ion chromatography & post column reaction IC/ICP-MS Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS) Chemically Suppressed Ion Chromatography Electrolytically Suppressed Ion Chromatography	 300.1, 302.0[6, 13] 317.0 Rev. 2.0[6], 326.0 [6] 321.8[6, 7] 557[6, 12]	 ---------- 	 ---------- 	 D 6581-00[3] D6581-08A[14] D6581-08B[14]
Chlorite Amperometric titration Spectrophotometry Ion chromatography Chemically Suppressed Ion Chromatography Electrolytically Suppressed Ion Chromatography	 ---------- 327.0 Rev 1.1[8] 300.0, 300.1, 317.0 Rev 2.0, 326.0	 4500-ClO_2 E[2, 8] ---------- ----------	 4500-ClO_2 E-008 ---------- 	 D 6581-00[3] D 6581-08 A[14] D 6581-08 B[14]
Chlorite - daily monitoring as prescribed in 310 CMR 22.07E(7)(b)2.a.i Amperometric Titration	 	 4500-ClO2 E[11]	 	

[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.

22.07E: continued

[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 310 CMR 22.07E(7)(b)3.b.

[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 may be used for routine daily monitoring of chlorite at the entrance to the Distribution System, as prescribed in 310 CMR 22.07E(7)(b)2.a.i. Ion chromatography shall be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the Distribution System, as prescribed in 310 CMR 22.07E(7)(b)2.a.ii. and (b)2.b.

[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.

[10] 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.

[11] 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.

[12] 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)*, August 2009. EPA 815-B-09-012. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

[13] EPA Method 302.0. *Determination of Bromate in Drinking Waters using Two-dimensional Ion Chromatography with Suppressed Conductivity Detection*, September 2009. EPA 815-B-09-014. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

[14] 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.

[15] EPA Method 524.4, Version 1.0. *Measurement of Purgeable Organic Compounds in Water by Gas Chromatography/Mass Spectrometry using Nitrogen Purge Gas*, May 2013. EPA 815-R-13-002. Available at http://water.epa.gov/drink.

2. Analysis under 310 CMR 22.07E(6) for Disinfection byproducts shall be conducted by laboratories that have received certification by EPA or the Department, except as specified under 310 CMR 22.07E(6)(c)3.

3. A party approved by EPA or the Department shall measure daily chlorite samples at the entrance to the Distribution System.

(d) Disinfectant Residuals.

1. Each Supplier of Water shall measure the Residual Disinfectant Concentration for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table:

22.07E: continued

APPROVED METHODS FOR DISINFECTANT RESIDUAL COMPLIANCE MONITORING

Methodology	Standard Method (19th, 20th or 21st editions)	SM Online[2]	EPA method	ASTM Method	Residual Measured [1]			
					Free Cl_2	Combined Cl_2	Total Cl_2	Cl_2 O_2
Amperometric Titration	4500-Cl D	4500-Cl D-00		D 1253-86 (96), 03, D 1253-08[4]	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-Cl O_2 E-00						X
Lissamine Green Spectrophotometric			327.0 Rev 1.1					X
Amperometric Sensor - ChloroSense[5]					X		X	
On-line Chlorine Analyzer			334.06		X		X	

[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] Cl_2 = Chlorine, ClO_2 = Chlorine Dioxide.

[4] 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.

[5] ChloroSense. *Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense*, September 2009. Available at http://www.nemi.gov or from Palintest Ltd, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018.

[6] EPA Method 334.0. *Determination of Residual Chlorine in Drinking Water Using an On-Line Chlorine Analyzer*, August 2009. EPA 815-B-09-013. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

2. Each Supplier of Water may also measure Residual Disinfectant Concentrations for chlorine, chloramines, and chlorine dioxide by using digital meter versions of DPD colorimetric test kits. Suppliers serving less than or equal to 3,300 persons may use non-digital meter DPD colorimetric test kits.

3. The Department approves all laboratory personnel (both in-house and at Department certified laboratories) as well as certified operators to conduct measurements of Residual Disinfectant Concentrations. All parties conducting these measurements shall be approved by the Department and shall be trained in the relevant methodology and/or the use of the relevant equipment and shall follow procedures outlines by the manufacturer of that equipment.

(e) Additional Analytical Methods. Each Supplier of Water who is required to analyze parameters not included in 310 CMR 22.07E(6)(c) and (d) shall use the following methods. A party approved by the Department as per 310 CMR 22.07E(6)(d)3. shall measure these parameters.

22.07E: continued

1. Alkalinity. All methods allowed in 310 CMR 22.06B(10) for measuring alkalinity.
2. Bromide. EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0, or ASTM D 6581-00.
3. Total Organic Carbon (TOC). Standard Method 5310 B (High-Temperature Combustion Method) 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 1.1or Revision 1.2. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples shall either be analyzed or shall be acidified at the time of sample collection to achieve pH less than or equal to 2.0 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples shall be analyzed within 28 days.
4. Specific Ultraviolet Absorbance (SUVA). SUVA is equal to the UV absorption at 254nm (UV254) (measured in m-1 divided by the dissolved organic carbon (DOC) concentration (measured as mg/l). In order to determine SUVA, it is necessary to separately measure UV254 and DOC. When determining SUVA, systems shall use the methods stipulated in 310 CMR 22.07E(6)(e)4.a. to measure DOC and the method stipulated in 310 CMR 22.07E(6)(e)4.b. to measure UV254. SUVA shall be determined on water prior to the addition of Disinfectants/oxidants by the system. DOC and UV254 samples used to determine a SUVA value shall be taken at the same time and at the same location.
   a. 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 or Revision 1.2. DOC samples shall be filtered through a 0.45 µm pore-diameter filter as soon as practical after sampling, not to exceed 48 hours. After Filtration, DOC samples shall be acidified to achieve pH less than or equal to 2.0 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples shall be analyzed within 28 days of sample collection. Inorganic carbon must be removed from the sample prior to analysis. Water passed through the filter prior to Filtration of the sample shall serve as the filtered blank. This filtered blank shall be analyzed using procedures identical to those used for analysis of the samples and shall meet the following criteria: DOC < 0.5 mg/L. Acidified DOC samples shall be analyzed within 28 days of sample collection.
   b. 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 or Revision 1.2. UV absorption shall be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV254 samples shall be filtered through a 0.45 µm pore-diameter filter. The pH of UV254 samples may not be adjusted. Samples shall be analyzed as soon as practical after sampling, not to exceed 48 hours.
5. pH. All methods allowed in 310 CMR 22.06B(10) for measuring pH.
6. Magnesium. All methods allowed in 310 CMR 22.06B(10)(a) for measuring magnesium.

(7) Monitoring Requirements.

(a) General Requirements.

1. Each Supplier of Water shall take all samples during normal operating conditions.
2. For the purpose of determining the minimum number of required TTHM and HAA5 samples, the Department may allow multiple wells drawing water from the same aquifer but entering the Distribution System at different locations to be considered one treatment plant. Upon written request from a Supplier of Water, the Department will make this determination based on the following criteria:
   a. The wells must be shown to be in the same aquifer using Department GIS and USGS information.
   b. The wells must be treated in the same fashion or with processes that can be shown to be equivalent with respect to the potential to form Disinfection byproducts.
   c. TOC samples from each well under consideration, taken during August, must have comparable results.

22.07E: continued

3. Each Supplier of Water shall monitor in accordance with the monitoring plan required under 310 CMR 22.07E(7)(f).

4. Each Supplier of Water may use only data collected under the provisions of 310 CMR 22.07E to qualify for reduced monitoring.

5. Each Supplier of Water who qualifies for reduced monitoring shall obtain Department approval prior to altering sampling practices.

6. Systems must collect both TTHM and HAA5 samples at the same frequency at each monitoring location.

(b) Monitoring Requirements for Disinfection Byproducts.

1. TTHM and HAA5.

a. Routine Monitoring. Each Supplier of Water shall 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
Systems using Surface Water or Groundwater Under the Direct Influence of Surface Water serving at least 10,000 persons.	Four water samples per quarter per treatment plant.	At least 25% 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]
Systems using Surface Water or Groundwater Under the Direct Influence of Surface Water serving from 500 to 9,999 persons.	One water sample per quarter per treatment plant.	Locations representing maximum residence time.[1]
Systems using Surface Water or Groundwater Under the Direct Influence of Surface Water serving fewer than 500 persons.	One sample per year per treatment plant during August.	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 shall increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the Distribution System, until the system meets reduced monitoring criteria in 310 CMR 22.07E(7)(b)1.d.
Systems using only groundwater 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 groundwater not under direct influence of surface water using chemical Disinfectant and serving fewer than 10,000 persons.	One sample per year per treatment plant during August.[2]	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 shall increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the Distribution System, until the system meets reduced monitoring criteria in 310 CMR 22.07E(7)(b)1.d.

22.07E: continued

[1] If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) shall be taken at locations that represent the maximum residence time of the water in the Distribution System. The remaining samples shall 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 prior Department approval in accordance with criteria developed under 310 CMR 22.07E(7)(a)2.

b. A Supplier of Water may reduce monitoring, except as otherwise provided, in accordance with the following table:

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
System using Surface Water or Groundwater Under the Direct Influence of Surface Water serving at least 10,000 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 quarter at Distribution System location reflecting maximum residence time.
System using Surface Water or Groundwater under the Direct Influence of Surface Water 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 August. NOTE: Any system using Surface Water or Groundwater under the Direct Influence of Surface Water serving fewer than 500 persons may not reduce its monitoring to less than one sample per treatment plant per year.
System using only groundwater 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 August.
System using only groundwater 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 ≤ 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 August, with the three-year cycle beginning on January 1st following the quarter in which system qualifies for reduced monitoring.

c. Monitoring Requirements for Source Water TOC. In order to qualify for reduced monitoring for TTHM and HAA5 under 310 CMR 22.07E(7)(b)1.b, Surface Water and Groundwater Under the Direct Influence of Surface Water systems not monitoring under the provisions of 310 CMR 22.07E(7)(d) 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 310 CMR 22.07E(7)(b)1.b., the source water TOC Running Annual Average must be 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 310 CMR 22.07E(7)(b)1.b., a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

22.07E: continued

d. Each Supplier of Water 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 shall monitor quarterly) or the result of the sample (for systems which shall monitor no more frequently than annually) is no more than 0.060 mg/l and 0.045 mg/l for TTHM and HAA5, respectively. Systems that do not meet these levels shall resume monitoring at the frequency identified in 310 CMR 22.07E(7)(b)1.a. (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 TTHM or HAA5, respectively. For each Supplier of Water using groundwater not under the direct influence of surface water and serving fewer than 10,000 people, if either the TTHM annual average is > 0.080 mg/l or the HAA5 annual average is > 0.060 mg/l, the system shall go to increased monitoring identified in 310 CMR 22.07E(7)(b)1.a. (sample location in the Distribution System column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/l or 0.060 mg/l for TTHM or HAA5 respectively.

e. Each Supplier of Water on increased monitoring may return to routine monitoring if after at least one year of monitoring their TTHM annual average is 0.060 mg/l and their HAA5 annual average is 0.045 mg/l.

f. The Department may return a Supplier of Water to routine monitoring at the Department's discretion.

2. Chlorite. An owner or operator of Community and Non-transient Non-community Water Systems using chlorine dioxide, for Disinfection or oxidation, shall conduct monitoring for chlorite.

a. Routine Monitoring.

i. Daily Monitoring. Each Supplier of Water shall take daily samples at the entrance to the Distribution System. For any daily sample that exceeds the chlorite MCL, the supplier shall take additional samples in the Distribution System the following day at the locations required by 310 CMR 22.07E(7)(b)2.b. in addition to the sample required at the entrance to the Distribution System.

ii. Monthly Monitoring. Each Supplier of Water shall take a three-sample set each month in the Distribution System. The supplier shall 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 shall be conducted in the same manner (as three-sample sets, at the specified locations). Each Supplier of Water may use the results of additional monitoring conducted under 310 CMR 22.07E(7)(b)2.b. to meet the requirement for monitoring in 310 CMR 22.07E(7)(b)2.a.ii.

b. Additional Monitoring. On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the Distribution System, the Supplier of Water 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).

c. Reduced Monitoring.

i. Chlorite monitoring at the entrance to the Distribution System required by 310 CMR 22.07E(7)(b)2.a.i. may not be reduced.

ii. Chlorite monitoring in the Distribution System required by 310 CMR 22.07E(7)(b)2.a.ii. 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 310 CMR 22.07E(7)(b)2.a.ii. has exceeded the chlorite MCL and the supplier has not been required to conduct monitoring under 310 CMR 22.07E(7)(b)2.b. The supplier may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the Distribution System under 310 CMR 22.07E(b)2.a.ii. exceeds the chlorite MCL or the system is required to conduct monitoring under 310 CMR 22.07E(7)(b)2.b., at which time the supplier shall revert to routine monitoring.

22.07E: continued

3. Bromate.

a. Routine Monitoring. Community and Non-transient Non-community Water Systems using ozone, for Disinfection or oxidation, shall take one sample per month for each treatment plant in the system using ozone. Each Supplier of Water shall take samples monthly at the entrance to the Distribution System while the ozonation system is operating under normal conditions.

b. Reduced Monitoring.

i. Until March 31, 2009, each Supplier of Water who is required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/l based upon representative monthly bromide measurements for one year. The Supplier of Water 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 upon representative monthly measurements. If the Running Annual Average source water bromide concentration is $\geq$0.05 mg/l, the Supplier of Water shall resume routine monitoring required by 310 CMR 22.07E(7)(b)3.a. in the following month.

ii. Beginning April 1, 2009, each Supplier of Water may no longer use the provisions of 310 CMR 22.07E(7)(b)3.b.i. to qualify for reduced monitoring. A Supplier of Water required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's Running Annual Average bromate concentration is 0.0025 mg/L based on monthly bromate measurements under 310 CMR 22.07E(7)(b)3.a. for the most recent four quarters, with samples analyzed using Method 302.0, 317.0 Revision 2.0, 326.0, 321.8 or 557. If a Supplier of Water has qualified for reduced bromate monitoring under 310 CMR 22.07E(7)(b)3.b.i. that Supplier of Water may remain on reduced monitoring as long as the Running Annual Average of quarterly bromate samples is 0.0025 mg/L based on samples analyzed using Method 302.0, 317.0 Revision 2.0, 326.0, 321.8 or 557. If the Running Annual Average bromate concentration is >0.0025 mg/L, the Supplier of Water must resume routine monitoring required by 310 CMR 22.07E(7)(b)3.a.

(c) Monitoring Requirements for Disinfectant Residuals.

1. Chlorine and Chloramines.

a. Routine Monitoring. Community and Non-transient Non-community Water Systems that use chlorine or chloramines shall 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 in 310 CMR 22.05. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water may use the results of Residual Disinfectant Concentration sampling conducted under 310 CMR 22.20A(5)(b)6. for unfiltered systems or 310 CMR 22.20A(5)(c)3. for systems which filter, in *lieu* of taking separate samples.

b. Reduced Monitoring. Monitoring may not be reduced.

2. Chlorine Dioxide.

a. Routine Monitoring. Community, Non-transient Non-community, and Transient Non-community Water Systems that use chlorine dioxide for Disinfection or oxidation shall take daily samples at the entrance to the Distribution System. For any daily sample that exceeds the MRDL, the supplier shall take samples in the Distribution System the following day at the locations required by 310 CMR 22.07E(7)(c)2.b., in addition to the sample required at the entrance to the Distribution System.

22.07E: continued

b. Additional Monitoring. On each day following a routine sample monitoring result that exceeds the MRDL, the supplier 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 supplier shall 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 supplier shall 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).

c. Reduced Monitoring. Chlorine dioxide monitoring may not be reduced.

(d) Monitoring Requirements for Disinfection Byproduct Precursors (DBPP).

1. Routine Monitoring. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water which use conventional Filtration treatment (as defined in 310 CMR 22.02) shall monitor each treatment plant for TOC no later than the point of combined filter effluent Turbidity monitoring and representative of the treated water. Each Supplier of Water required to monitor under 310 CMR 22.07E(7)(d)1. shall also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. The source water TOC sample may be taken at an earlier time than the treated water TOC sample where the difference between the two sampling times is equal to the time it takes the water to pass through the treatment processes. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, the Supplier of Water shall monitor for alkalinity in the source water prior to any treatment. Each Supplier of Water shall 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. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water 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 Supplier of Water shall revert to routine monitoring in the month following the quarter when the annual average treated water TOC is > 2.0 mg/l.

(e) Bromide. Each Supplier of Water who is required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the Supplier of Water demonstrates that the average source water bromide concentration is < 0.05 mg/l based upon representative monthly measurements for one year. The Supplier of Water shall continue bromide monitoring to remain on reduced bromate monitoring.

(f) Monitoring Plans. Each Supplier of Water who is required to monitor under 310 CMR 22.07E shall develop and implement a monitoring plan. The Supplier of Water shall 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 310 CMR 22.07E(3). Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water that serves more than 3,300 people shall submit a copy of the monitoring plan to the Department no later than the date of the first report required under 310 CMR 22.07E(9). The Department may also require the plan to be submitted by any other supplier. After review, the Department may require changes in any plan elements. The plan shall include at least the following elements.

1. Specific locations and schedules for collecting samples for any parameters included in 310 CMR 22.07E(7).

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, under the provisions of 310 CMR 22.12, the sampling plan shall reflect the entire Distribution System.

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4. Name, signature and title of system representative and date of signature.
5. System name and system PWSID No.

(8) 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 supplier'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 310 CMR 22.07E shall be included in determining compliance, even if that number is greater than the minimum required.

3. If, during the first year of monitoring under 310 CMR 22.07E(7), 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; or the MRDL for chlorine or chloramine, the system is out of compliance at the end of that quarter.

(b) Disinfection Byproducts.

1. TTHM and HAA5.

a. For each Supplier of Water monitoring quarterly, compliance with MCLs in 310 CMR 22.07E(1) shall be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the supplier as prescribed by 310 CMR 22.07E(7)(b)1.

b. For each Supplier of Water monitoring less frequently than quarterly, the supplier demonstrates MCL compliance if the average of samples taken that year under the provisions of 310 CMR 22.07E(7)(b)1. does not exceed the MCLs in 310 CMR 22.07E(1). If the average of these samples exceeds the MCL, the supplier shall increase monitoring to once per quarter per treatment plant and such a system 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 Supplier of Water is in violation at the end of that quarter. Each Supplier of Water who is required to increase monitoring frequency to quarterly monitoring shall calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring.

c. If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the Supplier of Water is in violation of the MCL and shall notify the public pursuant to 310 CMR 22.16, in addition to reporting to the Department pursuant to 310 CMR 22.07E(9).

d. If a Supplier of Water fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter Compliance Period shall be based on an average of the available data.

2. Bromate. Compliance shall be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the Supplier of Water takes more than one sample, the average of all samples taken during the month) collected by the Supplier of Water as prescribed by 310 CMR 22.07E(7)(b)3. If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and shall notify the public pursuant to 310 CMR 22.16, in addition to reporting to the Department pursuant to 310 CMR 22.07E(9). If a Supplier of Water fails to complete 12 consecutive months of monitoring, compliance with the MCL for the last four-quarter Compliance Period shall be based on an average of the available data.

3. Chlorite. Compliance shall be based on an arithmetic average of each three-sample set taken in the Distribution System as prescribed by 310 CMR 22.07E(7)(b)2.a.ii. and b. If the arithmetic average of any three-sample set exceeds the MCL, the supplier is in violation of the MCL and shall notify the public pursuant to 310 CMR 22.16, in addition to reporting to the Department pursuant to 310 CMR 22.07E(9).

22.07E: continued

(c) Disinfectant Residuals.

1. Chlorine and Chloramines.

a. Compliance shall be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the Supplier of Water under 310 CMR 22.07E(7)(c)1. If the average covering any consecutive four-quarter period exceeds the MRDL, the supplier is in violation of the MRDL and shall notify the public pursuant to 310 CMR 22.16, in addition to reporting to the Department pursuant to 310 CMR 22.07E(9).

b. In cases where the Supplier of Water switches between the use of chlorine and chloramines for residual Disinfection during the year, compliance shall be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to 310 CMR 22.07E(9) shall clearly indicate which residual Disinfectant was analyzed for each sample.

2. Chlorine Dioxide.

a. Acute Violations. Compliance shall be based on consecutive daily samples collected by the system under 310 CMR 22.07E(7)(c)2. 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 supplier is in violation of the MRDL and shall take immediate corrective action to lower the level of chlorine dioxide below the MRDL and shall notify the public pursuant to the procedures for acute health risks in 310 CMR 22.16 in addition to reporting to the Department pursuant to 310 CMR 22.07E(9). 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 supplier shall notify the public of the violation in accordance with the provisions for acute violations under 310 CMR 22.16 in addition to reporting to the Department pursuant to 310 CMR 22.07E(9).

b. Nonacute Violations. Compliance shall be based on consecutive daily samples collected by the Supplier of Water under 310 CMR 22.07E(7)(c)2. 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 supplier is in violation of the MRDL and shall 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 310 CMR 22.16 in addition to reporting to the Department pursuant to 310 CMR 22.07E(9). 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 supplier shall notify the public of the violation in accordance with the provisions for nonacute violations under 310 CMR 22.16 in addition to reporting to the Department pursuant to 310 CMR 22.07E(9).

(d) Disinfection Byproduct Precursors (DBPP). Compliance shall be determined as specified by 310 CMR 22.07E(10)(c). Each Supplier of Water 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 Supplier of Water who does not monitor during this period, and then determines in the first 12 months after the compliance date that they are not able to meet the Step 1 requirements in 310 CMR 22.07E(10)(b)2. and shall therefore apply for alternate minimum TOC removal (Step 2) requirements, are not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to 310 CMR 22.07E(10)(b)3. and are in violation. A Supplier of Water may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For each suppliers of water who is required to meet Step 1 TOC removals, if the value calculated under 310 CMR 22.07E(10)(c)1.d. is less than 1.00, the system is in violation of the Treatment Technique requirements and shall notify the public pursuant to 310 CMR 22.16, in addition to reporting to the Department pursuant to 310 CMR 22.07E(9).

22.07E: continued

(9) Reporting and Recordkeeping Requirements.

(a) Each Supplier of Water who is required to sample quarterly or more frequently shall report to the Department within ten days after the end of each quarter in which samples were collected, notwithstanding the provisions of 310 CMR 22.15. Each Supplier of Water who is required to sample less frequently than quarterly shall report to the Department within ten days after the end of each monitoring period in which samples were collected.

(b) Disinfection Byproducts. Each Supplier of Water shall report the information specified in the following table:

If you are a...	You shall report...[1]
1. System monitoring for TTHM and HAA5 under the requirements of 310 CMR 22.07E(7)(b) on a quarterly or more frequent basis.	a. The number of samples taken during the last quarter. b. The location, date, and result of each sample taken during the last quarter. c. The arithmetic average of all samples taken in the last quarter. d. The annual arithmetic average of the quarterly arithmetic averages of 310 CMR 22.07(9)(b)1.c. for the last four quarters. e. Whether, based on 310 CMR 22.07E(8)(b)1., the MCL was violated.
2. System monitoring for TTHM and HAA5 under the requirements of 310 CMR 22.07E(7)(b) less frequently than quarterly (but at least annually).	a. The number of samples taken during the last year. b. The location, date, and result of each sample taken during the last monitoring period. c. The arithmetic average of all samples taken over the last year. d. Whether, based on 310 CMR 22.07E(8)(b)1., the MCL was violated.
3. System monitoring for TTHM and HAA5 under the requirements of 310 CMR 22.07E(7)(b) less frequently than annually.	a. The location, date, and result of the last sample taken. b. Whether, based on 310 CMR 22.07E(8)(b)1., the MCL was violated.
4. System monitoring for chlorite under the requirements of 310 CMR 22.07E(7)(b)	a. The number of entry point samples taken each month for the last three months. b. The location, date, and result of each sample (both entry point and Distribution System) taken during the last quarter. c. For each month in the reporting period, the arithmetic average of all samples taken in each three sample set taken in the Distribution System. d. Whether, based on 310 CMR 22.07E(8)(b)3., the MCL was violated, in which month, and how many times it was violated each month.
5. System monitoring for bromate under the requirements of 310 CMR 22.07E(7)(b).	a. The number of samples taken during the last quarter. b. The location, date, and result of each sample taken during the last quarter. c. The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. d. Whether, based on 310 CMR 22.07E(8)(b)2., the MCL was violated.

[1] The Department may choose to perform calculations and determine whether the MCL was violated.

22.07E: continued

(c) Disinfectants. Each Supplier of Water shall report the information specified in the following table:

If you are a...	You shall report...[1]
1. System monitoring for chlorine or chloramines under the requirements of 310 CMR 22.07E(7)(c).	a. The number of samples taken during each month of the last quarter. b. The monthly arithmetic average of all samples taken in each month for the last 12 months. c. The arithmetic average of the monthly averages for the last 12 months. d. Whether, based on 310 CMR 22.07E(8)(c)1., the MRDL was violated.
2. System monitoring for chlorine dioxide under the requirements of 310 CMR 22.07E(7)(c).	a. The dates, results, and locations of samples taken during the last quarter. b. Whether, based on 310 CMR 22.07E(8)(c)2., the MRDL was violated. c. Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

[1] The Department may choose to perform calculations and determine whether the MRDL was exceeded or violated.

(d) Disinfection Byproduct Precursors and Enhanced Coagulation or Enhanced Softening. Each Supplier of Water shall report the information specified in the following table:

If you are a . . .	You shall report . . .[1]
1. System monitoring monthly or quarterly for TOC under the requirements of 310 CMR 22.07E(7)(d) and required to meet the Enhanced Coagulation or Enhanced Softening requirements in 310 CMR 22.07E(10)(b)2. or (b)3.	a. The number of paired (source water and treated water) samples taken during the last quarter. b. The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. c. 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. d. Calculations for determining compliance with the TOC percent removal requirements, as provided in 310 CMR 22.07E(10)(c)1. e. Whether the system is in compliance with the Enhanced Coagulation or Enhanced Softening percent removal requirements in 310 CMR 22.07E(10)(b) for the last four quarters.

[1] The Department may choose to perform calculations and determine whether the Treatment Technique was met.

22.07E: continued

If you are a . . .	You shall report . . .[1]
2. System monitoring monthly or quarterly for TOC under the requirements of Sec. 310 CMR 22.07E(7)(d) and meeting one or more of the alternative compliance criteria in 310 CMR 22.07E(10)(a)2. or (a)3.	a. The alternative compliance criterion that the system is using. b. The number of paired samples taken during the last quarter. c. The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. d. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in 310 CMR 22.07E(10)(a)2.a. or (a)2.c. or of treated water TOC for systems meeting the criterion in 310 CMR 22.07E(10)(a)2.b. e. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in 310 CMR 22.07E(10)(a)2.e. or of treated water SUVA for systems meeting the criterion in 310 CMR 22.07E(10)(a)2.f. f. The Running Annual Average of source water alkalinity for systems meeting the criterion in 310 CMR 22.07E(10)(a)2.c. and of treated water alkalinity for systems meeting the criterion in 310 CMR 22.07E(10)(a)3.a. g. The Running Annual Average for both TTHM and HAA5 for systems meeting the criterion in 310 CMR 22.07E(10)(a)2.c. or (a)2.d. h. The Running Annual Average of the amount of magnesium hardness removal (as $CaCO_3$, in mg/l) for systems meeting the criterion in 310 CMR 22.07E(10)(a)3.b. i. Whether the system is in compliance with the particular alternative compliance criterion in 310 CMR 22.07E(10)(a)2. or (a)3.

[1] The Department may choose to perform calculations and determine whether the Treatment Technique was met.

(10) Treatment Technique for Control of Disinfection Byproduct (DBP) Precursors.

(a) Applicability.

1. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water using conventional Filtration treatment (as defined in 310 CMR 22.02) shall operate with Enhanced Coagulation or Enhanced Softening to achieve the TOC percent removal levels specified in 310 CMR 22.07E(10)(b) unless the supplier meets at least one of the alternative compliance criteria listed in 310 CMR 22.07E(10)(a)2. or 3.

2. Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water using conventional Filtration treatment may use the alternative compliance criteria in 310 CMR 22.07E(10)(a)2.a. through f. to comply with 310 CMR 22.07E(10) in *lieu* of complying with 310 CMR 22.07E(10)(b). Each Supplier of Water shall still comply with monitoring requirements in 310 CMR 22.07E(7)(d).

a. The supplier's source water TOC level, measured according to 310 CMR 22.07E(6)(e)3., is less than 2.0 mg/l, calculated quarterly as a Running Annual Average.

b. The supplier's treated water TOC level, measured according to 310 CMR 22.07E(6)(e)3., is less than 2.0 mg/l, calculated quarterly as a Running Annual Average.

22.07E: continued

c. The supplier's source water TOC level, measured according to 310 CMR 22.07E(6)(e)3., is less than 4.0 mg/l, calculated quarterly as a Running Annual Average; the source water alkalinity, measured according to 310 CMR 22.07E(6)(e)1., 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 310 CMR 22.07E(3), the supplier has made a clear and irrevocable financial commitment not later than the effective date for compliance in 310 CMR 22.07E(3), to use technologies that will limit the levels of TTHM and HAA5 to no more than 0.040 mg/l and 0.030 mg/l, respectively. The Supplier of Water shall 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 310 CMR 22.07E(3). These technologies shall be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of 310 CMR 22.00.

d. 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.

e. The supplier's source water SUVA, prior to any treatment and measured monthly according to 310 CMR 22.07E(6)(e)4., is less than or equal to 2.0 l/mg-m, calculated quarterly as a Running Annual Average.

f. The supplier's finished water SUVA, measured monthly according to 310 CMR 22.07E(6)(e)4., is less than or equal to 2.0 l/mg-m, calculated quarterly as a Running Annual Average.

3. Additional Alternative Compliance Criteria for Enhanced Softening Systems. Each Supplier of Water who practices Enhanced Softening who cannot achieve the TOC removals required by 310 CMR 22.07E(10)(b)2. may use the alternative compliance criteria in 310 CMR 22.07E(10)(a)3.a. and b. in *lieu* of complying with 310 CMR 22.07E(10)(b). Each Supplier of Water shall still comply with monitoring requirements in 310 CMR 22.07E(7)(d).

a. Softening that results in lowering the treated water alkalinity to less than 60 mg/l (as $CaCO_3$), measured monthly according to 310 CMR 22.07E(6)(e)1. and calculated quarterly as a Running Annual Average.

b. Softening that results in removing at least 10 mg/l of magnesium hardness (as $CaCO_3$), measured monthly according to 310 CMR 22.07E(6)(e)6. and calculated quarterly as an annual running average.

(b) Enhanced Coagulation and Enhanced Softening Performance Requirements.

1. Each Supplier of Water shall achieve the percent reduction of TOC specified in 310 CMR 22.07E(10)(b)2. between the source water and the combined filter effluent, unless the Department approves the supplier's request for alternate minimum TOC removal (Step 2) requirements under 310 CMR 22.07E(10)(b)3.

2. Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with 310 CMR 22.07E(6)(e). Each Supplier of Water who practices softening is 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 by Enhanced Coagulation and Enhanced Softening for Systems Using Surface Water or Groundwater Under the Direct Influence of Surface Water and 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 310 CMR 22.07E(10)(a)2. are not required to operate with Enhanced Coagulation.

22.07E: continued

[2] Softening systems meeting one of the alternative compliance criteria in 310 CMR 22.07E(10)(a)3. are not required to operate with Enhanced Softening.

[3] Systems practicing softening shall meet the TOC removal requirements in this column.

3. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water using conventional treatment that cannot achieve the Step 1 TOC removals required by 310 CMR 22.07E(10)(b)2. due to water quality parameters or operational constraints shall apply to the Department, within three months of failure to achieve the TOC removals required by 310 CMR 22.07E(10)(b)2., for approval of alternative minimum TOC (Step 2) removal requirements. 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 supplier shall meet the Step 1 TOC removals contained in 310 CMR 22.07E(10)(b)2.

4. Alternate Minimum TOC Removal (Step 2) Requirements. Applications made to the Department by a Supplier of Water who practices Enhanced Coagulation for approval of alternate minimum TOC removal (Step 2) requirements under 310 CMR 22.07E(10)(b)3. shall include, at a minimum, results of bench- or pilot-scale testing conducted under 310 CMR 22.07E(10)(b)4.a. The submitted bench- or pilot-scale testing shall be used to determine the alternate Enhanced Coagulation level.

a. Alternate Enhanced Coagulation level is defined as Coagulation at a coagulant dose and pH as determined by the method described in 310 CMR 22.07E(10)(b)4.a. through e. such that an incremental addition of 10 mg/l of alum (or an 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. After the Department approves this minimum requirement, it shall supersede the minimum TOC removal, which is required by the table in 310 CMR 22.07E(10)(b)2. This minimum 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 310 MR 22.00.

b. The Supplier of Water shall conduct bench- or pilot-scale testing of Enhanced Coagulation using representative water samples and adding ten mg/l increments of alum (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

c. For waters with alkalinities of less than 60 mg/l for which addition of small amounts of alum coagulant (or the equivalent addition of ferric salts) drives the pH below 5.5 before significant TOC removal occurs, the Supplier of Water shall add chemicals necessary 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 (or an equivalent amount of ferric salt) is reached.

d. The Supplier of Water may operate the system at any coagulant dose or pH necessary (consistent with 310 CMR 22.00 requirements) to achieve the minimum TOC percent removal approved under 310 CMR 22.07E(10)(b)3.

e. If the TOC removal is consistently less than 0.3 mg/l of TOC per ten mg/l of incremental alum dose at all dosages of alum (or equivalent doses of ferric salt), the water will be deemed to contain TOC not amenable to Enhanced Coagulation. The Supplier of Water may then apply to the Department for a waiver of Enhanced Coagulation requirements.

22.07E: continued

(c) Compliance Calculations.

1. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water other than those identified in 310 CMR 22.07E(10)(a)2. or 3. shall comply with requirements contained in 310 CMR 22.07E(10)(b)2. or 3. Each Supplier of Water shall calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

a. Determine actual monthly TOC percent removal, equal to:
(1-(treated water TOC/source water TOC)) x 100

b. Determine the required monthly TOC percent removal (from either the table in 310 CMR 22.07E(10)(b)2. or 3.).

c. Divide the value in 310 CMR 22.07E(10)(c)1.a. by the value in 310 CMR 22.07E(10)(c)1.b.

d. Add together the results of 310 CMR 22.07E(10)(c)1.c. for the last 12 months and divide by 12.

e. If the value calculated in 310 CMR 22.07E(10)(c)1.d. is less than 1.00, the supplier is not in compliance with the TOC percent removal requirements.

2. Each Supplier of Water may use the provisions in 310 CMR 22.07E(10)(c)2.a. through e. in *lieu* of the calculations in 310 CMR 22.07E(10)(c)1.a. through e to determine compliance with TOC percent removal requirements.

a. In any month that the Supplier of Water's treated or source water TOC level, measured according to 310 CMR 22.07E(6)(e)3., is less than 2.0 mg/l, the supplier may assign a monthly value of 1.0 (in *lieu* of the value calculated in 310 CMR 22.07E(10)(c)1.c.) when calculating compliance under the provisions of 310 CMR 22.07E(10)(c)1.

b. In any month that a Supplier of Water practicing softening removes at least 10 mg/l of magnesium hardness (as $CaCO_3$), the supplier may assign a monthly value of 1.0 (in *lieu* of the value calculated in 310 CMR 22.07E(10)(c)1.c.) when calculating compliance under the provisions of 310 CMR 22.07E(10)(c)1.

c. In any month that the supplier's source water SUVA, prior to any treatment and measured according to 310 CMR 22.07E(6)(e)4., is $\leq$ 2.0 l/mg-m, the supplier may assign a monthly value of 1.0 (in *lieu* of the value calculated in 310 CMR 22.07E(10)(c)1.c.) when calculating compliance under the provisions of 310 CMR 22.07E(10)(c)1.

d. In any month that the Supplier of Water's finished water SUVA, measured according to 310 CMR 22.07E(6)(e)4., is $\leq$ 2.0 l/mg-m, the supplier may assign a monthly value of 1.0 (in *lieu* of the value calculated in 310 CMR 22.07E(10)(c)1.c.) when calculating compliance under the provisions of 310 CMR 22.07E(10)(c)1.

e. In any month that a Supplier of Water practicing Enhanced Softening lowers alkalinity below 60 mg/l (as $CaCO_3$), the supplier may assign a monthly value of 1.0 (in *lieu* of the value calculated in 310 CMR 22.07E(10)(c)1.c.) when calculating compliance under the provisions of 310 CMR 22.07E(10)(c)1.

3. Each Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water using conventional treatment may also comply with the requirements of 310 CMR 22.07E(10) by meeting the criteria in 310 CMR 22.07E(10)(a)2. or 3.

(d) Treatment Technique Requirements for DBP Precursors. The EPA Administrator identifies the following as Treatment Techniques to control the level of Disinfection byproduct precursors in drinking water treatment and Distribution Systems: For a Supplier of Water who uses a Surface Water Source or groundwater source under the direct influence of surface water that uses conventional treatment, Enhanced Coagulation or Enhanced Softening.

22.07F: Stage 2 Disinfection Byproducts Requirements (DBPR)

(1) Initial Distribution System Evaluations.

(a) General Requirements. The requirements of 310 CMR 22.07F(1) through (6) establish monitoring and other requirements for identifying Stage 2 DBPR compliance monitoring locations under 310 CMR 22.07(F) for determining compliance with Maximum Contaminant Levels for Total Trihalomethanes (TTHM) and Haloacetic Acids (Five) (HAA5). The Supplier of Water must use an Initial Distribution System Evaluation (IDSE) to determine locations with representative high TTHM and HAA5 concentrations throughout their Distribution System. IDSEs are used in conjunction with, but separate from, compliance monitoring required by 310 CMR 22.07E, to identify and select compliance monitoring locations under 310 CMR 22.07F(6).

(b) Applicability. For Community Water Systems that use a primary or residual Disinfectant other than ultraviolet light or deliver water that has been treated with a primary or residual Disinfectant other than ultraviolet light; or a Non-transient Non-community Water System that serves at least 10,000 people and 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) Schedule.

1. Each Supplier of Water must comply with the requirements of the schedule in the table in 310 CMR 22.20F(1)(c).

TABLE 1 – 310 CMR 22.07F
INITIAL DISTRIBUTION SYSTEM EVALUATION SCHEDULE

If you serve this population	Supplier of water must submit their standard monitoring plan or system specific study plan[1] or 40/30 certification[2] to the Department by or receive very small system waiver from the Department	Supplier of water must complete their standard monitoring or system specific study by	Supplier of water must submit their 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			
a. ≥100,000	October 1, 2006	September 30, 2008	January 1, 2009
b. 50,000-99,999	April 1, 2007	March 31, 2009	July 1, 2009
c. 10,000-49,999	October 1, 2007	September 30, 2009	January 1, 2010
d. < 10,000 (CWS Only)	April 1, 2008	March 31, 2010	July 1, 2010
Other systems that are part of a Combined Distribution System			
e. 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 the Supplier of Water's plan or notify them that it has not yet completed its review, the Supplier of Water may consider the plan that was submitted as approved.

[2] The Supplier of Water must implement that plan and they must complete standard monitoring or a system specific study no later than the date identified in the third column. The supplier of water must submit their 40/30 certification under 310 CMR 22.20F(4) 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 the Supplier of Water must comply on the schedule in 310 CMR 22.07F(1)(c)1.c., the Department does not approve their IDSE report or notify them that it has not yet completed its review, the Supplier of Water may consider the report that was submitted as approved and must implement the recommended monitoring in 310 CMR 22.07F as required.

22.07F: continued

2. For the purpose of the schedule in 310 CMR 22.07F(1)(c)1., 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 system only on an Emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) The Supplier of Water must conduct standard monitoring that meets the requirements in 310 CMR 22.20F(2), or a system specific study that meets the requirements in 310 CMR 22.07F(3), or certify to the Department that they meet 40/30 certification criteria under 310 CMR 22.20F(4), or qualify for a very small system waiver under 310 CMR 22.07F(5).

1. The Supplier of Water must have taken the full complement of routine TTHM and HAA5 compliance samples required of a system with their population and source water under 310 CMR 22.07E (or they must have taken the full complement of reduced TTHM and HAA5 compliance samples required of a system with their population and source water under 310 CMR 22.07E if they meet reduced monitoring criteria under 310 CMR 22.07E) during the period specified in 310 CMR 22.07F(4)(a) to meet the 40/30 certification criteria in 310 CMR 22.07F(4). The Supplier of Water must have taken TTHM and HAA5 samples under 310 CMR 22.07E(6) and (7) to be eligible for the very small system waiver in 310 CMR 22.07F(5).

2. If the Supplier of Water has not taken the required samples, they must conduct standard monitoring that meets the requirements in 310 CMR 22.07F(2), or a system specific study that meets the requirements in 310 CMR 22.07F(3).

(e) The Supplier of Water must use only the analytical methods specified in 310 CMR 22.07E(6), or otherwise approved by EPA for monitoring under 310 CMR 22.07F, to demonstrate compliance with the requirements of 310 CMR 22.07F.

(f) IDSE results will not be used for the purpose of determining compliance with MCLs in 310 CMR 22.07E(1).

(2) Standard Monitoring.

(a) Standard Monitoring Plan. The standard monitoring plan must comply with 310 CMR 22.07F(2)(a)1. through 4. The Supplier of Water must prepare and submit their standard monitoring plan to the Department according to the schedule in 310 CMR 22.07F(1)(c).

1. The standard monitoring plan must include a schematic of the Supplier of Water's 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 compliance monitoring required under 310 CMR 22.07E.

2. The standard monitoring plan must include justification of standard monitoring location selection and a summary of data relied on to justify standard monitoring location selection.

3. The standard monitoring plan must specify the population served and system type (Surface Water or Groundwater under the Direct Influence of Surface Water or Groundwater).

4. The Supplier of Water must retain a complete copy of their standard monitoring plan submitted under 310 CMR 22.07F(2)(a), including any Department modification of the standard monitoring plan, for as long as the Supplier of Water is required to retain their IDSE report under 310 CMR 22.07(2)(c)4.

(b) Standard Monitoring.

1. The Supplier of Water must monitor as indicated in the table in 310 CMR 22.07F(2)(b)1. The supplier 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. The Supplier of Water must conduct one monitoring period during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature. The Supplier of Water must review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature.

22.07F: continued

TABLE 2 – 310 CMR 22.07F
STANDARD MONITORING

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
Surface Water and Groundwater under the Direct Influence of Surface Water	<500 consecutive systems	One (during peak historical month)[2]	2	1	.....	1	
	<500 non-consecutive systems	.....	2	.....	.....	1	1
	500-3,300 consecutive systems	Four (every 90 days)	2	1	.....	1	
	500-3,300 non-consecutive systems	.....	2	.....	.....	1	1
	3,301-9,999	.....	4	.....	1	2	1
	10,000-49,999	Six (every 60 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
Groundwater	<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		2	2
	100,000-499,999	.....	8	1		3	3
	≥500,000	.....	12	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. The Supplier of Water must take samples at locations other than the existing monitoring locations required in 310 CMR 22.07E. 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, the Supplier of Water 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, the Supplier of Water must take samples at entry points to the Distribution System having the highest annual water flows.

4. The Supplier of Water's monitoring under 310 CMR 22.07F(2)(b) may not be reduced under the provisions of 310 CMR 22.12.

(c) IDSE Report. The Supplier of Water's IDSE report must include the elements required in 310 CMR 22.07F(2)(c)1. through 4. The Supplier of Water must submit their IDSE report to the Department according to the schedule in 310 CMR 22.07F(1)(c).

22.07F: continued

1. The Supplier of Water's IDSE report must include all TTHM and HAA5 analytical results from compliance monitoring under 310 CMR 22.07E 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 their standard monitoring plan submitted under 310 CMR 22.07F(2)(a), the Supplier of Water's report must also include a schematic of their Distribution System, the population served, and system type (Surface Water or Groundwater under the Direct Influence of Surface Water or Groundwater).

2. The Supplier of Water's IDSE report must include an explanation of any deviations from their approved standard monitoring plan.

3. The Supplier of Water must recommend and justify compliance monitoring locations under 310 CMR 22.07F and timing based on the protocol in 310 CMR 22.07F(6).

4. The Supplier of Water must retain a complete copy of their IDSE report submitted under 310 CMR 22.07F(2)(c) for ten years after the date that they submitted their report. If the Department modifies the monitoring requirements of 310 CMR 22.07F that the Supplier of Water recommended in their IDSE report or if the Department approves alternative monitoring locations, the Supplier of Water must keep a copy of the Department's notification on file for ten years after the date of the Department's notification. The Supplier of Water 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. The Supplier of Water's system specific study plan must be based on either existing monitoring results as required under 310 CMR 22.07F(3)(a)1. or modeling as required under 310 CMR 22.07F(3)(a)2. The Supplier of Water must prepare and submit their system specific study plan to the Department according to the schedule in 310 CMR 22.07F(1)(c).

1. Existing Monitoring Results. The Supplier of Water may comply by submitting monitoring results collected before they are required to begin monitoring under 310 CMR 22.07F(1)(c). The monitoring results and analysis must meet the criteria in 310 CMR 22.07F(3)(a)1.a and b.

a. Minimum Requirements.

i. TTHM and HAA5 results must be based on samples collected and analyzed in accordance with 310 CMR 22.07E(6). Samples must be collected no earlier than five years prior to the study plan submission date.

ii. The monitoring locations and frequency must meet the conditions identified in 310 CMR 22.07F(3)(a)1.a.ii. 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 monitoring results required under 310 CMR 22.07E plus additional monitoring results as necessary to meet minimum sample requirements.

22.07F: continued

TABLE 3 – 310 CMR 22.07F
EXISTING MONITORING RESULTS REQUIRED

System Type	Population size category	Number of monitoring locations	Number of samples	
			TTHM	HAA5
Surface and Groundwater under the Direct Influence of Surface Water	<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
Groundwater				
	<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

b. Reporting Monitoring Results. The Supplier of Water must report the following information:

i. The Supplier of Water 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 required under 310 CMR 22.07E.

ii. The Supplier of Water 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. The Supplier of Water's study monitoring plan must include a schematic of their Distribution System (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. The Supplier of Water's system specific study plan must specify the population served and system type (Surface Water or Groundwater under the Direct Influence of Surface Water or Groundwater)

v. The Supplier of Water must retain a complete copy of their system specific study plan submitted under 310 CMR 22.07F(3)(a)1., including any Department modification of their system specific study plan, for as long as they are required to retain their IDSE report under 310 CMR 22.07F(3)(b)7.

vi. If the Supplier of Water submits previously collected data that fully meets the number of samples required under 310CMR 22.07F(3)(a)1.a.ii. and the Department rejects some of the data, the Supplier of Water must either conduct additional monitoring to replace rejected data on a schedule the Department approves or conduct standard monitoring under 310 CMR 22.07F(2).

2. Modeling. The Supplier of Water may comply through analysis of an extended period simulation hydraulic model. The extended period simulation hydraulic model and analysis must meet the criteria in 310 CMR 22.07F(3)(a)2.

a. Minimum Requirements.

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 310 CMR 22.07F(3)(a)2.a.ii.(A) through (I).

(A) 75% of pipe volume;

(B) 50% of pipe length;

(C) All pressure zones;

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(D) All 12-inch diameter and larger pipes;
(E) All eight-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;
(F) All six-inch and larger pipes that connect remote areas of a Distribution System to the main portion of the system;
(G) All storage facilities with standard operations represented in the model; and
(H) All active pump stations with controls represented in the model; and
(I) 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.

b. Reporting Modeling. The Supplier of Water's system specific study plan must include the information in 310 CMR 22.07F(3)(a)2.b.

i. Tabular or spreadsheet data demonstrating that the model meets requirements in 310 CMR 22.07F(3)(a)2.a.ii.

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 predictions for the entire simulation period (*i.e.*, from time zero until the time it takes to for the model to reach a consistently repeating pattern of residence time).

iii. Model output showing preliminary 24-hour average residence time predictions throughout the Distribution System.

iv. Timing and number of samples representative of the Distribution System planned for at least one monitoring period of TTHM and HAA5 dual sample monitoring at a number of locations no less than would be required for the system under standard monitoring in 310 CMR 22.07F(2) during the historical month of high TTHM. These samples must be taken at locations other than existing compliance monitoring locations under 310 CMR 22.07E.

v. Description of how all requirements will be completed no later than 12 months after the Supplier of Water submits their system specific study plan.

vi. Schematic of the Supplier of Water's 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 required under 310 CMR 22.07E.

vii. Population served and system type (Surface Water and Groundwater Under the Direct Influence of Surface Water or Groundwater).

viii. The Supplier of Water must retain a complete copy of their system specific study plan submitted under 310 CMR 22.07F(3)(a)2., including any Department modification of the system specific study plan, for as long as the Supplier of Water is required to retain their IDSE report under 310 CMR 22.07F(3)(b)7.

c. If the Supplier of Water submits a model that does not fully meet the requirements under 310 CMR 22.07F(3)(a)2., the Supplier of Water must correct the deficiencies and respond to Department inquiries concerning the model. If the Supplier of Water fails to correct deficiencies or respond to inquiries to the Department's satisfaction, they must conduct standard monitoring under 310 CMR 22.07F(2).

(b) IDSE Report. The Supplier of Water's IDSE report must include the elements required in 310 CMR 22.07F(3)(b)1. through 6. The Supplier of Water must submit their IDSE report according to the schedule in 310 CMR 22.07F(1)(c).

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1. The Supplier of Water's IDSE report must include all TTHM and HAA5 analytical results from monitoring required under 310 CMR 22.07E 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 the Supplier of Water's system specific study plan submitted under 310 CMR 22.07F(3)(a), their IDSE report must also include a schematic of their Distribution System, the population served, and system type (Surface Water and Groundwater under the Direct Influence of Surface Water or Groundwater).
2. If the Supplier of Water used the modeling provision under 310 CMR 22.07F(3)(a)2., they must include final information for the elements described in 310 CMR 22.07F(3)(a)2.b., and a 24-hour time series graph of residence time for each compliance monitoring location selected in 310 CMR 22.07F.
3. The Supplier of Water must recommend and justify compliance monitoring locations in 310 CMR 22.07F and timing based on the protocol in 310 CMR 22.07(6).
4. The Supplier of Water's IDSE report must include an explanation of any deviations from their approved system specific study plan.
5. The Supplier of Water's IDSE report must include the basis (analytical and modeling results) and justification they used to select the recommended monitoring locations in 310 CMR 22.07F(6).
6. The Supplier of Water may submit their IDSE report in lieu of their system specific study plan on the schedule identified in 310 CMR 22.07F(1)(c) for submission of the system specific study plan if they believe that they have the necessary information by the time that the system specific study plan is due. If the Supplier of Water elects this approach, their IDSE report must also include all information required under 310 CMR 22.07F(3)(a).
7. The Supplier of Water must retain a complete copy of their IDSE report submitted under 310 CMR 22.07F(3)(b) for ten years after the date that they submitted their IDSE report. If the Department modifies the monitoring requirements in 310 CMR 22.07F that the Supplier of Water recommended in their IDSE report or if the Department approves alternative monitoring locations, the Supplier of Water must keep a copy of the Department's notification on file for ten years after the date of the Department's notification. The Supplier of Water must make the IDSE report and any Department notification available for review by the Department or the public.

(4) 40/30 Certification.

(a) Eligibility. The Supplier of Water is eligible for 40/30 certification if they had no TTHM or HAA5 monitoring violations under 310 CMR 22.07E 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 in 310 CMR 22.07F(4)(a).

TABLE 4 – 310 CMR 22.07F
40/30 CERTIFICATION SCHEDULE

If your 40/30 certification is due	Then your eligibility for 40/30 certification is based on eight consecutive calendar quarters of compliance monitoring results under 310 CMR 22.07E 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 the Supplier of Water is on reduced monitoring under 310 CMR 22.07E and was not required to monitor during the specified period. If they did not monitor during the specified period, they must base their eligibility on compliance samples taken during the 12 months preceding the specified period.

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(b) 40/30 Certification.

1. The Supplier of Water must certify to the Department that every individual compliance sample taken under 310 CMR 22.07E during the periods specified in 310 CMR 22.07F(4)(a) were ≤ 0.040 mg/L for TTHM and ≤ 0.030 mg/L for HAA5, and that they have not had any TTHM or HAA5 monitoring violations during the period specified in 310 CMR 22.07F(4)(a).

2. The Department may require the Supplier of Water to submit compliance monitoring results, Distribution System schematics, and/or recommended compliance monitoring locations as required in 310 CMR 22.07F in addition to their certification. If the Supplier of Water fails to submit the requested information, the Department may require standard monitoring under 310 CMR 22.07F(2) or a system specific study under 310 CMR 22.07F(3).

3. The Department may still require standard monitoring under 310 CMR 22.07F(2) or a system specific study under 310 CMR 22.07F(3) even if the Supplier of Water meets the criteria in 310 CMR 22.07F(4)(a).

4. The Supplier of Water must retain a complete copy of their certification submitted under 310 CMR 22.07F(4)(b) for ten years after the date that they submitted their certification. The Supplier of Water 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 the Supplier of Water serves fewer than 500 people and it has taken TTHM and HAA5 samples under 310 CMR 22.07E, the Supplier of Water is not required to comply with 310 CMR 22.07F(1) unless the Department notifies the Supplier of Water that it must conduct standard monitoring under 310 CMR 22.07F(2) or a system specific study under 310 CMR 22.07F(3).

(b) If the Supplier of Water has not taken TTHM and HAA5 samples under 310 CMR 22.07E or if the Department notifies the Supplier of Water that it must comply with 310 CMR 22.07F(1), the Supplier of Water must conduct standard monitoring under 310 CMR 22.07F(2) or a system specific study under 310 CMR 22.07F(3).

(6) Compliance Monitoring Location Recommendations.

(a) The Supplier of Water's IDSE report must include their recommendations and justification for where and during what month(s) TTHM and HAA5 monitoring required under 310 CMR 22.07F(8) should be conducted. They must base their recommendations on the criteria in 310 CMR 22.07F(6)(b) through (e).

(b) The Supplier of Water must select the number of monitoring locations specified in the table in 310 CMR 22.07F(6)(b). The Supplier of Water will use these recommended locations as routine compliance monitoring locations under 310 CMR 22.07F, unless the Department requires different or additional locations. The Supplier of Water should distribute locations throughout the Distribution System to the extent possible.

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TABLE 5 – 310 CMR 22.07F
DISTRIBUTION SYSTEM MONITORING LOCATIONS

			Distribution System monitoring location			
Source water type	Population size category	Monitoring frequency[1]	Total per monitoring period[2]	Highest TTHM locations	Highest HAA5 locations	Existing compliance locations under 310 CMR 22.07E
Surface or Groundwater under the Direct Influence of Surface Water	<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
	1,000,000-4,999,999	Per quarter	16	6	6	4
	≥5,000,000	Per quarter	20	8	7	5
Groundwater						
	<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
	≥500,000	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 Surface Water and Groundwater under the Direct Influence of Surface Water systems serving 500-3,300. Groundwater systems serving 500 9,999 on annual monitoring must take Dual Sample Sets at each monitoring location. All other systems on annual monitoring and Surface Water and Groundwater under the Direct Influence of Surface Water 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. For systems serving fewer than 500 people, 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.

(c) The Supplier of Water must recommend compliance monitoring locations for 310 CMR 22.07F(6) based on standard monitoring results, system specific study results, and compliance monitoring results required under 310 CMR 22.07E. The Supplier of Water must follow the protocol in 310 CMR 22.07F(6)(c)1. through 8. If required to monitor at more than eight locations, the Supplier of Water must repeat the protocol as necessary. If the Supplier of Water does not have existing compliance monitoring results required under 310 CMR 22.07E or if they do not have enough existing compliance monitoring results required under 310 CMR 22.07E, they must repeat the protocol, skipping the provisions of 310 CMR 22.07F(6)(c)(3) and (7) as necessary, until they have identified the required total number of monitoring locations.

1. Location with the highest TTHM LRAA not previously selected as a monitoring location under 310 CMR 22.07F.
2. Location with the highest HAA5 LRAA not previously selected as a monitoring location under 310 CMR 22.07F.
3. Existing average residence time compliance monitoring location (maximum residence time compliance monitoring location for groundwater systems) under 310 CMR 22.07E with the highest HAA5 LRAA not previously selected as a monitoring location under 310 CMR 22.07F.
4. Location with the highest TTHM LRAA not previously selected as a monitoring location under 310 CMR 22.07F.
5. Location with the highest TTHM LRAA not previously selected as a monitoring location under 310 CMR 22.07F.

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6. Location with the highest HAA5 LRAA not previously selected as a monitoring location under 310 CMR 22.07F.

7. Existing average residence time compliance monitoring location (maximum residence time compliance monitoring location for groundwater systems) under 310 CMR 22.07E with the highest TTHM LRAA not previously selected as a monitoring location under 310 CMR 22.07F.

8. Location with the highest HAA5 LRAA not previously selected as a monitoring location under 310 CMR 22.07F.

(d) The Supplier of Water may recommend locations other than those specified in 310 CMR 22.07F(6)(c) if they include a rationale for selecting other locations. If the Department approves the alternate locations, they must monitor at these locations to determine compliance under 310 CMR 22.07F.

(e) The Supplier of Water's recommended schedule must include monitoring required under 310 CMR 22.07F during the peak historical month for TTHM and HAA5 concentration, unless the Department approves another month. Once the Supplier of Water has identified the peak historical month, and if they are required to conduct routine monitoring at least quarterly, they must schedule compliance monitoring required under 310 CMR 22.07F at a regular frequency of every 90 days or fewer.

(7) General Monitoring Requirements of Stage 2 Disinfection Byproducts Rule.

(a) General. The requirements of 310 CMR 22.07F(7) through (16) establish 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. The Supplier of Water is subject to these requirements if their system is a Community Water System or a Non-transient Non-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.

(c) Schedule. The Supplier of Water must comply with the requirements in 310 CMR 22.07F(7) on the schedule in the following table based on their system type.

TABLE 6 – 310 CMR 22.07F
MONITORING SCHEDULE

If you are this type of system	You must comply with monitoring required under 310 CMR 22.07F(7) by:[1]
Systems that are not part of a Combined Distribution System and systems that serve the largest population in the Combined Distribution System	
1. System serving ≥ 100,000	April 1, 2012
2. System serving 50,000 99,999	October 1, 2012
3. System serving 10,000 49,999	October 1, 2013
4. System serving < 10,000	October 1, 2013 if no *Cryptosporidium* monitoring is required under 310 CMR 22.20G(2)(a)4. or October 1, 2014 if *Cryptosporidium* monitoring is required under 310 CMR 22.20G(2)(a)4. or 310 CMR 22.20G(2)(a)6.
Other systems that are part of a Combined Distribution System	
5. 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 evaluation levels if the Supplier of Water requires capital improvements to comply with an MCL.

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6. The Supplier of Water's monitoring frequency is specified in 310 CMR 22.07F(8)(a)2.

a. If the Supplier of Water is required to conduct quarterly monitoring, they must begin monitoring in the first full calendar quarter that includes the compliance date in the table in 310 CMR 22.07F(7)(c).

b. If the Supplier of Water is required to conduct monitoring at a frequency that is less than quarterly, they must begin monitoring in the calendar month recommended in the IDSE report prepared under 310 CMR 22.07F(2) or (3) or the calendar month identified in the monitoring plan developed under 310 CMR 22.07F(9) no later than 12 months after the compliance date in the table in 310 CMR 22.07F(7)(c).

7. If the Supplier of Water is required to conduct quarterly monitoring, they 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 the Supplier of Water is required to conduct monitoring at a frequency that is less than quarterly, they must make compliance calculations beginning with the first compliance sample taken after the compliance date.

8. For the purpose of the schedule in 310 CMR 22.07F(7)(c), 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 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 MCLs required by 310 CMR 22.07F listed in 310 CMR 22.07E(1), the Supplier of Water must calculate LRAAs for TTHM and HAA5 using monitoring results collected under 310 CMR 22.07F and determine that each LRAA does not exceed the MCL. If the Supplier of Water fails to complete four consecutive quarters of monitoring, they must calculate compliance with the MCL based on the average of the available data from the most recent four quarters. If the Supplier of Water takes more than one sample per quarter at a monitoring location, they 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 MCLs required by 310 CMR 22.07F listed in 310 CMR 22.07E(1), the Supplier of Water must determine that each sample taken is less than the MCL. If any sample exceeds the MCL, they must comply with the requirements of 310 CMR 22.07F(12). If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.

(e) Violation. The Supplier of Water is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if they fail to monitor.

(8) Routine Monitoring.

(a) Monitoring.

1. If the water supplier submitted an IDSE report, they must begin monitoring at the locations and months they have recommended in their IDSE report submitted under 310 CMR 22.07F(6) following the schedule in 310 CMR 22.07F(7)(c), unless the Department requires other locations or additional locations after its review. If the Supplier of Water submitted a 40/30 certification under 310 CMR 22.07F(4) or they qualified for a very small system waiver under 310 CMR 22.07F(5) or they are a Non-transient Non-community Water System serving < 10,000, they must monitor at the location(s) and dates identified in their monitoring plan in 310 CMR 22.07E(7)(f) updated as required by 310 CMR 22.07F(9).

2. The Supplier of Water must monitor at no fewer than the number of locations identified in 310 CMR 22.07F(8)(a)2.

22.07F: continued

TABLE 7 – 310 CMR 22.07F
ROUTINE MONITORING FREQUENCY

Source Water Type	Population Size Category	Monitoring Frequency [1]	Distribution System monitoring location total per monitoring period [2]
Surface Water and Groundwater under the Direct Influence of Surface Water	<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
Groundwater			
	<500	Per year	2
	500-9,999	Per year	2
	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 systems using Surface Water or Groundwater under the Direct Influence of Surface Water systems and serving 500-3,300. Groundwater systems serving 500-9,999 on annual monitoring must take Dual Sample Sets at each monitoring location. All other systems on annual monitoring and systems using Surface Water or groundwater systems under the direct influence of surface water 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. For systems serving fewer than 500 people, 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.

3. If the Supplier of Water is an undisinfected system that begins using a Disinfectant other than UV light after the dates in 310 CMR 22.07F(1) for complying with the Initial Distribution System Evaluation requirements, they must consult with the Department to identify compliance monitoring locations for 310 CMR 22.07F(8). The Supplier of Water must then develop a monitoring plan under 310 CMR 22.07F(9) that includes those monitoring locations.

(b) Analytical Methods. The Supplier of Water must use an approved method listed in 310 CMR 22.07E(6) for TTHM and HAA5 analyses in 310 CMR 22.07F(8). Analyses must be conducted by laboratories that have received certification by EPA or the Department as specified in 310 CMR 22.07E(6).

(9) Monitoring Plan.

(a) 1. The Supplier of Water 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 310 CMR 22.07F(9)(a)1.a. through d. and be completed no later than the date the Supplier of Water conducts their initial monitoring under 310 CMR 22.07F(8).

a. Monitoring locations;
b. Monitoring dates;
c. Compliance calculation procedures; and
d. Monitoring plans for any other systems in the Combined Distribution System if the Department has reduced monitoring requirements.

22.07F: continued

2. If the Supplier of Water was not required to submit an IDSE report under either 310 CMR 22.07F(2) or (3), and they do not have sufficient monitoring locations required under 310 CMR 22.07E to identify the required number of compliance monitoring locations indicated in 310 CMR 22.07F(6)(b), they 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. They must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If the Supplier of Water has more monitoring locations required under 310 CMR 22.07E than required for compliance monitoring in 310 CMR 22.07F(6)(b), they must identify which locations they will use for compliance monitoring under 310 CMR 22.07F(8) by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations under 310 CMR 22.07F(8) have been identified.

(b) If the Supplier of Water is a Surface Water or a Groundwater under the Direct Influence of Surface Water serving > 3,300 people, they must submit a copy of their monitoring plan to the Department prior to the date they conduct their initial monitoring under 310 CMR 22.07F(8), unless their IDSE report submitted under 310 CMR 22.07F(2) contains all the information required by 310 CMR 22.07F(9).

(c) The Supplier of Water may revise their 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 the Supplier of Water changes monitoring locations, they 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 their monitoring plan. If they are a Surface Water or Groundwater under the Direct Influence of Surface Water system serving > 3,300 people, they must submit a copy of their modified monitoring plan to the Department prior to the date they are required to comply with the revised monitoring plan.

(10) Reduced Monitoring.

(a) The Supplier of Water may reduce monitoring to the level specified in the table in 310 CMR 22.07F(10)(a) any time the LRAA is $\leq$ 0.040 mg/L for TTHM and $\leq$ 0.030mg/L for HAA5 at all monitoring locations. They may only use data collected under the provisions of 310 CMR 22.07E or 22.07F to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be $\leq$ 4.0 mg/L at each treatment plant treating Surface Water or Groundwater Under the Direct Influence of Surface Water, based on monitoring conducted under 310 CMR 22.07E(7)(b)1.c. or (d).

22.07F: continued

TABLE 8 – 310 CMR 22.07F
REDUCED MONITORNG FREQUENCY AND LOCATION

Source water type	Population size category	Monitoring frequency[1]	Distribution System monitoring location per monitoring period
Surface Water or Groundwater under the Influence of Surface Water	<500	.....	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.
Groundwater			
	<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 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.

22.07F: continued

(b) The Supplier of Water may remain on reduced monitoring as long as the TTHM LRAA $\leq$ 0.040 mg/L and the HAA5 LRAA $\leq$ 0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample $\leq$ 0.060 mg/L and each HAA5 sample $\leq$ 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 $\leq$ 4.0 mg/L at each treatment plant treating Surface Water or Groundwater under the Direct Influence of Surface Water, based on monitoring conducted under either 310 CMR 22.07E(7)(b)1.c. or (d).

(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, >4.0 mg/L at any treatment plant treating Surface Water or Groundwater Under the Direct Influence of Surface Water, the Supplier of Water must resume routine monitoring under 310 CMR 22.07F(8) or begin increased monitoring if 310 CMR 22.07F(12) applies.

(d) The Department may return the Supplier of Water to routine monitoring at the Department's discretion.

(11) Additional Requirements for Consecutive Systems. If the Supplier of Water is 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, they must comply with analytical and monitoring requirements for chlorine and chloramines in 310 CMR 22.07E(6)(c) and(7)(c)1. and the compliance requirements in 310 CMR 22.07E(8)(c)1. beginning April 1, 2009, unless required earlier by the Department, and report monitoring results under 310 CMR 22.07E(9)(c).

(12) Conditions Requiring Increased Monitoring.

(a) If the Supplier of Water is required to monitor at a particular location annually or less frequently than annually under 310 CMR 22.07F(8) or (10), they 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) The Supplier of Water is in violation of the MCL when the LRAA exceeds the Stage 2 Disinfection Byproducts MCLs in 310 CMR 22.07E(1), 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). The Supplier of Water is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if they fail to monitor.

(c) The Supplier of Water may return to routine monitoring once they have conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is $\leq$ 0.060 mg/L for TTHM and $\leq$ 0.045 mg/L for HAA5.

(13) Operational Evaluation Levels.

(a) The Supplier of Water has 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 four 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 four to determine an average, exceeds 0.060 mg/L.

(b) 1. If the Supplier of Water exceeds the operational evaluation level, they 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 them to exceed the operational evaluation level. The written report must be made available to the public upon request.

2. The Supplier of Water's 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 exceedences.

a. The Supplier of Water may request and the Department may allow them to limit the scope of their evaluation if they are able to identify the cause of the operational evaluation level exceedance.

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b. The Supplier of Water's request to limit the scope of the evaluation does not extend the schedule in 310 CMR 22.07F(13)(b)1. for submitting the written report. The Department must approve this limited scope of evaluation in writing and the Supplier of Water must keep that approval with the completed report.

(14) Requirements for Remaining on Reduced TTHM and HAA5 Monitoring Based on Results Required under 310 CMR 22.07E. The Supplier of Water may remain on reduced monitoring after the dates identified in 310 CMR 22.07F(7)(c) for compliance with 310 CMR 22.07F(14) only if they qualify for a 40/30 certification under 310 CMR 22.07F(4) or have received a very small system waiver under 310 CMR 22.07F(5), plus they meet the reduced monitoring criteria in 310 CMR 22.07F(10)(a), and they do not change or add monitoring locations from those used for compliance monitoring under 310 CMR 22.07E. If the Supplier of Water's monitoring locations under 310 CMR 22.07F differ from their monitoring locations under 310 CMR 22.07E, they may not remain on reduced monitoring after the dates identified in 310 CMR 22.07F(7)(c) for compliance with 310 CMR 22.07F.

(15) Requirements for Remaining on Increased TTHM and HAA5 Monitoring Based on Results Required under 310 CMR 22.07E. If the Supplier of Water was on increased monitoring under 310 CMR 22.07E(7)(b)1., they must remain on increased monitoring until they qualify for a return to routine monitoring under 310 CMR 22.07F(12)(c). The Supplier of Water must conduct increased monitoring under 310 CMR 22.07F(12) at the monitoring locations in the monitoring plan developed under 310 CMR 22.07F(9) beginning at the date identified in 310 CMR 22.07F(7)(c) for compliance with 310 CMR 22.07F and remain on increased monitoring until they qualify for a return to routine monitoring under 310 CMR 22.07F(12)(c).

(16) Reporting and Recordkeeping Requirements.

(a) Reporting.

1. The Supplier of Water must report the following information for each monitoring location to the Department within ten days of the end of any quarter in which monitoring is required:

a. Number of samples taken during the last quarter.

b. Date and results of each sample taken during the last quarter.

c. 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, they 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 the Supplier of Water is required to conduct monitoring at a frequency that is less than quarterly, they must make compliance calculations beginning with the first compliance sample taken after the compliance date, unless they are required to conduct increased monitoring under 310 CMR 22.07F(12).

d. Whether, based on 310 CMR 22.07E(1) and 22.07F, the MCL was violated at any monitoring location.

e. 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 the Supplier of Water is a Surface Water or Groundwater under the Direct Influence of Surface Water system seeking to qualify for or remain on reduced TTHM/HAA5 monitoring, they must report the following source water TOC information for each treatment plant that treats Surface Water or Groundwater under the Direct Influence of Surface Water to the Department within ten days of the end of any quarter in which monitoring is required:

a. The number of source water TOC samples taken each month during last quarter.

b. The date and result of each sample taken during last quarter.

c. The quarterly average of monthly samples taken during last quarter or the result of the quarterly sample.

d. The Running Annual Average (RAA) of quarterly averages from the past four quarters.

e. Whether the RAA exceeded 4.0 mg/L.

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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. The Supplier of Water must retain any monitoring plans required under 310 CMR 22.07F and their monitoring results as required by 310 CMR 22.07E(8).

22.08: Maximum Turbidity Contaminant Levels, Monitoring Requirements and Analytical Methods for Unfiltered Systems and for Filtered Systems Not in Compliance with 310 CMR 22.20A

(1) The maximum contaminant level for turbidity, applicable only to public water systems which use water obtained in whole or in any part from surface water sources, shall be measured at representative entry point(s) to the distribution system, and shall be:

(a) One turbidity unit, (one NTU, Nephelometric turbidity unit) as determined by a monthly average rounded to the nearest significant whole number pursuant to 310 CMR 22.08(3) except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the Department that the higher turbidity does not do any of the following:

1. Interfere with disinfection; or
2. Prevent maintenance of an effective disinfectant agent throughout the distribution system; or
3. Interfere with microbiological determinations.

(b) Five turbidity units, as determined by the arithmetic mean of two consecutive daily samples pursuant to 310 CMR 22.08(3).

(2) All analyses shall be conducted in accordance with the following methods:

(a) Nephelometric Method 2130B, "Standard Methods for the Examination of Water and Wastewater", American Public Health Association, 14th Edition, pages 132-4, 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, 9222A, B, C, D-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; or

(b) Nephelometric Method, Method 180.1, "*Methods in the Determination of Inorganic Substances in Environmental Samples*" EPA-600/R-93-100, August 1995, Available at NTISPB94-121811.

(c) GLI Method 2, "*Turbidity*" November 2, 1992, Great Lakes Instrumentation, Inc., 8855 North 55th Street, Milwalkee, Wisconsin

(d) Hach FilterTrak Method 10133. A description of the Hach Filter Trak 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.

(e) Styrene divinyl benzene beads (*e.g.* AMCO-AEPA-1 or equivalent) and stabilized formazin (*e.g.* Hach StablCal™ or equivalent) are acceptable substitutes for formazin.

(3) In no event shall the frequency of sampling be less than as set forth in 310 CMR 22.08(3)(a) through (d):

(a) Community water systems subject to 310 CMR 22.08 shall commence sampling by not later than June 24, 1977 and shall take at least one sample per day thereafter. All samples shall be taken at representative entry point(s) to the distribution system.

(b) Non-community water systems subject to 310 CMR 22.08 shall commence sampling by not later than June 24, 1979 and shall take at least one sample per day thereafter. All samples shall be taken at representative entry point(s) to the distribution system.

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(c) If the result of a turbidity analysis pursuant to 310 CMR 22.08(3)(a) and (b) indicates that the maximum contaminant level has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum contaminant level has been exceeded, the supplier of water shall report to the Department by the end of the next business day. The repeat sample shall be the sample used for calculating the monthly average pursuant to 310 CMR 22.08(3)(a) and (b). If the monthly average of the daily samples exceeds one turbidity unit, or if the average of two consecutive daily samples exceeds five turbidity units, the supplier of water shall notify the public pursuant to 310 CMR 22.16.

(d) If the Department determines that a reduced sampling frequency in a non-community system will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain an active residual disinfectant in the distribution system, and in those cases where the Department has indicated in writing that no unreasonable risk to health existed under the circumstances of this option.

(4) The requirements in 310 CMR 22.08 apply to unfiltered systems that the Department has determined in writing that filtration is required. The requirements in 310 CMR 22.08 also apply to filtered systems until such time that said systems are in compliance with 310 CMR 22.20A. The requirements for unfiltered systems that have met the criteria for avoiding filtration must comply with 310 CMR 22.20A.

22.09A: Maximum Radionuclide Contaminant Levels, Monitoring Requirements and Analytical Methods Effective as of December 8, 2003

(1) Maximum Contaminant Levels for Radionuclides: The maximum contaminant levels for radionuclide contaminants of 310 CMR 22.09A apply only to community water systems. The MCLs for radionuclides are as indicated in 310 CMR 22.09A: *Table A*:

TABLE A
MAXIMUM CONTAMINANT LEVELS FOR RADIONUCLIDES

Contaminant	MCL
Combined radium-226 and radium-228	5 pCi/L
Gross alpha particle activity (excluding radon and uranium)	15 pCi/L
Beta particle and photon radioactivity	4 mrem/year
Uranium	30 µg/L

(a) MCL for 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.

(b) MCL for Gross Alpha Particle Activity (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.

(c) MCL for Beta Particle and Photon Radioactivity.

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

2. Except for the radionuclides listed in 310 CMR 22.09A: *Table B*, the concentration of man-made radionuclides causing four mrem total body or organ dose equivalents must be calculated on the basis of two liter per day drinking water intake using the 168 hour data list in "*Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure*" NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. Copies of this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800–553–6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC. 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 mrem/year.

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TABLE B AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE: A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR		
Radionuclide	Critical organ	pCi/L
Tritium	Total body	20000
Strontium-90	Bone Marrow	8

(d) MCL for Uranium. The maximum contaminant level for uranium is 30 µg/L.

(e) 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 310 CMR 22.09A(1): *Table A* beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of 310 CMR 22.09A(1) through (5). Compliance with reporting requirements for the radionuclides under 310 CMR 22.16 and 22.16A is required beginning December 8, 2003.

(f) Best Available Technologies (BATs) for Radionuclides. The USEPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1412, has identified as indicated in 310 CMR 22.09A: *Table C*, *Table D*, and *Table E* of the best technology available for achieving compliance with the maximum contaminant levels for combined radium-226 and radium-228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.

TABLE C BAT FOR COMBINED RADIUM-226 AND RADIUM-228, URANIUM, GROSS ALPHA PARTICLE ACTIVITY, AND BETA PARTICLE PHOTON ACTIVITY	
Contaminant	BAT
Combined radium-226 and radium-228	Ion exchange, reverse osmosis, lime softening.
Uranium	Ion exchange, reverse osmosis, lime softening, coagulation/filtration.
Gross alpha particle activity (excluding Radon and Uranium)	Reverse osmosis.
Beta particle and photon radioactivity	Ion exchange, reverse osmosis.

TABLE D 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 Intermediate	All ground waters
9. Pre-formed hydrous Manganese oxide filtration.	g	Intermediate	All ground waters
10. Activated alumina	a, h	Advanced	All ground waters; compet-ing 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.

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[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.

[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 E
COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDES

Contaminant	Compliance technologies [1] for system size categories (population served) 3,300–10,000		
	25–500	501–3,300	3300-10,000
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 310 CMR 22.09A(1): *Table D*.

(2) Monitoring Frequency and Compliance Requirements for Radionuclides in Community Water Supplies.

(a) Monitoring Frequency and Compliance Requirements for Gross Alpha Particle Activity, Radium-226, Radium-228, and Uranium.

1. Community water systems must conduct initial monitoring to determine compliance with the maximum contaminant levels listed in 310 CMR 22.09A by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, "detection limit" is defined as in 310 CMR 22.09A(5)(b).

a. Applicability and sampling location for existing community water systems or sources. All existing community water systems using ground water, surface water or systems using both ground and surface water (for the purpose of 310 CMR 22.09A referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (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 310 CMR 22.09A(2)(b)2.

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b. Applicability and sampling location for new community water systems or sources. All new community water systems or community water systems 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. Community water systems 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.

(b) Initial Monitoring. The supplier of water must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

1. Systems without acceptable historical data, as defined in 310 CMR 22.09A(2)(b)1. through 4., must collect four consecutive quarterly samples at all sampling points before December 31, 2007.

2. 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.

a. 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.

b. 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.

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

3. 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.

4. If the average of the initial monitoring results for a sampling point is above the MCL, the supplier of water 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.

(c) 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.

1. 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 310 CMR 22.09A: *Table G*, the supplier of water must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

2. 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 ½ the MCL, the supplier of water 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 ½ the MCL, the supplier of water must collect and analyze for that contaminant using at least one sample at that sampling point every six years.

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3. For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above ½ the MCL but at or below the MCL, the supplier of water 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 ½ the MCL but at or below the MCL, the supplier of water must collect and analyze at least one sample at that sampling point every three years.

4. The supplier of water 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 ½ the MCL, then the next monitoring period for that sampling point is three years).

5. If a supplier of water 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 supplier of water enters into another schedule as part of a formal compliance agreement with the Department.

(d) Compositing. To fulfill quarterly monitoring requirements for gross alpha particle activity, radium-226, radium-228, or uranium, a supplier of water 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 composited sample 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 ½ MCL, the Department may direct the supplier of water to take additional quarterly samples before allowing the supplier of water to sample under a reduced monitoring schedule.

(e) 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% (1.65σ, where σ is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a supplier of water 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, ½ the detection limit will be used to determine compliance and the future monitoring frequency.

(3) Monitoring and Compliance Requirements for Beta Particle and Photon Radioactivity. To determine compliance with the maximum contaminant levels in 310 CMR 22.09A: *Table A* for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

(a) Community water systems (both surface and ground water) designated by the Department as vulnerable must sample for beta particle and photon radioactivity. The supplier of water 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.

1. 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 three years. The supplier of water must collect all samples required in 310 CMR 22.09A(3)(a) during the reduced monitoring period.

2. For systems in the vicinity of a nuclear facility, the Department may allow the community water system 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 310 CMR 22.09A(3)(a).

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(b) 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. The supplier of water must collect 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.

1. 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.
2. 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.
3. 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.
4. 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, (screening level), the Department may reduce the frequency of monitoring at that sampling point to every three years. The supplier of water must collect all samples required in 310 CMR 2.09A(3)(b) during the reduced monitoring period.
5. For systems in the vicinity of a nuclear facility, the Department may allow the community water system 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 310 CMR 22.09A(3)(b).

(c) 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 310 CMR 22.09A(3)(a) or (b).

(d) 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. The supplier of water is 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.

(e) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate 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 310 CMR 22.09A(1)(c)1., using the formula in 310 CMR 22.09A(1)(c)2. Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(f) The supplier of water must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in 310 CMR 22.09A: *Table A* beginning the month after the exceedance occurs. The supplier of water must continue monthly monitoring until the system has established, by a rolling average of three monthly samples, that the MCL is being met. Systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in 310 CMR 22.09A(3)(a)2. or (b)1.

(4) General Monitoring and Compliance Requirements for Radionuclides.

(a) The Department may require more frequent monitoring than specified in 310 CMR 22.09A(2) and (3), or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

22.09A: continued

(b) Each supplier of water shall monitor at the time designated by the Department during each compliance period.

(c) Compliance with 310 CMR 22.09A(1)(a) through (d) 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.

1. 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.

2. 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.

3. Each supplier of water must include all samples taken and analyzed under the provisions of 310 CMR 22.09A in determining compliance, even if that number is greater than the minimum required.

4. If a supplier of water 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.

5. 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, ½ the detection limit will be used to calculate the annual average.

(d) The Department has the discretion to delete results of obvious sampling or analytic errors.

(e) If the MCL for radioactivity set forth in 310 CMR 22.09A(1)(a) through (d) is exceeded, the operator of a community water system must give notice to the Department pursuant to 310 CMR 22.15 and shall notify the public as required by 310 CMR 22.16.

(5) Analytical Methods for Radioactivity.

(a) Analysis for the following contaminants shall be conducted to determine compliance with 310 CMR 22.09A(1) in accordance with the methods in 310 CMR 22.09A: *Table F* or their equivalent as determined by USEPA.

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TABLE F

ANALYTICAL METHODS FOR RADIONUCLIDE MONITORING

Contaminant	Methodology	Reference (method or page number)								
		EPA[1]	EPA[2]	EPA[3]	EPA[4]	SM[5]	ASTM[6]	USGS[7]	DOE[8]	Other
Naturally Occurring:										
Gross alpha & beta [11]	Evaporation	900	p 1	0	p 1	302, 7110 B 7110 B-00		R–1120–76		
Gross alpha [11]	Co-precipitation			0		7110 C 7110 C-00				
Radium 226	Radon emination Radiochemical	903.1 903	p 16 p 13	Ra-04 Ra-03	p 19	305, 7500-Ra C 7500 Ra C-01 304, 7500-Ra B 7500-Ra B-01	D 3454–97 D 2460–97	R–1141–76 R–1140–76	Ra-04	N.Y. [9] GA[14]
Radium 228	Radiochemical	904.4	p 24	Ra-05	p 19	7500-Ra D 7500-RaD-01		R–1142–76		N.Y. [9] N.J. [10]
Uranium [12]	Radiochemical	908				7500-U B 7500-U B-00				GA[14]
	Fluorometric	908.1				7500-U C (17th Ed.)	D 2907–97	R–1180–76	U-04	
								R–1181–76		
	Alpha spectronomy Laser phosphorimetry			0	p 33	7500-U C (18th, 19th, or 20th edition) 7500-U C-00	D 3972–97, 02 D 5174–97, 02	R–1182–76	U-02	
	ICP-MS	200.8[13]				3125	D 5673-03			
Man-made:										
Radioactive cesium	Radiochemical Gamma ray spectrometry	901 901.1	p 4		 p 92	7500-Cs B 7500-Cs B-00 7120, 7120-97	D 2459–72 D 3649–91, 98a	R–1111–76 R–1110–76	 4.5.2.3	
Radioactive iodine	Radiochemical Gamma ray spectrometry	902 p 9 901.1	p 6 		 p 92	7500–1 B 7500-1 B-00 7500–1 C 7500-1C-00 7500–1 D 7500-1 D-00 7120, 7120-97	 D 3649–91, 98a D 4785–93, 00a	 	 4.5.2.3	
Radioactive Strontium 89, 90	Radiochemical	905	p 29	Sr-04	p 65	303, 7500-Sr B, 7500-Sr B-01		R–1160–76	Sr-01 Sr-02	
Tritium	Liquid scintillation	906	p 34	H-02	p 87	306,7500–3H B, 7500-3 H B-00	D 4107–91, 98 (Reapproved 2002)	R–1171–76		
Gamma emitters	Gamma ray Spectrometry	901.1 902 901			p 92	7120, 7120-97 7500-Cs B 7500-Cs B-00 7500-I B, 7500-I B-00	D 3649–91, 98a D 4785–88 93, 00a	R–1110–76	Ga-01-R	

[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, 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800–553–6847), PB 80–224744, except Method 200.8, "*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 1*", EPA 600-R-94-111, May 1994. Available at NTIS, PB95-125472.

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[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*, U.S. Department of Energy, March 1979. Available at NTIS, ibid. EMSL LV 053917.

[5] *Standard Methods for the Examination of Water and Wastewater*, 13th, 17th, 18th, 19th, or 20th editions, 1971, 1989, 1992, 1995 and 1998. Available at American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Methods 7110B, 7500-Ra B, 7500-Ra C, 7500-Ra D, 7500-U B, 7500-Cs B, 7500-I B, 7500–I C, 7500–I D, 7500-Sr B, 7500–3H B are in the 17th, 18th, 19th, and 20th editions. Method 7110C is in the 18th, 19th, and 20th editions. Method 7500-U C Fluorometric Uranium is only in the 17th Edition, and 7500-U C Alpha spectrom-etry is only in the 18th, 19th, and 20th editions. Method 7120 is only in the 19th and 20th editions. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Method 3125 is only in the 20th edition. Methods 7110 B-00, 7110 C-00, 7500-Ra B-01, 7500-Ra C-01, 7500 Ra D-01, 7500-U B-00, 7500-U C-00, 7500-1 B-00, 7500-1 C-00, 7500-1 D-00, 7120-97, 7500-Sr B-01, and 7500-^{3}H B-00 are available online 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.

[6] Annual Book of ASTM Standards, Vol. 11.01 and 11.02, 1999, 2002; American Society for Testing and Materials International; any year containing the cited version of the method may be used. Copies of these two volumes and the 2003 version of D 5673-03 may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

[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 Geo-logical Survey, 1977. Available at U.S. Geological Survey Information Services, Box 25286, Federal Center, Denver, CO 80225–0425.

[8] *EML Procedures Manual*, 27th (1990), or 28th (1997) Editions, Volume 1 and 2; either edition may be used. In the 27th Edition Method Ra-04 is listed as Ra-05 and Method Ga-01-R is listed as Sect. 4.5.2.3. 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 Analytical Services, 9 Ewing Street, Trenton, NJ 08625.

[11] Natural uranium and thorium-230 are approved as gross alpha-particle activity calibration standards for the gross alpha co-precipitation and evaporation methods; americium-241 is approved for use with the gross alpha co-precipitation methods.

[12] If uranium (U) is determined by mass-type methods (*i.e*., fluorometric or laser phosphorimetry), a 0.67 pCi/mg uranium conversion factor must be used. This conversion factor is conservative and is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally-occurring uranium in rock.

[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 1*, 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.

(b) To determine compliance with 310 CMR 22.09A(1) the detection limit shall not exceed the concentrations as indicated in 310 CMR 22.09A *Table G*.

22.09A: continued

TABLE G REQUIRED REGULATORY DETECTION LIMITS FOR VARIOUS RADIOCHEMICAL CONTAMINANTS	
Contaminant	**Detection Limit (pCi/L)**
Gross alpha	3
Gross beta	4
Radium-226	1
Radium-228	1
Uranium	[ug/L]
Cesium-134	10
Strontium-89	10
Strontium-90	2
Iodine-131	1
Tritium	1000
Other radionuclides and Photon/Gamma Emmitters	$1/10^{th}$ of the rule

(c) To judge compliance with the maximum contaminant levels listed in 310 CMR 22.09A(1), 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.

22.10: Alternative Analytical Methods

(1) With the express written permission of the Department, given after a public hearing and the approval of the Administrator or the Administrator's designee, an alternate analytical technique may be employed for any analytical technique prescribed in 310 CMR 22.00. The Department shall give such permission only if the alternative technique is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not alter the frequency of monitoring required by 310 CMR 22.00.

(2) The Department shall approve all USEPA Alternative Testing Methods approved for analyses under the Safe Drinking Water Act that are identified in 40 CFR 141, Subpart C, Appendix A. These methods are also listed at http://www.ecfr.gov/cgi-bin/text-idx?SID=fda778b5ffa108853e7f2eb78b656c5a&mc=true&node=sp40.23.141.c&rgn=div6#ap40.23.141_129.a. The use of these alternative analytical techniques shall not alter the frequency of monitoring required by 310 CMR 22.00 and laboratories seeking to use the methods must comply with all requirements of 310 CMR 42.00: *Certification and Operation of Environmental Analysis Laboratories*.

22.11A: Laboratoy Certification

(1) No laboratory shall conduct the analyses of drinking water required by 310 CMR 22.00 nor report them to the Supplier of Water or to the Department for the purpose of complying with 310 CMR 22.00 unless the Department has certified the laboratory to conduct analytical measurements, pursuant to 310 CMR 42.00: *Certification and Operation of Environmental Analysis Laboratories* except that measurements of Turbidity, chlorine residual, temperature, pH, alkalinity, calcium, conductivity, orthophosphates, silica and other analyses for the control of treatment works for Public Water Systems may be performed by any employee or agent of the Public Water System whom the Department designates as competent and authorized to perform such analyses. No sample shall be considered for the purpose of determining compliance with 310 CMR 22.00 if the sample was analyzed by a laboratory not certified pursuant to 310 CMR 42.00: *Certification and Operation of Environmental Analysis Laboratories*, or analyzed by an unapproved analytical method. All sample results submitted to the Department shall be on forms specified and approved by the Department. Certified laboratories, or other agents approved by the Department, shall provide chain of custody, collection containers of the recommended size, quality and construction for the collection of drinking water samples, as well as any required preservative.

22.11A: continued

(2) The Department may accept results of analyses performed by laboratories which are certified by the EPA or any other certification authority approved by the Department. Such laboratories must continue to participate in performance evaluation studies and in laboratory intercomparison cross check studies which include the analyses for which the laboratory is certified or seeking certification.

22.11B: Public Water Systems Certified Operator Staffing Requirements

(1) Operation. Each Supplier of Water shall ensure that its Public Water System is operated at all times by a Primary and Secondary Operator for the treatment and distribution of drinking water, unless otherwise authorized in writing by the Department. Any Public Water System personnel who make decisions regarding the Public Water System's process control or operational integrity shall be certified pursuant to 236 CMR: *Board of Certification of Operators of Drinking Water Supply Facilities*. Exemptions to this requirement are addressed in 310 CMR 22.11B(5). The Primary Operator shall be directly responsible for the operation of a Treatment Facility and/or Distribution System. The Secondary Operator shall be directly responsible for the operation of a Treatment Facility and/or Distribution System or a major segment of the Public Water System, during the temporary absence of the Primary Operator or during operational shifts when the Primary Operator is not scheduled to work. Persons exercising official general administrative duties such as city engineers exercising engineering design duties, elected water commissioners, clerks or administrative workers involved in customer relations, billing, payroll, timekeeping, *etc*. shall not be considered directly responsible for a Public Water System, unless otherwise authorized in writing by the Department.

(2) Staffing Requirements. In order to ensure the proper management, operation and maintenance of Public Water Systems, every Public Water System, except as provided in 310 CMR 22.11B(5), shall be operated as follows:

(a) Treatment - Primary Operator.

1. A Public Water System utilizing treatment shall be operated, whenever the Treatment Facility is in operation, by a Primary Operator (*i.e*., a Certified Operator who has a grade certificate at least equal to the class of the Treatment Facility, as further defined in 310 CMR 22.02) who, except when temporarily absent, shall be:
    a. present at the Treatment Facility at least one seven-hour working shift each day for five days during each work week (meaning seven consecutive days); and
    b. available to respond in person to Emergencies at the Treatment Facility within one hour at all times when not present at the Treatment Facility.
2. A Supplier of Water may submit a written request for the Department to approve an alternative work schedule for the Primary Operator. The proposed alternative work schedule shall demonstrate that the Primary Operator will work at least 35 hours and at least four days each work week (as defined in 310 CMR 22.11B(2)(a)1.) at the Treatment Facility to ensure its safe and proper operation.

(b) Treatment - Secondary Operator. A Public Water System utilizing treatment shall be operated, whenever the Treatment Facility is in operation, by a Secondary Operator (i.e., a Certified Operator who has a grade certificate not less than one grade lower than the classification of the Treatment Facility, as more fully defined in 310 CMR 22.02) who shall be:

1. present at the Treatment Facility on all working shifts when the Primary Operator is not required to be present; and
2. present at the Treatment Facility during any working shift when a Primary Operator is required to be present in accordance to 310 CMR 22.11B(2)(a)1. or 2., but is temporarily absent.

(c) Distribution - Primary Operator.

1. A Public Water System's Distribution System shall be operated by a Primary Operator (*i.e*., a Certified Operator who has a grade certificate at least equal to the class of the Distribution System, as more fully defined in 310 CMR 22.02) who, except for temporary absence, shall be:
    a. present at the Distribution System at least one seven-hour working shift each day for five days during each work week (as defined in 310 CMR 22.11B(2)(a)1.); and
    b. available to respond in person to Emergencies with the Distribution System within one hour at all times when not present at the Distribution System.

22.11B: continued

2. A Supplier of Water may submit a written request for the Department to approve an alternative work schedule for the Primary Operator. The proposed alternative work schedule shall demonstrate that the Primary Operator will work at least 35 hours and at least four days each work week (as defined in 310 CMR 22.11B(2)(a)1.) at the Distribution System to ensure its safe and proper operation.

(d) Distribution - Secondary Operator. A Public Water System's Distribution System shall be operated by a Secondary Operator (*i.e.*, a Certified Operator who has a certification not less than one grade lower than the classification of the Distribution System, as more fully defined in 310 CMR 22.02) who shall be:

1. present at the Distribution System on all working shifts when the Primary Operator is not required to be present; and

2. present at the Distribution System during any working shift when a Primary Operator is required to be present in accordance to 310 CMR 22.11B(2)(c)1. or 2., but is not present due to a temporary absence.

(e) Multiple Treatment Facilities.

1. A Supplier of Water whose Public Water System is classified as Grade 1T or 2T and consists of multiple Treatment Facilities shall not be required to staff each Treatment Facility individually.

2. A Supplier of Water whose Public Water System is classified as Grade 3T or 4T and consists of multiple Grade 3 or 4 Treatment Facilities shall staff each facility individually, in accordance with its classification.

3. A Supplier of Water whose Public Water System is classified as Grade 3T or 4T and consists of a single Grade 3 or 4 Treatment Facility and one or more Grade 1 or 2 Treatment Facilities shall staff the higher grade Treatment Facility, but shall not be required to staff each lower grade Treatment Facility.

(f) Staffing and Comprehensive Operations Plan. A Supplier of Water, upon request from the Department, shall submit to the Department for review a "Staffing and Comprehensive Operations Plan" on a form provided by the Department and, if applicable, a Contract Operator Compliance Notice, demonstrating compliance with 310 CMR 22.11B(2).

(3) Primary and Secondary Operator Changes. Except for periods of temporary absence of no more than 30 days, whenever a Supplier of Water changes a Certified Operator responsible for primary or secondary supervision under 310 CMR 22.11B(1),

(a) the Supplier of Water shall report the change to the Department within seven days, thereafter;

(b) the Supplier of Water shall submit to the Department for review an updated "Staffing and Comprehensive Operations Plan" and, if applicable, a Contract Operator Compliance Notice, within 30 days of the change described in 310 CMR 22.11B(3)(a); and

(c) the Supplier of Water shall obtain a replacement Primary or Secondary Operator(s) of appropriate grade no later than 30 days from the date the current operator(s) ceases to perform the Primary or Secondary Operator duties.

(4) Classification of Public Water Systems. A Public Water System's Distribution System shall be classified in accordance with 310 CMR 22.11B(4)(c) and its Treatment Facilities, if any, shall be classified in accordance with 310 CMR 22.11B(4)(a). However, if the Public Water System is a free standing vending machine, it shall be classified instead in accordance with 310 CMR 22.11B(4)(b) or (d), as applicable. The overall classification of each Public Water System shall be indicated by the classification of its Distribution System followed by the numerically highest class of its Treatment Facilities, if any (*e.g.*, III-D/II-T) or its vending classification (*e.g.*, II-VNDT). The increasing numerical class indicates an increasing complexity of operation and a higher level of training, knowledge, and experience required for operation. The certification grades for operators established in 236 CMR 3.02: *Classification of Public Water System Operators*, shall correspond to the classification of the system as required under 310 CMR 22.11B(4). The Department shall make the final determination of all such classifications.

(a) Rating Treatment Facilities. The class of each Treatment Facility within a Public Water System shall be established by adding together all rating values reflecting the complexity of operation for such Treatment Facility's treatment units, as set forth in 310 CMR 22.11B: *Table 1. Treatment Unit Rating Values*.

22.11B: continued

310 CMR 22.11B: *TABLE 1*
TREATMENT UNIT RATING VALUES

Item	**Points Possible**
Size (20 points maximum allowed)	
Design flow average day, or peak month's average day, whichever is larger (1 point per 0.5 MGD. Round up.) Design flow: Consider this to be the design capacity of the plant. Examples: 9.2 MGD = 19 points 4.7 MGD = 10 points	1 - 20
Water Supply Sources (Rating based on public health significance)	
Seawater/saltwater	0
Groundwater	0
Groundwater Under Direct Influence of Surface Water (GWUDI)	8
Surface Water	10
Average Raw Water Quality Variation - Applies to all sources (surface and groundwater) Key is the effect on treatment process changes that would be necessary to achieve optimized performance. • Little or no variation - no treatment provided except Disinfection (0 points) • Minor variation - *e.g.* "high quality" surface source appropriate for Slow Sand Filtration (1 point) • Moderate variation in chemical feed, dosage changes made: monthly (2 points), weekly (3 points), or daily (4 points) • Variation significant enough to require pronounced and/or very frequent changes (5 points) • Severe variation - source subject to non- point discharges, agricultural/ urban storm runoff, flooding (7 points) • Raw Water quality subject to agricultural or municipal waste point source discharges (8 points) • Raw Water quality subject to industrial waste pollution (10 points)	0 - 10
Raw Water quality is subject to:	
• Taste and/or odor for which treatment process adjustments are routinely made - ***see* exceptions in Note 1 at end of table**	2
• Color > 15 CU (not due to precipitated metals) - ***see* exceptions in Note 1 at end of table**	3
• Iron or/and manganese > SMCL: Fe (2 points), Mn (3 points) (3 points maximum allowed) - ***see* exceptions in Note 1 at end of table**	2 - 3
• Algal growths for which treatment process adjustments are routinely made - ***see* exceptions in Note 1 at end of table**	3

22.11B: continued

Item	Points Possible
Chemical Treatment/Addition Processes	
Fluoridation	4
Disinfection/Oxidation (Note: Points are additive to a maximum of 15 points allowed for this category.) • Chlorination: ○ Hypochlorites (5 points) • If generated on site (add 1 point) ○ Chlorine gas (8 points) ○ Chloramination (10 points) ○ Chlorine dioxide (10 points) • Ozonation (10 points) • UV Irradiation (2 points) • Iodine, Peroxide, or similar (5 points) • Potassium permanganate (4 points) ○ (If used with green sand filtration do not give 4 points)	0 - 15
pH adjustment for process control (*e.g.*, pH adjustment aids Coagulation)	4
Stability or Corrosion Control (If the same chemical is used for both Corrosion Control and pH adjustment, count points only once)	4
Coagulation/Flocculation & Filter Aid	
Primary coagulant addition	6
Coagulant aid / Flocculant chemical addition (in addition to primary coagulant use)	2
Flocculation	2
Filter aid addition (Non-ionic/anionic polymers)	2
Clarification/Sedimentation	
Sedimentation (plain, tube, plate)	4
Contact Adsorption	6
Other clarification processes (air flotation, ballasted clarification, *etc.*)	6
Upflow clarification ("sludge blanket clarifier") - ***see* Note 2 at end of table**	8
Filtration	
Granular media filtration (Surface Water/GWUDI) less than or equal to 3 gpm/sq ft	10
Granular media filtration (Surface Water/GWUDI) greater than 3 gpm/sq ft	20
Groundwater Filtration	6
Membrane Filtration • For compliance with a primary MCL, Treatment Technique, MRDL, Action Level or any standards specific to an individual Public Water System established pursuant to a health assessment as provided in 310 CMR 22.03(8) (10 points) • For compliance with a Secondary MCL regulation (6 points)	6-10
Diatomaceous Earth (pre-coat filtration)	10
Cartridge/bag	5
Pre-filtration (staged cartridges, pressure sand w/o Coagulation, *etc.*): add one point per stage to maximum of 3 points	1-3
Slow sand	5

22.11B: continued

Item	Points Possible
Other Treatment Processes	
Aeration	3
Air stripping (including diffused air, packed tower Aeration)	5
Ion-exchange/softening	5
Green sand Filtration	10
Lime-soda ash softening (includes: chemical addition, mixing/flocculation/clarification/Filtration - do not add points for these processes separately)	20
Granular activated carbon filter (do not assign points when included as a bed layer in another filter)	5
Powdered activated carbon	2
Blending sources with significantly different water quality • To achieve MCL, MRDL, Action Level or any standards specific to an individual Public Water System established pursuant to a health assessment as provided in 310 CMR 22.03(8) (4 points) * For aesthetic reasons (2 points)	2 - 4
Reservoir management employing chemical addition	2
Electrodialysis	15
Other: The Department may assign 2 to 15 additional points for processes not listed elsewhere in this table.	2 - 15
Residuals Disposal	
• Discharge to surface, sewer, or equivalent (0 points) • On-site disposal, land application (1 point) • Discharge to lagoon/drying bed, with no recovery/recycling - e.g. downstream outfall (1 point) • Backwash recovery/recycling: discharge to basin or lagoon and then to source (2 points) • Backwash recovery/recycling: discharge to basin or lagoon and then to Plant Intake (3 points)	0 - 3
Facility Characteristics	
Instrumentation - Use of SCADA or similar instrumentation systems to provide data, with: • Monitoring/alarm only, no process operation - plant has no automated shutdown capability (0 points) • Limited process operation - e.g. remote shutdown capability (1 point) • Moderate process operation - alarms and shutdown, plus partial remote operation of plant (2 points) • Extensive or total process operation - alarms and shutdown, full remote operation of plant possible (4 points)	0 - 4

Notes:

1 - Raw Water quality is subject to:

- Taste and/or odor for which treatment process adjustments are routinely made (2 points): 1) taste and/or odor issue has been identified in a pre-design report, *etc*., 2) a process has been installed to address, and 3) operational control adjustments are made at least seasonally. Do not give points for taste and/or odor when there is no specific additional impact on operation. *E.g*. if a system is already pre-chlorinating for Disinfection, give no points for taste and/or odor.
- Color > 15 CU (not due to precipitated metals) (3 points) with following exceptions. Color will be considered elevated and points assigned when levels exceed 75 Color Units (CU) for conventional filtration, 40 CU for Direct Filtration, or 15 CU for all other technologies, except Reverse Osmosis (no points given for color for Reverse Osmosis).
- Iron and/or manganese > SMCL: Fe (2 points), Mn (3 points) (3 points maximum allowed) with following exceptions. Iron and manganese levels will be considered elevated and points assigned if they are greater than the SMCL, except for applications of manganese greensand filters. For applications of manganese greensand filters, iron and manganese levels will be considered elevated when their combined level exceeds 1.0 mg/L or if manganese exceeds 0.3 mg/L (3 points allowed).
- Algal growths for which treatment process adjustments are routinely made (3 points): Raw Water will be considered subject to algae growths when treatment processes are specifically adjusted due to the presence of high levels of algae on at least a weekly basis for at least two months each year.

22.11B: continued

2 - Upflow clarification ("sludge blanket clarifier") - 8 points - Also known as sludge blanket clarification. Includes such proprietary units as Super-Pulsator. These units include processes for flocculation and Sedimentation. Important note: these are not the same as Adsorption clarifiers.

1. Each unit process should have points assigned only once.
2. Point System: Treatment Facilities shall be classified according to the following points system:

Class I-T	30 Points and less
Class II-T	31 to 55 points
Class III-T	56 to 75 points
Class IV-T	76 points and greater

(b) Water Vending Machines with Treatment. Free standing vending machines consisting of filters with the addition of chemicals and/or Reverse Osmosis system shall be classified as follows:

2000 gal per day and less	Class I-VNDT
2001 gal per day to 5000	Class II-VNDT
5001 gal per day to 50000	Class III-VNDT
50001 gal per day and grater	Class IV-VNDT

(c) Rating Distribution Systems. Distribution Systems shall be rated according to the population served as follows except for Non-community Water Systems:

500 and less	VSS (Very Small System)
501 to 1,500	Class I-D
1,501 to 15,000	Class II-D
15,001 to 50,000	Class III-D
50,001 and greater	Class IV-D

All Non-community Water Systems shall be classified as Very Small Systems (VSS) regardless of population served.

(d) Water Vending Machines without Treatment. Free standing vending machines consisting of filters, and/or ultra-violet Disinfection systems with no chemical addition shall be classified as follows:

500 gal per day and less	VND-ID (Water Vending Machine)
501 gal per day and more	VND-IID

(e) Bulk or Bottled Water. Water that is treated to be distributed in bulk or as bottled water shall be classified as stated in 310 CMR 22.11B(4)(b) and unless otherwise authorized in writing by the Department.

(f) Specific Rating Values. The Department may establish a rating value for any system or unit not shown on the table. The Department may change the classification of a particular facility when there are site-specific factors affecting the operation of the Public Water System or complexity of the treatment process.

(5) Exemptions. The Department may exempt any Supplier of Water from the requirements of 310 CMR 22.11B(1) and (2).

(a) The Department shall not grant any exemption unless the Supplier of Water demonstrates to the Department's satisfaction that:

1. due to compelling factors the Supplier of Water is unable to comply with the requirements of 310 CMR 22.11B(1) or (2);
2. the granting of the requested exemption will not result in an unreasonable risk to health or impair the quality of water which is being delivered to the Public Water System's consumers;
3. the Supplier of Water can ensure the proper operation of the Public Water System and can detect any malfunctions in the operation of the Treatment Facility or Distribution System in the absence of the Primary Operator;
4. the Primary Operator is able to respond to Emergencies within a reasonable period of time. In no event shall an Emergency response time greater than one hour be deemed reasonable;
5. the Primary Operator is responsible for the operation of the Public Water System at all times whether or not present in person; and
6. any individual utilized by the Supplier of Water to operate the Public Water System and to detect any malfunctions in the operation of the Public Water System in the absence of the Primary Operator, is properly trained by, and is acting under the direction of, the Primary Operator.

22.11B: continued

(b) Staffing and Comprehensive Operations Plan. A Supplier of Water requesting an exemption under 310 CMR 22.11B(5) shall submit to the Department for review and approval a "Staffing and Comprehensive Operations Plan" for the Public Water System.

(c) Part-time Operation. With the prior written approval of the Department, a Supplier of Water whose Public Water System includes a Distribution System classified as a I-D or less may reduce the staffing requirements of 310 CMR 22.11B(1) and (2) by operating the Distribution System on a part-time basis. With the prior written approval of the Department, a Supplier of Water whose Public Water System includes a Treatment Facility classified as I-T or less may reduce the staffing requirements of 310 CMR 22.11B(1) and (2) by operating the Treatment Facility on a part-time basis. A Supplier of Water seeking a reduction in the staffing requirements shall be subject to the conditions listed at 310 CMR 22.11B(5)(a)1. through 6. and (b). Subject to such approval(s), the Primary and Secondary Operators or both may be allowed to operate the Treatment Facility or Distribution System on a part-time basis.

(d) Public Water System - Automated Operations. Increased instrumentation, automation and SCADA Systems may be used to reduce the number of on-site staff required during periods of routine operation. A Public Water System which has been designed for off-site monitoring may apply to the Department for an exemption from the requirements of 310 CMR 22.11B(1) and (2).

1. The Department shall use, but not be limited to, the following factors in making its determination to evaluate whether a Treatment Facility or Distribution System can reduce the number of staff required to operate a Treatment Facility or Distribution System:
   a. the complexity and type of the treatment process;
   b. the size of storage tanks and clearwells;
   c. the estimated length of time for water quality to deteriorate from a treatment process failure such that unsafe or impure levels of drinking water are present in the Distribution System;
   d. the variability of source water quality;
   e. the degree of sophistication, reliability and control of the instrumentation monitoring and control system;
   f. the location of the off-site monitoring site with respect to operator response and/or travel time to the Treatment Facility;
   g. the adequacy of the Emergency response plan when alarms or out-of-range parameters are reported by Distribution System or Treatment Facility instrumentation;
   h. the capabilities of a Distribution System or Treatment Facility to be shut down during a critical alarm condition;
   i. the ability of the Public Water System to provide at least 12 hours of safe water for the correction of a process malfunction;
   j. the ability of improperly treated water to be flushed from the Distribution System prior to the first customer without an interruption of water service;
   k. demonstration that the Public Water System has adequate capacity to repair and maintain the automated controls or show that it has an agreement with a third party to do so; and
   l. secured remote access.
2. The Treatment Facility or Distribution System shall include where applicable, but not limited to, instrumentation to continuously monitor, control, record and maintain historical data for critical processes at established regulatory compliance points such as:
   a. water storage tank levels at the Treatment Facility and in the Distribution System;
   b. chemical storage tank levels;
   c. disinfection equipment.
   d. critical chemicals or treatment processes including, but not limited to:
      i. pH;
      ii. Turbidity;
      iii. Disinfectant residual;
      iv. fluoride (if using hydrofluorosilicic acid); or
      v. surrogate measures as approved by the Department.
3. The Treatment Facility or Distribution System shall include where applicable, but not limited to, alarms to detect and notify operators in the event of a process failure or condition that could present a concern such as:

22.11B: continued

a. high and low water storage tank levels at the Treatment Facility and in the Distribution System;
b. critical chemicals including, but not limited to:
i. pH;
ii. Turbidity;
iii. Disinfectant residual;
iv. fluoride (if using hydrofluorosilicic acid); or
v. surrogate measures as approved by the Department.
c. gaseous chlorine leaks;
d. ozone leaks;
e. fire and intrusion;
f. power failures and generator operational status;
g. critical pumps and motors;
h. bulk chemical tank volumes (high and low levels); and
i. loss of communication.

(e) 4T Systems. A Public Water System that includes a Treatment Facility classified as 4T and which meets the requirements of 310 CMR 22.11B(5)(d), with the exception of Satellite Facilities and seasonal Treatment Facilities as described in 310 CMR 22.11B(7), shall be staffed for a minimum of eight hours per day during the days when such Treatment Facility and/or filtration units are in operation. The Treatment Facility shall be staffed in accordance with its classification.

(f) 3T Systems. A Public Water System that includes a Treatment Facility classified as 3T and which meets the requirements of 310 CMR 22.11B(5)(d), with the exception of Satellite Facilities and seasonal Treatment Facilities as described in 310 CMR 22.11B(7), shall be staffed for a minimum of eight hours per day during the days when such Treatment Facility and/or filtration units are in operation, unless otherwise approved by the Department. The Treatment Facility shall be staffed in accordance with its classification.

(g) 2T System or Less. A Public Water System that includes a Treatment Facility classified as 2T or less and which meets the requirements of 310 CMR 22.11B(5)(d), with the exception of Satellite Facilities or seasonal Treatment Facilities as described in 310 CMR 22.11B(7) shall be staffed for a minimum of four hours per day every Monday through Friday when the Treatment Facility is in operation. The Treatment Facility shall be staffed in accordance with its classification.

Weekend/Holiday Coverage. Each operating Treatment Facility must be visited by a Certified Operator at least once per day on weekends and holidays.

(h) Slow Sand Filtration. A Slow Sand Filtration process meeting the requirements of 310 CMR 22.11B(5)(d) shall be staffed by the Primary Operator at a minimum of two hours per day every Monday through Friday when the Filtration process is in operation. Weekend/Holiday Coverage shall be in accordance with 310 CMR 22.11B(5)(g)1.

(i) Very Small Systems and Non-community Water Systems.

1. A Secondary Operator is not required for Public Water Systems classified as a very small system (VSS), Transient Non-community or Non-transient Non-community Water Systems. However, during the times when the Primary Operator is temporarily absent (*i.e.* absences not exceeding 30 days), a Certified Operator who has a certification which corresponds to the class of the facility or higher shall be retained during the absence of the Primary Operator to respond in the event of an Emergency. I

n no event shall an Emergency response time greater than one hour be deemed reasonable.

2. A Public Water System classified as a very small system (VSS), Transient Non-community or Non-transient Non-community Water System, utilizing one or more of the following treatment processes may be operated by a Primary Operator with a VSS Full license and an operator-in-training (OIT) treatment license equal to the classification of the treatment system:

a. Disinfection (provided Disinfection is not required to meet the treatment requirements of 310 CMR 22.20A, 22.20D, 22.20F, 22.20G or 22.26);
b. lime contactor;
c. ion-exchange; or
d. in-line bag or Cartridge Filter that is not providing pathogen removal.

22.11B: continued

(6) Contract Services.

(a) A Supplier of Water may contract for the services of a Certified Operator to meet the requirements of 310 CMR 22.11B(1) and (2) provided that the Supplier of Water submits for the Department's review a Contract Operator Compliance Notice and "Staffing and Comprehensive Operations Plan" in accordance with 310 CMR 22.11B(5)(b), and in a format specified by the Department, within 30 days of execution of the contract.

(b) A Supplier of Water who contracts for the services of a Certified Operator shall ensure that the Certified Operator conducts, at a minimum, monthly on-site inspections. The Department may require more frequent inspections if it determines an increased frequency to be necessary based on the complexity of the Public Water System or compliance issues. During each inspection, the Certified Operator shall record the details of the inspection in writing. The Supplier of Water shall maintain all inspection forms and records on site for a minimum of five years from the date of the inspection and shall make them available to the Department upon request.

(7) Satellite Facilities and Seasonal Treatment Facilities. A Public Water System, all the Treatment Facilities of which are staffed and which has centralized water treatment operations meeting the requirements of 310 CMR 22.11B, may, subject to the Department's written approval, operate its Satellite Facilities or seasonal Treatment Facilities, if any, from the location of such centralized water treatment operations using remote control of key functions sufficient to permit normally unstaffed operation, provided that such Public Water System complies with the following:

(a) all requirements set forth in 310 CMR 22.11B(5) (a)1. through 5.;

(b) all requirements set forth in 310 CMR 22.11B(5)(b);

(c) all requirements set forth in 310 CMR 22.11B (5)(d);

(d) all maintenance, chemical deliveries and other actions at such Satellite Facilities and seasonal Treatment Facilities requiring the physical presence of Certified Operators shall only be performed in the presence of such Certified Operators provided from the staffed Treatment Facilities; and

(e) all such Satellite Facilities and seasonal Treatment Facilities which are in operation shall be visited by a Certified Operator at least once per day who shall visually check and verify the instrumentation readings between such Satellite Facilities and seasonal Treatment Facilities and such centralized operations.

(8) Treatment Facility and Distribution System Verification. Before and after unstaffed operation periods, a Certified Operator must check and confirm the validity and accuracy of data transmitted between the location of any centralized water treatment operations and any Treatment Facility or Distribution System by verifying such data at the location of such Treatment Facility or Distribution System and must make entry in the Treatment Facility or Distribution System log of any malfunctions. Malfunctions shall be corrected prior to further unstaffed operation of the Treatment Facility or Distribution System.

22.12: Consecutive Public Water Systems

(1) When a public water system supplies water to one or more other consecutive public water systems, the Department may, based on a written request by the consecutive system, modify the monitoring requirements in 310 CMR 22.00 otherwise applicable to the consecutive system based on the extent that the interconnection of the system justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a written schedule approved by the Department.

(2) Any reduced monitoring plan approved by the Department pursuant to 310 CMR 22.12(1) will require a consecutive system to collect, at a minimum, the samples specified at 310 CMR 22.05, and monthly total coliform samples at each entry point to the distribution system.

22.13: Variances

The Department upon receipt of an application from the Public Water System, may grant variances from the requirements of 310 CMR 22.05 through 22.09A, but only subject to the following conditions:

22.13: continued

(1) The Department may grant one or more variances to one or more Public Water Systems:

(a) which, because of characteristics of the raw water sources which are reasonably available to the system(s), cannot comply with a prescribed Maximum Contaminant Level or levels despite application of the best technology, Treatment Techniques, or other means, which the Department finds are generally available, taking costs into consideration. The Department shall not grant a variance pursuant to 310 CMR 22.13(1)(a) unless the Department finds in consultation with the Massachusetts Department of Public Health that the variance will not result in an unreasonable risk to health. If the Department grants a Public Water System a variance pursuant to 310 CMR 22.13(1)(a) the Department shall prescribe at the time the variance is granted, a compliance schedule for:

1. a. Compliance, within the shortest practicable time feasible under the circumstances but not to exceed five years, except as provided in 310 CMR 22.13(1)(a)2., including increments of progress by the Public Water System with each Maximum Contaminant Level requirement with respect to which the variance was granted; and
   b. Implementation by the Public Water System of such control measures as the Department may require for each contaminant, that is subject to the Maximum Contaminant Level requirement, during the period ending on the date compliance with such requirement is required.
2. If the compliance schedule exceeds five years from the date of issuance, then the public notice issued pursuant to 310 CMR 22.13(2) shall include a discussion of the rationale for the extension. In no event shall any compliance schedule exceed the shortest practicable time schedule feasible under the circumstances.

(b) from any provision of 310 CMR 22.13 which requires the use of a specified Treatment Technique with respect to a contaminant if the Public Water System applying for the variance demonstrates to the Department's satisfaction that such Treatment Technique is not necessary to protect the health of Persons because of the nature of the raw water source of such system. A variance granted pursuant to 310 CMR 22.13(1)(b) shall be conditioned on such monitoring and other requirements as the Department may prescribe.

(2) Before the Department grants any variance, or prescribes any schedule pursuant to any variance, the Department shall give notice and opportunity for public hearing to the public, to the Massachusetts Department of Public Health, and to the Agency. A notice given pursuant to 310 CMR 22.13(2) may cover the granting of more than one variance or the prescribing of more than one schedule, and a hearing held pursuant to such notice shall include each of the variances and schedules covered by the notice.

(3) The Department shall not accept any application for a variance unless the Public Water System applying for the variance agrees in writing to all of the following:

(a) Pay in full the cost of all notices and hearings required by 310 CMR 22.13(2);

(b) Comply with any schedule prescribed pursuant to 310 CMR 22.13(1)(a) as expeditiously as possible;

(c) Comply with any monitoring or other requirement prescribed pursuant to 310 CMR 22.13(1)(b);

(d) Report to the Department, in the manner prescribed in 310 CMR 22.15, the results of all tests, measurements and analyses made in compliance with the variance, and with the schedule and/or monitoring requirements prescribed pursuant to the variance;

(e) Report to the Department, in the manner prescribed in 310 CMR 22.15, any failure to comply with the terms of the variance, or with the schedule and/or monitoring requirements prescribed pursuant to the variance;

(f) Notify the public, in the manner prescribed in 310 CMR 22.16 of the granting of the variance;

(g) Notify the public, in the manner prescribed in 310 CMR 22.16 of any failure to comply with the variance or with any requirement of any schedule or monitoring requirement prescribed pursuant to the variance; and

(h) Maintain all the records prescribed in 310 CMR 22.17 in the manner prescribed;

(i) The system has the technical, managerial, and financial capacity to adhere to 310 CMR 22.04(3), as determined by the Department.

22.13: continued

(4) Every variance issued by the Department shall be conditioned on compliance by the Public Water System with the requirements set forth in 310 CMR 22.13(3)(a) through (h). Said requirements shall have the same force and effect they would have if specifically set forth in 310 CMR 22.00.

(5) The Department shall promptly report to the Administrator or to the Administrator's designee, every variance granted by the Department. Such notification shall contain all of the following:

(a) The reason for the variance;

(b) The basis for the Department's finding that the granting of the variance will not result in an unreasonable risk to health, in those cases where the Department must make such a finding before granting a variance; and

(c) Documentation of the need for the variance.

(6) All applications for variances shall be made on forms prescribed by the Department.

(7) Best Available Technologies (BATs).

(a) BATs for Organic Compounds. The following technologies listed in 310 CMR 22.13(7)(a)1. through 54. are identified by the EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1415(a) (1)(A), (effective August 6, 1996) as the best technology, Treatment Techniques, or other means available for achieving compliance with the Maximum Contaminant Levels for organic chemicals as listed in 310 CMR 22.07A(1) and 22.07B(1).

22.13: continued

Best Available Technologies

Contaminant	PTA[1]	GAC[2]	OX[3]
1. Benzene	X	X	
2. Carbon tetrachloride	X	X	
3. 1,2-Dichloroethane	X	X	
4. Trichloroethylene	X	X	
5. para-Dichlorobenzene	X	X	
6. 1,1-Dichloroethylene	X	X	
7. 1,1,1-Trichloroethane	X	X	
8. Vinyl chloride	X		
9. cis-1,2-Dichloroethylene	X	X	
10. 1,2-Dichloropropane	X	X	
11. Ethylbenzene	X	X	
12. Monochlorobenzene	X	X	
13. o-Dichlorobenzene	X	X	
14. Styrene	X	X	
15. Tetrachloroethylene	X	X	
16. Toluene	X	X	
17. trans-1,2-Dichloroethylene	X	X	
18. Xylenes (total)	X	X	
19. Alachlor		X	
20. Aldicarb		X	
21. Aldicarb sulfoxide		X	
22. Aldicarb sulfone		X	
23. Atrazine		X	
24. Carbofuran		X	
25. Chlordane		X	
26. Dibromochloropropane	X	X	
27. 2,4-D		X	
28. Ethylene dibromide	X	X	
29. Heptachlor		X	
30. Heptachlor epoxide		X	
31. Lindane		X	
32. Methoxychlor		X	
33. PCBs		X	
34. Pentachlorophenol		X	
35. Toxaphene		X	
36. 2,4,5-TP		X	
37. Endrin		X	
38. Benzo(a)pyrene		X	
39. Dalapone		X	
40. Dichloromethane		X	
41. Di(2-ethylhex)adipate	X	X	
42. Di(2-ethylhexyl)phthalate		X	
43. Dinoseb		X	
44. Diquat		X	
45. Endothall		X	
46. Glphosate			X
47. Hexachlorobenzene		X	
48. Hexachlorocyclopentadiene	X	X	
49. Oxamyl		X	
50. Picloram		X	
51. Simazine		X	
52. 1,2,4-Trichlorobenzene	X	X	
53. 1,1,2-Trichloroethane	X	X	
54. 2,3,7,8-TCDD(Dioxin)		X	

22.13: continued

(b) BATs for Inorganic Compounds: The EPA Administrator, pursuant to the federal Safe Drinking Water Act, § 1415(a)(1)(A), (effective August 6, 1996), hereby identifies the following as the best technology, Treatment Techniques, or other means available for achieving compliance with the Maximum Contaminant Levels for the inorganic contaminants listed in 310 CMR 22.13(7)(b):

BAT FOR INORGANIC CONTAMINANTS LISTED IN 310 CMR 22.06(2)

CHEMICAL NAME	BAT(s)
Antimony	2, 7
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Cadmium	2, 5, 6, 7
Chromium	2, 5, 6[2], 7
CHEMICAL NAME	BAT(s)
Cyanide	5, 7, 10
Mercury	2[1], 4, 6[1], 7[1]
Nitrate	5, 7, 9
Nitrite	5, 7
Selenium	1, 2[3], 6, 7, 9
Thallium	1, 5

Key to BATs in Table

1 = Activated Alumina
2 = Coagulation/Filtration (Not BAT for Systems <500 service connections)
3 = Direct and Diatomite Filtration
4 = Granular Activated Carbon
5 = Ion Exchange Electrodialysis
6 = Lime Softening (not BAT for systems <500 service connections)
7 = Reverse Osmosis
8 = Corrosion Control
9 = Electrodialysis
10 = Chlorine
11 = Ultraviolet

[1]BAT only if influent Hg concentrations ≤10 µg/l.
[2]BAT for Chromium III only
[3]BAT for Selenium IV only

(c) Best Available Technologies (BATs) for Radionuclides.: The Department shall require Community Water Systems to install and/or use any treatment technology identified in 310 CMR 22.09A: *Table C*, or in the case of Small Water Systems (those serving 10,000 persons or fewer), 310 CMR 22.09A: *Table D* and *Table E*, as a condition for granting a variance under 310 CMR 22.13 or 22.13A, Small System Variances, except as provided in 310 CMR 22.13(7)(e).

(d) Requirement to Install BAT: The Department shall require Community Water Systems and Non-transient, Non-community Water Systems to install and/or use any treatment method identified in 310 CMR 22.13(7)(a) and (b) as a condition for granting a variance except as provided in 310 CMR 22.13(7)(e). If, after the system's installation of the treatment method, the system cannot meet the MCL, that system shall be eligible for a variance under the provisions of 310 CMR 22.13 or 22.13A, if the system serves fewer than 10,000 persons.

(e) Engineering Assessment Option: If a system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment methods identified in 310 CMR 22.13(7)(a) through (c) would only achieve a *de minimis* reduction in contaminants, the Department may issue a schedule of compliance that requires the system being granted the variance to examine other treatment methods as a condition of obtaining the variance.

(f) Compliance Schedule: If the Department determines that a treatment method identified in 310 CMR 22.13(7)(e) is technically feasible, the Department may require the system to

22.13: continued

install and/or use that treatment method in connection with a compliance schedule issued under the provisions of the federal Safe Drinking Water Act, § 1415(a)(1)(A), (effective August 6, 1996), incorporated in 310 CMR 22.13(7) by reference. The Department's determination shall be based upon studies by the system and other relevant information.

(8) No variances from the requirements set forth in 310 CMR 22.20A are allowed.

22.13A: Small System Variances

For compliance with a requirement specifying a Maximum Contaminant Level or treatment technique contained in a 310 CMR 22.00.

(1) Size of Public Water System Eligible For A Small System Variance.
(a) The Department may grant a small system variance to a Public Water System serving:
1. 3,300 persons or fewer, or
2. more than 3,300 persons but fewer than 10,000 persons, with approval of the Administrator.
(b) In determining the number of persons served by the Public Water System, the Department or the Administrator, as applicable, will include in the number, all persons served by consecutive Public Water System. A small system variance granted to a Public Water System shall also apply to any consecutive Public Water System served by it.

(2) Small System Variances Availability.
(a) A small system variance is not available under 310 CMR 22.13A for a national primary drinking water regulation for a microbial contaminant (including a bacterium, Virus, or other organism) or an indicator or Treatment Technique for a microbial contaminant.
(b) A small system variance under 310 CMR 22.13A is otherwise only available for compliance with the requirement specifying a Maximum Contaminant Level or Treatment Technique for a contaminant with respect to which;
1. a national primary drinking water regulations was promulgated on or after January 1, 1986; and
2. the Administrator has published a small system variance technology pursuant to the federal Safe Drinking Water Act, § 1412(b)(15).

(3) Timing of a Small System Variance. No variance can be granted under 310 CMR 22.13A by the Department until the later of the following:
(a) 90 days after the Department proposes to grant the small system variance;
(b) If the Department is proposing to grant a small system variance to a Public Water System serving 3,300 or fewer persons and the Administrator objects to the small system variance, the date on which the Department makes the recommended modifications or responds in writing to each objection; or
(c) If the Department is proposing to grant a small system variance to a Public Water System serving a population more than 3,300 and fewer than 10,000 persons, the date the Administrator must approve or disapprove the variance within 90 days after it is submitted to the Administrator for review.

(4) Review of Small System Variance Applications.
(a) A Public Water System requesting a small system variance must provide accurate and correct information to the Department or the Administrator to issue a small system variance in accordance with 310 CMR 22.13A. The Department may assist a Public Water System in compiling information required for the Department or the Administrator to issue a small system variance in accordance with 310 CMR 22.13A.
(b) Based upon an application for a small system variance and other information, and before a small system variance may be proposed under 310 CMR 22.13A, the Department or the Administrator must find and document the following:
1. The small system is eligible for a small system variance pursuant to 310 CMR 22.13A(1) and (2).
2. The Small Water System cannot afford to comply, in accordance with affordability criteria established by the Department, with the national primary drinking water regulations for which a small system variance is sought, including by:

22.13A: continued

a. Treatment;
b. Alternative sources of water supply;
c. Restructuring or consolidation changes, including ownership change and/or physical consolidation with another Public Water System; or
d. Obtaining financial assistance pursuant to Drinking Water State Revolving Fund loan program, 310 CMR 45.00: *DEP Selection, Approval and Regulation of Drinking Water Projects Receiving Financial Assistance from the State Revolving Fund* or any other Federal or State program.

3. The small system meets the source water quality requirements for installing the small system variance technology developed by the Administrator pursuant to guidance published under the federal Safe Drinking Water Act, § 1412(b)(15) .

4. The small system has the technical, managerial and financial capacity to install, operate and maintain the applicable small system variance technology in compliance with 310 CMR 22.04; and

5. The terms and conditions of the small system variance, as developed through compliance with 310 CMR 22.13A(5), ensure adequate protection of human health, considering the following:
a. the quality of the source water for the Public Water System; and
b. removal efficiencies and expected useful life of the small system variance technology.

6. The small system has the technical, managerial, and financial capacity to operate its system, as determined by the Department.

(5) Terms and Conditions. The terms and conditions of the small system variance shall include, at a minimum, the following requirements:

(a) proper and effective installation, operation and maintenance of the applicable small system variance technology in accordance with guidance published by the Administrator pursuant to the federal Safe Drinking Water Act, § 1412(b)(15), taking into consideration any relevant source water characteristics and any other site-specific conditions that may affect proper and effective operation and maintenance of the technology;

(b) monitoring requirement for the contaminant for which a small system variance is sought, as specified at 310 CMR 22.00; and

(c) any other terms or conditions that are necessary to ensure adequate protection of public health, which may include:
1. Public education requirements; and
2. Source water protection requirements.

(d) the Department or the Administrator shall establish a schedule for the Public Water System to comply with the terms and conditions of the small system variance which must include , at a minimum, the following requirements:

1. increments of progress, such as milestone dates for the Public Water System to apply for financial assistance and begin capital improvements;

2. quarterly reporting to the Department or Administrator, as applicable, of the public system's compliance with the terms and conditions of the small system variance;

3. schedule for the Department or the Administrator to review the small system variance under 310 CMR 22.13A(5)(e); and

4. compliance with the terms and conditions of the small system variance as soon as practicable but not later than three years after the date on which the small system variance is granted. The Administrator or the Department may allow up to two additional years in the Administrator of the Department determines that additional time is necessary for the Public Water System to;
a. complete necessary capital improvements to comply with small system variance technology, secure an alternative source of water or restructure or consolidate; or
b. obtain financial assistance provided pursuant to the Drinking Water State Revolving Funds loan program, 310 CMR 45.00: *DEP Selection, Approval and Regulation of Drinking Water Projects Receiving Financial Assistance from the State Revolving Fund* or any other federal or state Program.

22.13A: continued

(e) The Department or the Administrator must review each small system variance granted not less often than every five years after the compliance date established in the small system variance to determine whether the Public Water System continues to meet the eligibility criteria and remains eligible for the small system variance and is complying with the terms and conditions of the small system variance. If the Public Water System would no longer be eligible for a small system variance, the Department or the Administrator must determine whether continuing the variance is in the public interest. If the Department or the Administrator finds that continuing the variance is not in the public interest, the variance shall be withdrawn.

(6) Public Participation.

(a) At least 15 days before the date of variance proposal, and at least 30 days prior to a public meeting to discuss the proposed small system variance, the small waster system as directed by the Department or Administrator, must provide notice to all Persons served by the Public Water System. For billed customers, identified in 310 CMR 22.13A(6)(a)1., this notice must include the information listed in 310 CMR 22.13A(6)(c). For other Persons regularly served by the system, identified in 310 CMR 22.13A(6)(a)2., the notice shall include the information identified in 310 CMR 22.13A(6)(d). Notice must be provided to all Persons served by:

1. Direct mail or other home delivery to billed customers or other service connections; and
2. Any other method reasonable calculated to notify, in a brief and concise manner, other Persons regularly served by the system. Such methods may include publication in a local newspaper, posting in public places or delivery to community organizations.

(b) At the time of proposal, the Department will publish a notice in the *State Register* or a newspaper or newspapers of wide circulation in the State, or in the case of the Administrator, in the *Federal Register*. This notice shall include the information listed in 310 CMR 22.13A(6)(c).

(c) The notice in 310 CMR 22.13A(6)(a)1. and (b) must include, at a minimum, the following:

1. Identification of the contaminant(s) for which a small system variance is sought;
2. A brief statement of the health effects associated with the contaminant(s) for which a small system variance is sought using the applicable language contained in 310 CMR 22.16A(27);
3. The address and telephone number at which interested Persons may obtain further information concerning the contaminant and the small system variance;
4. A brief summary, in easy understandable terms, of the terms and conditions of the small system variance;
5. A description of the consumer petition process under 310 CMR 22.13A(8)(a) and information on contacting the EPA Regional Office;
6. A brief statement announcing the public meeting required under 310 CMR 22.13A(7)(a), including a statement of the purpose of the meeting, information regarding the time and location for the meeting, and the address and telephone number at which interested Persons may obtain further information concerning the meeting; and
7. In communities with a large proportion of non-English-speaking residents, as determined by the Department, information in the appropriate language regarding the content and importance of the notice.

(d) The notice in 310 CMR 22.13A(6)(a)2. must provide sufficient information to alert readers to the proposed variance and direct them where to receive additional information.

(e) At its option, the Department or the Administrator may choose to issue separate notices or additional notices related to the proposed small system variance, provided that the requirements in 310 CMR 22.13A(5)(a) through (d) are satisfied.

(f) Prior to promulgating the final variance, the Department or the Administrator must respond in writing to all significant public comments received relating to the small system variance. Response to public comment and any other documentation supporting the issuance of a variance must be made available to the public after final promulgation.

(7) Public Meeting Requirements.

(a) The Department or the Administrator must provide for at least one public meeting on the small system variance no later than 15 days after the small system variance is proposed.

22.13A: continued

(b) At the time of the public meeting, the Department or Administrator must prepare and make publicly available, in addition to the information listed in 310 CMR 22.13A(6)(c), either;

1. The proposed small system variance, if the public meeting occurs after proposal of the small system variance; or
2. A draft of the proposed small system variance, if the public meeting occurs prior to proposal of the proposed small system variance.
3. Notice of the public meeting must be provided in the manner required under 310 CMR 22.13A(6) at least 30 days in advance of the public meeting. The notice shall be provided by the Public Water System, as directed by the Department or Administrator.

(8) Consumer Petition Process.

(a) Any Person served by the small system may petition the Administrator to object to the granting of a small system variance within 30 days after the Department proposes to grant a small system variance for a Public Water System.

(b) The Administrator must respond to a petition filed by any Person served by the small system and determine whether to object to the small system variance under 310 CMR 22.13A(9), no later than 60 days after the receipt of the petition.

(9) EPA Review and Approval of Small System Variances.

(a) At the time the Department proposes to grant a small system variance under 310 CMR 22.13A, the Department must submit to the Administrator the proposed small system variance and all supporting information, including any written public comments received prior to proposal.

(b) The Administrator may review and object to any proposed small system variance within 90 days of receipt of the proposed small system variance. The Administrator must notify the Department in writing of each basis for the objection and propose a modification to the small system variance to resolve the concerns of the Administrator. The Department must make the recommended modification, respond in writing to each objection, or withdraw the proposal to grant the small system variance.

(c) If the Department issues the small system variance without resolving the concerns of the Administrator, the Administrator may overturn the Department's decision to grant the variance if the Administrator determines the Department's decision does not comply with the federal Safe Drinking Water Act, or 40 CFR 142.301 through 142.313.

(10) EPA action on a small system variance to a Public Water System serving a population of more than 3,300 and fewer than 10,000 persons.

(a) At the time the Department proposes to grant a small system variance to a small system serving a population of more than 3,300 and fewer than 10,000 persons, the Department must submit the proposed small system variance and all supporting information, including public comments received prior to proposal, to the Administrator.

(b) The Administrator must approve or disapprove the small system variance within 90 days of receipt of the proposed small system variance and supporting information. The Administrator must approve the small system variance if it meets each requirement within the federal Safe Drinking Water Act, and 40 CFR 142.301 through 142.313.

(c) If the Administrator disapproves the small system variance, the Administrator must notify the Department in writing of the reasons for disapproval and the small system variance does not become effective. The Department may resubmit the small system variance for review and approval with modifications to address the objections stated by the Administrator.

22.14: Exemptions

The Department may upon receipt of an application, exempt any public water system from any maximum contaminant level prescribed in 310 CMR 22.06 through 22.09A, or from any prescribed treatment technique, or from both, but only subject to the following conditions:

22.14: continued

(1) The Department shall not grant any exemption unless the Department finds all of the following:

(a) Due to compelling factors, which may include economic factors, the public water system is unable to comply with the maximum contaminant level requirement or the treatment technique requirement; or to implement measures to develop an alternative source of water supply;

(b) The public water system was in operation on the effective date of such maximum contaminant level requirement or treatment technique requirement; or for a public water system that was not in operation by that date, no reasonable alternative source of drinking water is available to such new public water system;

(c) The granting of the exemption will not result in an unreasonable risk to health. The Department shall make this finding in consultation with the Massachusetts Department of Public Health; and

(d) Management or restructuring changes (or both) cannot reasonably be made that:

1. will result in compliance with 310 CMR 22.00, taking into consideration the circumstances specified in 40 C.F.R. 142.20(b)(1)(i) (effective September 14, 1998), incorporated by reference); or

2. if compliance cannot be achieved, will improve the quality of the drinking water.

(e) The system has the technical, managerial, and financial capacity to adhere to 310 CMR 22.04(3), as determined by the Department.

(2) No exemption shall be granted unless the public water system established that it is taking all practicable steps to meet the standards, and

(a) The public water system cannot meet the standard without capital improvements that cannot be completed prior to the date established pursuant to 40 C.F.R. 142.50(b)(1) (effective September 14, 1998).

(b) In the case of a public water system which needs financial assistance for the necessary improvements, the public water system has entered into an agreement to obtain such financial assistance or assistance provided pursuant to the Drinking Water State Revolving Fund loan program, 310 CMR 45.00: *DEP Selection, Approval and Regulation of Drinking Water Projects Receiving Financial Assistance from the State Revolving Fund*, or any other federal or state Program that is reasonably likely to be available within the period of the exemption; or

(c) The public water system has entered into an enforceable agreement to become a part of a regional public water system.

(3) A public water system may not receive an exemption under 310 CMR 22.14, if the public water system was granted a variance under 310 CMR 22.13A.

(4) A public water system may submit a joint request for exemptions when it seeks similar exemptions under similar circumstances.

(5) Any written request for an exemption or exemptions pursuant to 310 CMR 22.14, shall include the following information:

(a) The nature and duration of exemption requested;

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of 310 CMR 22.00;

(c) Explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance;

(d) Other information, if any, believed by the applicant to be pertinent to the application;

(e) A proposed compliance schedule, including the date when each step toward compliance will be achieved;

(f) Such other information as the Department my require.

(6) The Department shall act on any exemption request submitted pursuant to 310 CMR 22.14 within 90 days of receipt of the request.

(7) In the Department's consideration of whether the public water system is unable to comply due to compelling factors pursuant to 310 CMR 22.14, the Department shall consider such factors as the following:

22.14: continued

(a) Construction, installation, or modification of the treatment equipment or system;
(b) The time needed to put into operation a new treatment facility to replace an existing system, this is not in compliance;
(c) Economic feasibility of compliance.

(8) If the Department decides to deny the application for an exemption, the Department shall notify the applicant in writing of the Department's intention to issue a denial. Such notice shall include a statement of reasons for the proposed denial, and shall offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument in writing to the Department. The Department shall make a final determination on the request within 30 days after receiving any such additional written information or argument. If no additional information or argument is submitted by the applicant in writing to the Department, the application shall be denied.

(9) If the Department grants an exemption request submitted pursuant to 310 CMR 22.14, the Department shall notify the applicant of the Department's decision in writing. Such notice shall identify the facility covered, and shall specify the termination date of the exemption. Such notice shall provide that the exemption will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Department that the system has failed to comply with any requirements of the final schedule issued pursuant to 310 CMR 22.14.

(10) The Department shall propose a schedule for:
(a) Compliance, including increments of progress or measure to develop an alternative source of water supply, by the public water system with each maximum contaminant level requirement and treatment technique requirement with respect to which the exemption was granted; and
(b) Implementation by the public water system of such control measures, as the Department may require for each contaminant, subject to the maximum contaminant level requirement or treatment technique requirement, during the period ending on the date compliance with such requirement is required.

(11) The schedule shall be prescribed by the Department at the time the exemption is granted, in accordance with provision of opportunity for a hearing pursuant to 310 CMR 22.14(12).

(12) Before a schedule proposed by the Department pursuant to 310 CMR 22.14(11) may take effect the Department shall provide notice and opportunity for a public hearing on the schedule.
(a) Public notice of an opportunity for hearing on an exemption schedule shall be circulated in a manner designed to inform interested and potentially interested persons of the proposed schedule, and shall include a least the following:
1. Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system.
2. Mailing of a notice to the, the Massachusetts Department of Public Health, the local or regional public health agency in which the system is located and to other appropriate State or local agencies at the Department's discretion.
3. Such notices shall include a summary of the proposed schedule and shall inform interested persons that they may request a public hearing on the proposed schedule.
(b) Requests for a hearing may be submitted by any interested person. Frivolous or insubstantial request for hearing may be denied by the Department. Request must be submitted to the Department within 30 days after issuance of the public notices provided for in 310 CMR 22.14(12)(a). Such request shall include the following:
1. The name, address and telephone number of the individual, organization or other entity requesting a hearing;
2. A brief statement of the interest of the person making the request in the proposed schedule and of the information that the requesting person intends to submit at such hearing; and

22.14: continued

3. The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(c) The Department shall give notice in the manner set forth in 310 CMR 22.14(12)(b) of any hearing to be held pursuant to a request submitted by an interested person or on his own motion. Notice of the hearing shall also be sent to the person requesting the hearing, in any, Notice of the hearing shall include a statement of the purpose of the hearing, information regarding the time and location of the hearing, and the address and telephone number of an office at which interested persons may obtain further information concerning the hearing. All hearing locations specified in the public notice shall be within the state. Notice of the hearing shall be given not less than 15 days prior to the time scheduled for the hearing.

(d) A public hearing convened pursuant to 310 CMR 22.14(12)(d) shall be conducted before a hearing officer to be designated by the Department. The hearing shall be conducted by the hearing officer in an informal, orderly and expeditious manner. The hearing officer shall have authority to call witnesses, receive oral and written testimony and take such action as may be necessary to assure the fair and efficient conduct of the hearing. Following the conclusion of the hearing, the hearing officer shall forward the record of the hearing to the Department.

(13) A notice given pursuant to 310 CMR 22.14(12) may cover the granting of more than one exemption or the prescribing of more than one schedule, and a hearing held pursuant to such notice shall include each of the exemptions and schedules covered by the notice.

(14) Final Schedule. Within 30 days after the termination of the public hearing pursuant to 310 CMR 22.14(12), the Department shall, taking into consideration information obtained during such hearing, revise the proposed schedule as necessary and prescribe the final schedule for compliance and interim measures for the public water system granted an exemption under 310 CMR 22.14.

(15) The final schedule pursuant to 310 CMR 22.14(14) must require compliance with each contaminant level and treatment technique requirement with respect to which the exemption was granted as expeditiously as practicable but not later than three years after the otherwise applicable compliance date established in the federal Safe Drinking Water Act, 1412(b)(10).

(16) Extension of Date for Compliance. In the case of a public water system which serves a population of not more than 3,300 persons and which needs financial assistance for the necessary improvements, an exemption granted under 310 CMR 22.14(2)(a) or (b) may be renewed for one or more additional two-year periods, but not to exceed a total of six additional years, if the public water system established that the public water system is taking all practicable steps to meet the requirements of 310 CMR 22.14(2) and the established compliance schedule.

(17) The Department shall not accept any application for an exemption unless the public water system applying for the exemption agrees in writing to all of the following:

(a) Pay in full the cost of all notices and hearings required by 310 CMR 22.14(3);

(b) Comply with any schedule prescribed pursuant to 310 CMR 22.14(2) as expeditiously as possible, and in no event by later than the deadlines prescribed in 310 CMR 22.14(5);

(c) Report to the department, in the manner prescribed in 310 CMR 22.15, the results of all tests, measurements, and analyses made in compliance with the exemption, and with the schedule prescribed pursuant to the exemption;

(d) Report to the Department, in the manner prescribed in 310 CMR 22.15, any failure to comply with the terms of the exemption, or with the schedule prescribed pursuant to the exemption;

(e) Notify the public, in the manner prescribed in 310 CMR 22.16 of the granting of the exemption;

(f) Notify the public, in the manner prescribed in 310 CMR 22.16, of any failure to comply with the exemption or with any requirement of any schedule prescribed pursuant to the exemption;

22.14: continued

(g) Maintain all the records prescribed in 310 CMR 22.17 in the manner prescribed in 310 CMR 22.17.

(18) The Department shall promptly report to the Administrator or to the Administrator's designee every exemption or extension of an exemption granted by the Department. Such notification shall contain all of the following:

(a) The reason for the exemption or extension of the exemption;

(b) The basis for the Department's finding that the granting of the exemption or extension of the exemption will not result in an unreasonable risk to health; and

(c) Documentation of the need for the exemption or extension of the exemption.

(19) All applications for exemptions shall be made on forms prescribed by the Department.

(20) Exemptions from the requirements set forth at 310 CMR 22.06 through 22.09A will be granted only in accordance with the federal Safe Drinking Water Act, § 1416, (effective August 6, 1996), and with 40 C.F.R. 142.62 (effective January 23, 2006).

(21) No exemptions from the requirements set forth in 310 CMR 22.20A(3)(a)3. and 310 CMR 22.20A(3)(b)2. to provide disinfection are allowed.

(22) No exemptions from the maximum contaminant level for total coliforms in 310 CMR 22.05(8) are allowed.

(23) Bottled Water, Point-of-use, and Point of Entry Devices. The Department may require a public water system to use bottled water, point-of-use devices, point-of-entry devices as a condition of granting an exemption from the requirements of 310 CMR 22.06, 22.06B, 22.07A and 22.07B to avoid an unreasonable risk to health. The Department may require a public water system to use bottled water and point-of-use devices or other means, but not point of entry devices, as a condition for granting an exemption for corrosion control treatment required for lead and copper in 310 CMR 22.06B(2) and (3) to avoid an unreasonable risk to health. The Department may require a public water system to use point-of-entry devices as a condition for granting an exemption from the source water treatment and lead service line replacement requirements for lead and copper under 310 CMR 22.06B(4) and (5) to avoid an unreasonable risk to health.

(24) Public water systems using bottled water as a condition of obtaining an exemption from the requirements of 310 CMR 22.06(16), 22.07A or 22.07B(1) must meet the requirements in 310 CMR 22.14(25)

(25) Bottled Water. Public water systems that use bottled water as a condition for receiving a variance or an exemption from the requirements of 310 CMR 22.06(2), 22.07(A)(1) or 22.07B(1) must meet the requirements specified in either 310 CMR 22.14(25)(a) or (b) and (c):

(a) Monitoring Program. The Department will require and approve a monitoring program for bottled water. The public water system must develop and put in place a monitoring program that provides reasonable assurances that the bottled water meets all MCLs. The public water system must monitor a representative sample of the bottled water for all contaminants regulated under 310 CMR 22.06(2), 22.07A(1) and 22.07B(1) during the first three-month period that it supplies the bottled water to the public, and annually thereafter. Results of the monitoring program shall be provided to the Department annually.

(b) Certification. The public water system must receive a certification from the bottled water company that the bottled water supplied has been taken from an "approved source" as defined in 21 CFR 129.3(a); the bottled water company has conducted monitoring in accordance with 21 CFR 129.80(g)(1) through (3); and the bottled water does not exceed any MCLs or quality limits as set out in 21 CFR 103.35, 110, and 129. The public water system shall provide the certification to the Department the first quarter after it supplies bottled water and annually thereafter. At the Department's option a public water system may satisfy the requirements of 310 CMR 22.14(25) if an approved monitoring program is already in place in another State.

22.14: continued

(c) Responsibility. The public water system is fully responsible for the provision of sufficient quantities of bottled water to every person supplied by the public water system via door-to-door bottled water delivery.

(26) Public water systems that use point-of-use or point-of-entry devices as a condition of receiving an exemption must meet the requirements in 310 CMR 22.14(27).

(27) Public water systems that use point-of-use or point-of-entry devices as a condition for obtaining a variance or and exemption from 310 CMR 22.00 must meet the following requirements:

(a) It is the responsibility of the public water system to operate and maintain the point-of-use and/or point-of-entry treatment system.

(b) Before point-of-use or point-of-entry devices are installed, the public water system must obtain the approval of monitoring plan which ensures that the devices provided health protection equivalent to the provided by central water treatment.

(c) The public water system must apply effective technology under the Department approved plan. The microbiological safety of the water must be maintained at all times.

(d) The Department will require adequate certification of performance, filed testing, and, if not included the certification process, a rigorous engineering design review of the point-of-use and/or point-of-entry devices.

(e) The design and application of the point-of-use and/or point-of-entry devices must consider the potential for increasing concentrations of heterotrophic bacteria in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contractor disinfection, and Heterotrophic Plant Count monitoring to ensure that the microbiological safety of the water is no compromised.

(f) Point-of-use or point-of-entry devices that are properly installed, maintained, and monitored such that all consumers will be protected.

(g) In requiring the use of a point-of entry device as a condition of granting an exemption form the treatment requirement for lead and copper under 310 CMR 22.06B, the Department must be assured that use of the device will not cause increased corrosion of lead and copper bearing materials located between the devices and the tap that could increase contaminates levels at the tap.

22.15: General Reporting Requirements

(1) (a) Except where a different reporting period is specified in 310 CMR 22.00, each Supplier of Water shall report to the Department within 48 hours every failure to comply with any of 310 CMR 22.00 applicable to the Supplier of Water, including failure to comply with any monitoring requirement applicable to the Supplier of Water pursuant to any of 310 CMR 22.00 and every failure to comply with a Treatment Technique approved by the Department.

(b) Nitrate Reporting Requirements. With regard to nitrate, a Supplier of Water shall notify the Department of Public Health and local public health authorities within 30 days of the date the Public Water System first learns of an analysis taken for purposes of 310 CMR 22.06 which indicates nitrate levels in excess of 10 mg/L.

(c) Except where a different reporting period is specified in 310 CMR 22.00, for each acute contaminant specified in 310 CMR 22.16: *Table 3*, or where a single sample result is greater than four times the MCL, each Supplier of Water shall report to the Department an MCL exceedance on the same business day that the Supplier of Water becomes aware of the test results. If the Supplier of Water receives such notification outside of the Department's regular business hours, then the Supplier of Water shall notify and consult with the Department on the next business day. In cases where the Supplier of Water receives such notification, and the following day is a non-business day then it shall provide notification to the Department by calling the Department's Emergency notification telephone number and using any other electronic reporting tool designated by the Department, or other Department designated numbers no later than 24 hours after it receives such notification from the laboratory.

(d) A system must notify the Department as soon as possible but no later than the end of the day (*i.e*. prior to midnight) when the system learns of an *E. coli* MCL violation, in accordance with 310 CMR 22.05(12)(a)1.a., and must notify the public in accordance with 310 CMR 22.16.

22.15: continued

(2) Unless a shorter reporting period is prescribed elsewhere in 310 CMR 22.00, the Supplier of Water shall report to the Department the results of every test, measurement or analysis the Supplier of Water is required by 310 CMR 22.00 to make within the shorter of the following time periods:

(a) the first ten days following the month in which the results are received; or

(b) the first ten days following the end of the required monitoring period as stipulated by the Department.

(3) (a) The Supplier of Water is not required to report analytical results to the Department in cases where a Department laboratory performs the analysis.

(b) The Supplier of Water within ten days of completing the public notification requirements under 310 CMR 22.16 for the initial public notice and any repeat notices, shall submit to the Department and local Board of Health a certification that it has fully complied with the public notification regulations. The Supplier of Water shall include with this certification a representative copy of each type of notice distributed, published, posted, and made available to the Persons served by the system and to the media.

(c) When requested, the Supplier of Water shall submit to the Department within the time specified copies of any records required to be maintained under 310 CMR 22.15 or copies of any documents then in existence which the Department is entitled to inspect pursuant to 310 CMR 22.00.

(4) Chemical Addition. Every Supplier of Water shall report to the Department at least once each month the use of chemicals added to the water supply. Such reports shall include, but not be limited to, the name of the chemical, the amount added, the resulting concentration of the chemical in the water, and the reason for adding the chemical to the water.

(5) Annual Statistical Report. Every Supplier of Water shall report electronically to the Department annually, by the due date specified each year on a form prescribed by the Department, full and complete information describing the operation of the Public Water System during the prior year, including but not limited to, the amount of water that passes through their Distribution Systems during the preceding calendar year. A Supplier of Water may request, on a form provided by the Department, approval for a hardship exemption from electronic reporting for the annual report due that year, based on a lack of internet access or service. If granted, the Supplier of Water shall make a paper filing for that year using a form provided by the Department. In no event shall the Supplier of Water fail to file the annual report by the due date specified above. Such reports shall include, at a minimum, the following:

(a) a monthly breakdown of the amount of water:

1. purchased from other Public Water Systems;
2. sold to other Public Water Systems;
3. sold or otherwise supplied to other consumers; and
4. withdrawn from each source.

(b) an annual breakdown, to the extent known to the Supplier of Water, of the amount of water furnished during the year to each of the following classes of users:

1. residential users;
2. agricultural users;
3. commercial users;
4. industrial users;
5. other Public Water Systems; and
6. unaccounted for.

(c) Total number of users served by the system.

(d) Total number of days the system is operating during the calendar year.

(e) Any updates to the Public Water Systems' Emergency Response Plan prepared in accordance with 310 CMR 22.04(13).

(f) Names and Grades of Certified Operators.

(6) Reporting and Public Notification for Certain Unregulated Contaminants. A Community Water System or Non transient, Non community Water System required to monitor under 310 CMR 22.07C shall send to the Department any public notice required under 310 CMR 22.16 and two copies of such monitoring within 30 days of receipt of the analysis report unless 310 CMR 22.15(2) requires submission by an earlier date.

22.15: continued

(7) For each sample analyzed under 310 CMR 22.00, for which the Department requires a submittal or report, every Supplier of Water shall submit or report to the Department the following information:

(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 collection and time of sample collection (if applicable);
(f) Date of analysis;
(g) Laboratory name and certification number, including subcontracting laboratories;
(h) Method Detection or other Reporting Limits;
(i) Name of sample collector;
(j) QA/QC information, where applicable;
(k) Point of sample collection;
(l) Department assigned sample location identifier;
(m) Laboratory assigned sample identification number(s).

(8) Notification of Imposition of Mandatory Water Use Restrictions and Local Drinking Water Health Advisory.

(a) All Public Water Systems establishing a mandatory restriction on water use must notify the Department in writing within 14 days of its effective date. In its notice to the Department, the Public Water System establishing a mandatory restriction on water use shall include appropriate regulations, bylaws or ordinances establishing and imposing the restriction.

(b) Public Water Systems establishing water use restrictions should consider requesting from the Department a declaration of a state of water supply Emergency pursuant to M.G.L. c. 21G.

(c) Public Water Systems who would issue a local drinking water health advisory shall consult with and notify the Department prior to issuance and provide notification to the Department within 24 hours of termination. At a minimum, all local drinking water health advisories for contaminants regulated by 310 CMR 22.00 shall include the required public notice content information listed at 310 CMR 22.16(5)(a).

(9) Emergency Reporting.

(a) Except as otherwise determined by the Department in writing, each public water supplier shall notify the Department and its local Board of Health as soon as possible, but not more than two hours after obtaining knowledge of a potential or actual Emergency described in 310 CMR 22.15(9)(b)1., by calling the Department's Emergency notification telephone number or using any other electronic reporting tool designated by the Department, unless the water supplier establishes, by a preponderance of the evidence, that extenuating circumstances prevented notification within such two hour time period. Except as otherwise determined by the Department in writing, each public water supplier shall notify the Department and its local Board of Health as soon as possible but not more than 24 hours after obtaining knowledge of all other potential or actual Emergencies, including those described in 310 CMR 22.15(9)(b)2., by calling the Department's Emergency notification telephone number and using any other electronic reporting tool designated by the Department, unless the water supplier establishes, by a preponderance of the evidence, that extenuating circumstances prevented notification within such 24 hour time period. In the event of such extenuating circumstances, notification to the Department shall be made as soon as possible thereafter, taking into account the extenuating circumstances. Extenuating circumstances shall include, without limitation, the following:

1. A lack of reasonably available communication equipment at the site of the Emergency;
2. A need to take action prior to notification in order to mitigate or prevent an actual or potential threat to public health or safety; and/or
3. A physical injury to the Person responsible for notifying caused by or associated with the Emergency when the injury reasonably prevents that Person from notifying.

(b) Emergency reporting is required after the occurrence of any of the following incidents or Emergencies that result in the consumers of the system receiving water that does not meet required or routine quantity or quality conditions:

22.15: continued

1. Emergencies or incidents requiring notification within two hours:
   a. Loss of water or drop in pressure to less than 20 psi, affecting 50% or more of consumers for a system serving less than 10,000 persons;
   b. Loss of water or drop in pressure to less than 20 psi, affecting 5,000 or more consumers for a system serving 10,000 or more persons;
   c. Chemical or microbiological contamination of the water supply in exceedence of limits specified by the Department's Office of Research and Standards (ORS), as set forth in ORS' Immediate Action Levels for Water Treatment Plant Chemicals (available on-line at: http://www.mass.gov/eea/agencies/massdep/water/regulations/immediate-action-levels-water-treatment-plant-chemicals.html);
   d. Discovery of malicious intent or an act of vandalism, which may impact a system component;
   e. Any consumer complaint in which the water may have caused physical injury;
   f. A pattern of unusual customer complaints about the water quality such as taste, odor, *etc*.; and
   g. Any other Emergency as determined by the Department in writing.
2. Emergencies or incidents requiring notification within 24 hours:
   a. Loss of water supply from a source;
   b. Loss of water supply due to major component failure;
   c. Damage to power supply equipment or loss of power;
   d. Contamination of water in the Distribution System from backflow or cross connection incident;
   e. Collapse of a reservoir, reservoir roof, or pump house structure;
   f. Break in a transmission or distribution line that results in a loss of service or drop in pressure to less than 20 psi to more than 100 consumers for more than four hours;
   g. Chemical or microbiological contamination of the water supply, not specified in 310 CMR 22.15(9)(b)1.c.; and
   h. Any other failure or potential failure of part or all of the water supply system not listed in 310 CMR 22.15(9)(b)2. that may lead to an Emergency as defined in 310 CMR 22.02.

(c) Unless otherwise determined by the Department in writing, a water supplier must file an Emergency Response Report within 30 days of any of the Emergencies identified in 310 CMR 22.04(13)(a), a Level III or higher Emergency, as described in *Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Appendix O - Handbook for Water Supply Emergencies*, or any cross connection problem that results in contamination of the water provided by the Public Water System. The Emergency Response Report must include the following information at a minimum:

1. Detailed timeline of the incident and response;
2. Evaluation of the incident;
3. Recommendations for improvements to Emergency response planning, training and communication;
4. Recommendations for improvements to water system operations, staffing and budget;
5. Timeline for making all recommended changes;
6. Updated Emergency response plan except for those items that are security sensitive; and
7. A completed Emergency Response Checklist. (A copy of the Emergency Response Checklist form is contained in the *Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Appendix O - Handbook for Water Supply Emergencies, Attachment E*).

(d) Unless otherwise determined by the Department in writing, a water supplier must complete an Emergency Response Checklist within ten days of any Level I or II Emergency, as described in *Massachusetts Drinking Water Guidelines and Policies for Public Water Supplies, Appendix O - Handbook for Water Supply Emergencies*, and maintain on file for five years for the Department's review.

(e) Each water supplier must annually submit to the Department all updates to its Emergency Response Plan made during the year, except for those items that are security sensitive. At a minimum the annual update must include:

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1. An updated Emergency contact list; and
2. A list and description of all Emergency response training provided to system personnel and local partners during the year.

22.16: Public Notification Requirements

(1) (a) Public Water Systems Required to Notify. Each Supplier of Water for a Public Water System (Community Water Systems, Non-transient Non-community Water Systems, and Transient Non-community Water Systems) shall give notice for all violations of National Primary Drinking Water Regulations (NPDWR), 310 CMR 22.00 and for other situations, as listed in 310 CMR 22.16: *Table 1* or specified by the Department in writing. The term "violations" is used in 310 CMR 22.16 to include violations of the Maximum Contaminant Level (MCL), maximum residual Disinfection level (MRDL), Treatment Technique (TT), monitoring requirements, and testing procedures defined in 310 CMR 22.00 or specified by the Department in writing. 310 CMR 22.16: *Table 2* identifies the tier assignment for each specific violation or situation requiring a public notice.

310 CMR 22.16: *Table 1*
Violation Categories and other Situations Requiring a Public Notice

1. Violations.
   a. Failure to comply with an applicable Maximum Contaminant Level (MCL) or Maximum Residual Disinfectant Level (MRDL).
   b. Failure to comply with a prescribed Treatment Technique (TT).
   c. Failure to perform water quality monitoring, as required by 310 CMR 22.00.
   d. Failure to comply with testing procedures as prescribed by 310 CMR 22.00.
2. Variance and Exemptions under 310 CMR 22.13, 22.13A and 22.14.
   a. Operation under a variance or an exemption.
   b. Failure to comply with the requirements of any schedule that has been set under a variance or an exemption.
3. Special Public Notices.
   a. Occurrence of a Waterborne Disease Outbreak or other waterborne Emergencies or water supply Emergencies, including those described in 310 CMR 22.04(13).
   b. Exceedance of the nitrate MCL by Non-community Water Systems (NCWS), where granted permission by the Department under 310 CMR 22.13 and 22.13A.
   c. Exceedance of the Secondary Maximum Contaminant Level (SMCL) for fluoride.
   d. Availability of unregulated contaminant monitoring data.
   e. Other violations and situations determined by the Department to require a public notice under 310 CMR 22.16(1)(a)3., not already listed in 310 CMR 22.16: *Table 1*.

(b) Tier Classification. Public notice requirements are divided into three tiers, to take into account the seriousness of the violation or situation and of any potential adverse health effects that may be involved. The public notice requirements for each violation or situation listed in 310 CMR 22.16: *Table 1* are determined by the tier to which the violation is assigned. 310 CMR 22.16: Table 2 provides the definition of each tier. 310 CMR 22.16: *Table 6* identifies the tier assignment for each specific violation or situation.

310 CMR 22.16: *Table 2*
Definition of Public Notice Tiers

1. Tier 1 Public Notice required for 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 violations and situations with potential to have serious adverse effects on human health.
3. Tier 3 Public Notice required for all other violations and situations not included in Tier 1 and Tier 2.

22.16: continued

(c) Persons to be Notified.

1. Each Supplier of Water shall provide public notice to Persons served by the water system, in accordance with 310 CMR 22.16. 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/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 shall be granted in writing.

3. A copy of the notice shall also be sent to the Department and the local Board of Health, in accordance with the requirements of 310 CMR 22.15(3)(b) and (c).

(2) Tier 1 Public Notice.

(a) Violations or Situations Requiring Tier 1 Public Notice. 310 CMR 22.16: *Table 3* lists the violation categories and other situations requiring a Tier 1 Public Notice. 310 CMR 22.16: *Table 6* identifies the tier assignment for each specific violation or situation.

310 CMR 22.16: *Table 3*

Violation Categories and Other Situations Requiring a Tier 1 Public Notice

1. Violation of the MCL when *E. coli* are present in the water Distribution System (as specified in 310 CMR 22.05(8)(a)), or when the water system fails to test for *E. coli* when any repeat sample tests positive for coliform (as specified in 310 CMR 22.05);

2. Violation of the MCL for nitrate, nitrite, total nitrate and nitrite or perchlorate, as defined in 310 CMR 22.06, 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, nitrite or perchlorate MCL, as specified in 310 CMR 22.06(10);

3. Exceedance of the nitrate MCL by Non-community Water Systems, where permitted to exceed the MCL by the Department under 310 CMR 22.13 or 22.13A;

4. Violation of the MRDL for chlorine dioxide, as defined in 310 CMR 22.07E, 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 310 CMR 22.07E;

5. Violation of the Turbidity MCL under 310 CMR 22.08 and 22.20A, 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;

6. Violation of 310 CMR 22.20A, the Surface Water Treatment Rule (SWTR), or 310 CMR 22.20D, the Interim Enhanced Surface Water Treatment rule (IESWTR), or 310 CMR 22.20F, the 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 310 CMR 22.16: *Table 6*), 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 310 CMR 22.02(1), or other waterborne Emergency such as:

a. a failure or significant interruption in key water treatment processes;

b. a natural disaster that disrupts the water supply or Distribution System;

c. a chemical spill; or

d. an 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. Emergencies identified in 310 CMR 22.04(13);

10. Detection of *E. coli*, enterococci, or coliphage in source water samples as specified in 310 CMR 22.26(3)(a) and (b).

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(b) Timeframe and Additional Requirements for Tier 1 Notification. Each Supplier of Water required to give Tier 1 notification shall:

1. Provide a public notice as soon as practical but no later than 24 hours after the supplier learns of the violation, unless it is an Emergency situation identified in 310 CMR 22.04(13). Emergency situations identified in 310 CMR 22.04(13) must comply with 310 CMR 22.16(2)(b)4.;
2. Initiate consultation with the Department as soon as practical, but no later than 24 hours after the supplier learns of the violation or situation, to determine additional public notice requirements; unless it is an Emergency situation identified in 310 CMR 22.04(13). For Emergency situations identified in 310 CMR 22.04(13), each Supplier of Water must notify the Department within two hours after the supplier learns of the Emergency in accordance with 310 CMR 22.15(9)(a) and initiate consultation within the same time frame;
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; and
4. For Emergency situations identified in 310 CMR 22.04(13), each supplier must provide a public notice as soon as practical but no later than two hours after the supplier has consulted with the Department and the Department has determined that an Emergency exists and an Emergency public notice must be issued.

(c) Form and Manner of Public Notice. Each Supplier of Water shall provide the notice within 24 hours in a form and manner reasonably calculated to reach all Persons served unless it is an Emergency situation identified in 310 CMR 22.04(13). For Emergencies identified in 310 CMR 22.04(13), each Supplier of Water shall provide the notice within the time frame specified in 310 CMR 22.16(b)(4) in a form and manner reasonably calculated to reach all Persons served. The form and manner used by the supplier are to fit the specific situation, but shall be designed to reach residential, transient, and non-transient users of the water system and meet the minimum information and format requirements specified by the Department.

1. In order to reach all Persons served, each Supplier of Water is required to use, at a minimum, one or more of the following forms of delivery:
   a. Appropriate broadcast media (such as radio and television);
   b. Posting of the notice in conspicuous locations throughout the area served by the water system;
   c. Hand delivery of the notice to Persons served by the water system; or
   d. Any other delivery method approved in writing by the Department.
2. Unless directed otherwise by the Department in writing, as in Emergency situations identified in 310 CMR 22.04(13), Community Water Systems shall publish appropriate public notice within the local newspaper as a one day advertisement no later than 14 days after a Tier 1 violation. A copy of said notice shall be submitted to the Department no later than the time published.

(3) Tier 2 Public Notice.

(a) Violations or Situations Requiring Tier 2 Public Notice. 310 CMR 22.16: *Table 4* lists the violation categories and other situations requiring a Tier 2 Public Notice. 310 CMR 22.16: *Table 6* identifies the tier assignment for each specific violation or situation.

310 CMR 22.16: *Table 4*
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 310 CMR 22.16(2)(a): *Table 3* 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.

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4. Failure to take corrective action or failure to maintain at least four log treatment of Viruses (using inactivation, removal, or a Department approved combination of four log Virus inactivation and removal) before or at the first customer under 310 CMR 22.26(4)(a).

5. Changes in corrosion control treatment practices that persist longer than seven days.

(b) Timeframe Required for Tier 2 Notification.

1. a. Each Supplier of Water shall provide the public notice as soon as practical, but no later than 30 days after the system learns of the violation.

b. If the public notice is posted, the notice shall 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.

c. 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. Extensions granted by the Department shall be in writing.

2. a. Each Supplier of Water shall repeat the notice every three months as long as the violation or situation persists, unless the Department determines in writing that appropriate circumstances warrant a different repeat notice frequency.

b. In no circumstance may the repeat notice be given less frequently than once per year.

c. In no circumstance may the frequency of a repeat notice for an MCL or Treatment Technique violation under 310 CMR 22.05, the Revised Total Coliform Rule; a Treatment Technique violation under 310 CMR 22.20A, the Surface Water Treatment Rule; 310 CMR 22.20D, the Interim Enhanced Surface Water Treatment Rule; 310 CMR 22.20F, the Long Term 1 Enhanced Surface Water Treatment Rule; or 310 CMR 22.20G, the Long Term 2 Enhanced Surface Water Treatment Rule; be reduced.

3. a. For the Turbidity violations specified in 310 CMR 22.16: *Table 6*, the Supplier of Water shall 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 310 CMR 22.16(2)(a): *Table 3* is required to protect public health.

b. When consultation does not take place within the 24-hour period, the water system shall 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 310 CMR 22.16(2)(b) and (c).

c. Consultation with the Department is required for:

i. Violation of the Turbidity MCL under 310 CMR 22.08 and 22.20A; or

ii. Violation of 310 CMR 22.20A, 22.20D, or 22.20F Treatment Technique requirement resulting from a single exceedance of the maximum allowable Turbidity limit.

4. For corrosion control treatment changes that last more than seven days, the Public Water Systems must:

a. Provide a public notice as soon as practical but no later than 30 days after the supplier learns of the violation, unless it is an Emergency situation identified in 310 CMR 22.04(13). Emergency situations identified in 310 CMR 22.04(13) must comply with 310 CMR 22.16(2)(b)4.

b. Initiate consultation with the Department as soon as practical, but no later than 24 hours after the supplier learns of the violation or situation, to determine additional public notice requirements, unless it is an Emergency situation identified in 310 CMR 22.04(13). For Emergency situations identified in 310 CMR 22.04(13), each Supplier of Water must notify the Department within two hours after the supplier learns of the Emergency in accordance with 310 CMR 22.15(9)(a) and initiate consultation within the same timeframe.

c. 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.

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(c) Form and Manner of Public Notice. Each Supplier of Water shall 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 shall at a minimum meet the following requirements:

1. Unless directed otherwise by the Department in writing, Community Water Systems shall provide notice by:

a. 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

b. 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 310 CMR 22.16(3)(c)1.a. 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, the owner/operator of a Non-community Water System shall provide notice by:

a. 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

b. 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 310 CMR 22.16(3)(c)2.a. 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.

(a) Violations or Situations Requiring Tier 3 Public Notice. 310 CMR 22.16: *Table 5* lists the violation categories and other situations requiring a Tier 3 Public Notice. 310 CMR 22.16: *Table 6* identifies the tier assignment for each specific violation or situation.

310 CMR 22.16: *Table 5*
Violation Categories and Other Situations Requiring a Tier 3 Public Notice

1. Monitoring violations under 310 CMR 22.00, except where a Tier 1 notice is required under 310 CMR 22.16(2) or where the Department determines that a Tier 2 notice is required;

2. Failure to comply with a testing procedure established in 310 CMR 22.00, except where a Tier 1 notice is required under 310 CMR 22.16(2) or where the Department determines that a Tier 2 notice is required;

3. Operation under a variance granted under 310 CMR 22.13, 22.13A or an exemption granted under 310 CMR 22.14;

4. Availability of unregulated contaminant monitoring results, as required under 310 CMR 22.16(7);

5. Exceedance of the fluoride Secondary Maximum Contaminant Level (SMCL), as required under 310 CMR 22.16(8); and

6. Reporting and Recordkeeping violations under 310 CMR 22.05.

(b) Timeframe Required for Tier 3 Notification.

1. a. Unless otherwise determined by the Department, each supplier of water shall 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.

b. Following the initial notice, the supplier shall repeat the notice annually for as long as the violation, variance, exemption, or other situation persists.

22.16: continued

c. If the public notice is posted, the notice shall 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. If approved by the Department under 310 CMR 22.16(4)(b)1., instead of individual Tier 3 public notices, a supplier of water may use an annual report detailing all violations and situations that occurred during the previous 12 months, as long as the timing requirements of 310 CMR 22.16(4)(b)1. are met and the format is approved by the Department.

(c) Form and Manner of Public Notice. Each supplier of water who is required to give Tier 3 notice shall 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 shall at a minimum meet the following requirements:

1. Unless directed otherwise by the Department in writing, community water systems shall provide notice by:

a. 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

b. 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 310 CMR 22.16(4)(c)1.a. Other 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, the owner/operator of a non-community water system shall provide notice by:

a. 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

b. 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 310 CMR 22.16(4)(c)2.a. Other 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).

(d) If approved by the Department, the supplier of water may use the Consumer Confidence Report (CCR) required under 310 CMR 22.16A 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 310 CMR 22.16(4)(b);

2. The Tier 3 notice contained in the CCR follows the content requirements under 310 CMR 22.16(5); and

3. The CCR is distributed following the delivery requirements under 310 CMR 22.16(4)(c)1.

(5) Public Notice Content.

(a) When a Supplier of Water violates 310 CMR 22.00 or has a situation requiring public notification, each public notice shall include the following elements:

1. Public Water System name, Public Water System identification number (PWSID#);

2. A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);

3. When the violation or situation occurred;

4. Any potential adverse health effects from the violation or situation, including the standard language under 310 CMR 22.16(5)(d)1. or 2., whichever is applicable;

5. The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;

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6. Whether alternative water supplies should be used;
7. What actions consumers should take, including when they should seek medical help, if known;
8. What the system is doing to correct the violation or situation;
9. When the water system expects to return to compliance or resolve the situation;
10 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
11. A statement to encourage the notice recipient to distribute the public notice to other Persons served, using the standard language under 310 CMR 22.16(5)(d)3., where applicable.

(b) Public Notice Requirements for Systems Operating under a Variance or Exemption.
1. If a Supplier of Water has been granted a variance or an exemption, the public notice shall contain:
   a. An explanation of the reasons for the variance or exemption;
   b. The date on which the variance or exemption was issued;
   c. 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
   d. A notice of any opportunity for public input in the review of the variance or exemption.
2. If a Supplier of Water violates the conditions of a variance or exemption, the public notice shall contain the 11 elements listed in 310 CMR 22.16(5)(a).

(c) Public Notice Presentation.
1. Each public notice required by 310 CMR 22.16(5):
   a. Shall be displayed in a conspicuous way when printed or posted;
   b. Shall not contain overly technical language or very small print;
   c. Shall not be formatted in a way that defeats the purpose of the notice;
   d. Shall not contain language which nullifies the purpose of the notice.
2. Multilingual Requirements.
   a. For a Supplier of Water serving a large proportion of non-English speaking consumers, as determined in 310 CMR 22.16A, the public notice shall 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.
   b. In cases where the Department has not determined what constitutes a large proportion of non-English speaking consumers, the Supplier of Water shall include in the public notice the same information as in 310 CMR 22.16(5)(c)2.a., where appropriate to reach a large proportion of non-English speaking Persons served by the water system.

(d) Standard Language.
1. Standard health effects language for MCL or MRDL violations, Treatment Technique violations, and violations of the condition of a variance or exemption. Each Supplier of Water shall include in each public notice the health effects language specified in 310 CMR 22.16: *Table 7* of corresponding to each MCL, MRDL, and Treatment Technique violation listed in 310 CMR 22.16: *Table 6*, and for each violation of a condition of a variance or exemption.
2. Standard language for monitoring and testing procedure violations. Each Supplier of Water shall include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring testing procedure violations listed in 310 CMR 22.16: *Table 6*:

   "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."

22.16: continued

3. Standard language to encourage the distribution of the public notice to all Persons served. Each Supplier of Water shall 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) The owner/operator of a Community Water System shall 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) The owner/operator of a Non-community Water System shall continuously post the public notice in conspicuous locations as specified by the Department in order to inform new consumers of any continuing violation, variance or exemption, or other 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) The owner or operator of a community water system or non-transient non-community water system required to monitor under 310 CMR 22.07C or the EPA Unregulated Contaminant Monitoring Rule shall 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) The form and manner of the public notice shall follow the requirements for a Tier 3 public notice prescribed in 310 CMR 22.16(4)(c), (d)1. and (d)3. The notice shall 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) Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of two mg/l as specified in 310 CMR 22.06C (determined by the last single sample taken in accordance with 310 CMR 22.06(6)(h), but do not exceed the maximum contaminant level (MCL) of four mg/l for fluoride (as specified in 310 CMR 22.06(4)1., shall provide the public notice in 310 CMR 22.16(8)(c) to Persons served. Public notice shall be provided as soon as practical but no later than 12 months from the day the supplier of water learns of the exceedance. A copy of the notice shall also be sent to all new billing units and new customers at the time service begins and to the Massachusetts Department of Public Health. The supplier of water shall repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice shall 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) The form and manner of the public notice (including repeat notices) shall follow the requirements for a Tier 3 public notice in 310 CMR 22.16(4)(d)3.

(c) The notice shall 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 younger than nine years old. At low levels, fluoride can help prevent cavities, but children drinking water containing more than two 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 younger than nine years old 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.

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Drinking water containing more than four 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 four mg/l of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed two mg/l because of this cosmetic dental problem.

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 Exceedance above MCL by Non-community Water Systems, Where Granted Permission by the Department.

(a) The owner or operator of a non-community water system granted permission by the Department under 310 CMR 22.13 and 22.13A to exceed the nitrate MCL shall provide notice to Persons served according to the requirements for a Tier 1 notice under 310 CMR 22.16(2)(b) and (c).

(b) Form and Manner of the Special Notice. The owner/operator of a non-community water system granted permission by the Department to exceed the nitrate MCL under 310 CMR 22.06 shall provide continuous posting of the fact that nitrate levels exceed ten mg/l and the potential health effects of exposure, according to the requirements for Tier 1 notice delivery under 310 CMR 22.16(2)(c) and the content requirements under 310 CMR 22.16(5).

(10) Notice by Department in Behalf of the Supplier of Water.

(a) The Department may give the notice required by 310 CMR 22.16 on behalf of the owner and operator of the public water system if the Department complies with the requirements of 310 CMR 22.16.

(b) The owner or operator of the public water system remains legally responsible for ensuring that the requirements of 310 CMR 22.16 are met.

(11) Public Notification by the Department for any Public Water System Subject to 310 CMR 22.00.

(a) The Department may require a supplier of water or any person subject to 310 CMR 22.00 to provide public notice for any violation of 310 CMR 22.00, the content of which shall either satisfy the requirements of 310 CMR 22.16(5), and/or be approved by the Department, prior to publication. The supplier of water remains legally responsible for ensuring that the requirements of 310 CMR 22.16 are met.

(b) The Department reserves the right to give notice to the public when not required by 310 CMR 22.16 in the event of a significant health problem. The supplier of water shall be responsible for all fees incurred by the Department as a result such notice.

22.16: continued

310 CMR 22.16 - Table 6
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 and 310 CMR 22.00[3]**				
A. **Microbiological Contaminants**				
1.a. Total coliform (TT violations resulting from failure to perform assessments or corrective actions, monitoring violations, and reporting violations).	2	310 CMR 22.05(11)(b)1.	3	310 CMR 22.05(11)(c)1. 310 CMR 22.05(11)(d)1.
1.b. Seasonal System failure to follow Department-approved start-up plan prior to serving water to the public or failure to provide certification to the State.	2	310 CMR 22.05(11)(b)(2)	3	310 CMR 22.05(11)(d)3.
2.a. *E. coli* (MCL, monitoring, and reporting violations).	1	310 CMR 22.05(11)(a)	3	310 CMR 22.05(11)(c)2. 310 CMR 22.05(11)(d)1. 310 CMR 22.05(11)(d)2.
2.b. *E. coli* (TT violations resulting from failure to perform Level 2 Assessments or corrective action).	2	310 CMR 22.05(11)(b)1.	……	……
3. Turbidity MCL.	2	310 CMR 22.08 310 CMR 22.20A 310 CMR 22.20D	3	310 CMR 22.08 310 CMR 22.20A 310 CMR 22.20D
4. Turbidity MCL (average of 2 days' samples > five NTU).	[5]2, 1	310 CMR 22.08 310 CMR 22.20A	3	310 CMR 22.08 310 CMR 22.20A
5. Turbidity (for TT violations resulting from a single exceedance of maximum allowable Turbidity level).	[6] 2, 1	310 CMR 22.08 310 CMR 22.20A 310 CMR 22.20D 310 CMR 22.20F	3	310 CMR 22.08 310 CMR 22.20A 310CMR 22.20D 310 CMR 22.20F
6. Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. allowable Turbidity level (TT).	2	310 CMR 22.20A	3	310 CMR 22.20A
7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. Turbidity level (TT).	2	[7]310 CMR 22.20D	3	310 CMR 22.20D
8. Filter Backwash Recycling Rule.	2	310 CMR 22.20E(3)	3	310 CMR 22.20E(2) and (4)
9. Long Term 1 Enhanced Surface Water Treatment Rule.	2	310 CMR 22.20F	3	310 CMR 22.20F
10. Long Term 2 Enhanced Surface Water Treatment Rule violations.	2	310 CMR 22.20G (11) through (23)	[21]2, 3	310 CMR 22.20G(2) through (6), (9) and (10)
11. Ground Water Rule violations.	2	310 CMR 22.26(5)	3	310 CMR 22.26(3)(h) 310 CMR 22.26(4)(d)

22.16: continued

Contaminant	MCL/MRDL/TT violations [2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
B. **Inorganic Chemicals (IOCs)**				
1. Antimony	2	310 CMR 22.06	3	310 CMR 22.06
2. Arsenic	2	[8]310 CMR 22.06	3	[9]310 CMR 22.06
3. Asbestos (fibers > 10 μm)	2	310 CMR 22.06	3	310 CMR 22.06
4.Barium	2	310 CMR 22.06	3	310 CMR 22.06
5. Beryllium	2	310 CMR 22.06	3	310 CMR 22.06
6. Cadmium	2	310 CMR 22.06	3	310 CMR 22.06
7. Chromium (total)	2	310 CMR 22.06	3	310 CMR 22.06
8. Cyanide	2	310 CMR 22.06	3	310 CMR 22.06
9. Fluoride	2	310 CMR 22.06	3	310 CMR 22.06
10. Mercury (inorganic)	2	310 CMR 22.06	3	310 CMR 22.06
11. Nitrate	1	310 CMR 22.06	3	310 CMR 22.06
12. Nitrite	1	310 CMR 22.06	3	310 CMR 22.06
13. Total Nitrate and Nitrite	1	310 CMR 22.06	3	310 CMR 22.06
14. Perchlorate	1	310 CMR 22.06	3	310 CMR 22.06
15. Selenium	2	310 CMR 22.06	3	310 CMR 22.06
16. Thallium	2	310 CMR 22.06	3	310 CMR 22.06
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	310 CMR 22.06B	3	310 CMR 22.06B
D. **Synthetic Organic Chemicals (SOCs)**				
1. 2,4-D	2	310 CMR 22.07A	3	310 CMR 22.07A
2. 2,4,5-TP (Silvex)	2	310 CMR 22.07A	3	310 CMR 22.07A
3. Alachlor	2	310 CMR 22.07A	3	310 CMR 22.07A
4. Atrazine	2	310 CMR 22.07A	3	310 CMR 22.07A
5. Benzo(a)pyrene (PAHs)	2	310 CMR 22.07A	3	310 CMR 22.07A
6. Carbofuran	2	310 CMR 22.07A	3	310 CMR 22.07A
7. Chlordane	2	310 CMR 22.07A	3	310 CMR 22.07A
8. Dalapon	2	310 CMR 22.07A	3	310 CMR 22.07A
9. Di-(2-ethylhexyl) adipate	2	310 CMR 22.07A	3	310 CMR 22.07A
10. Di-(2-ethylhexyl) phthalate	2	310 CMR 22.07A	3	310 CMR 22.07A
11. Dibromochloropropane	2	310 CMR 22.07A	3	310 CMR 22.07A
12. Dinoseb	2	310 CMR 22.07A	3	310 CMR 22.07A
13. Dioxin (2,3,7,8-TCDD)	2	310 CMR 22.07A	3	310 CMR 22.07A
14. Diquat	2	310 CMR 22.07A	3	310 CMR 22.07A
15. Endothall	2	310 CMR 22.07A	3	310 CMR 22.07A
16. Endrin	2	310 CMR 22.07A	3	310 CMR 22.07A
17. Ethylene dibromide	2	310 CMR 22.07A	3	310 CMR 22.07A
18. Glyphosate	2	310 CMR 22.07A	3	310 CMR 22.07A
19. Heptachlor	2	310 CMR 22.07A	3	310 CMR 22.07A
20. Heptachlor epoxide	2	310 CMR 22.07A	3	310 CMR 22.07A
21. Hexachlorobenzene	2	310 CMR 22.07A	3	310 CMR 22.07A
22. Hexachlorocyclo-pentadiene	2	310 CMR 22.07A	3	310 CMR 22.07A
23. Lindane	2	310 CMR 22.07A	3	310 CMR 22.07A
24. Methoxychlor	2	310 CMR 22.07A	3	310 CMR 22.07A
25. Oxamyl (Vydate)	2	310 CMR 22.07A	3	310 CMR 22.07A

22.16: continued

Contaminant	MCL/MRDL/TT violations [2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
26. Pentachlorophenol	2	310 CMR 22.07A	3	310 CMR 22.07A
27. Picloram	2	310 CMR 22.07A	3	310 CMR 22.07A
28. Polychlorinated biphenyls (PCBs)	2	310 CMR 22.07A	3	310 CMR 22.07A
29. Simazine	2	310 CMR 22.07A	3	310 CMR 22.07A
30. Toxaphene	2	310 CMR 22.07A	3	310 CMR 22.07A
E. **Volatile Organic Chemicals (VOCs)**				
1. Benzene	2	310 CMR 22.07B	3	310 CMR 22.07B
2. Carbon tetrachloride	2	310 CMR 22.07B	3	310 CMR 22.07B
3. Chlorobenzene (monochlorobenzene)	2	310 CMR 22.07B	3	310 CMR 22.07B
4. o-Dichlorobenzene	2	310 CMR 22.07B	3	310 CMR 22.07B
5. p-Dichlorobenzene	2	310 CMR 22.07B	3	310 CMR 22.07B
6. 1,2-Dichloroethane	2	310 CMR 22.07B	3	310 CMR 22.07B
7. 1,1-Dichloroethylene	2	310 CMR 22.07B	3	310 CMR 22.07B
8. cis-1,2-Dichloroethylene	2	310 CMR 22.07B	3	310 CMR 22.07B
9. trans-1,2-Dichloroethylene	2	310 CMR 22.07B	3	310 CMR 22.07B
10. Dichloromethane	2	310 CMR 22.07B	3	310 CMR 22.07B
11. 1,2-Dichloropropane	2	310 CMR 22.07B	3	310 CMR 22.07B
12. Ethylbenzene	2	310 CMR 22.07B	3	310 CMR 22.07B
13. Styrene	2	310 CMR 22.07B	3	310 CMR 22.07B
14. Tetrachloroethylene	2	310 CMR 22.07B	3	310 CMR 22.07B
15. Toluene	2	310 CMR 22.07B	3	310 CMR 22.07B
16. 1,2,4-Trichlorobenzene	2	310 CMR 22.07B	3	310 CMR 22.07B
17. 1,1,1-Trichloroethane	2	310 CMR 22.07B	3	310 CMR 22.07B
18. 1,1,2-Trichloroethane	2	310 CMR 22.07B	3	310 CMR 22.07B
19. Trichloroethylene	2	310 CMR 22.07B	3	310 CMR 22.07B
20. Vinyl chloride	2	310 CMR 22.07B	3	310 CMR 22.07B
21. Xylenes (total)	2	310 CMR 22.07B	3	310 CMR 22.07B
F. **Radioactive Contaminants**				
1. Beta/photon emitters	2	310 CMR 22.09A	3	310 CMR 22.09A
2. Alpha emitters	2	310 CMR 22.09A	3	310 CMR 22.09A
3. Combined radium (226 & 228)	2	310 CMR 22.09A	3	310 CMR 22.09A
4. Uranium[11, 12]	2	310 CMR 22.09A	3	310 CMR 22.09A
G. **Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where Disinfection 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 acid (HAAs).**[13]				
1. Total Trihalomethanes (TTHMs)	2	310 CMR 22.07E	3	310 CMR 22.07E
2. Haloacetic Acids (HAA5)	2	310 CMR 22.07E	3	310 CMR 22.07E
3. Bromate	2	310 CMR 22.07E	3	310 CMR 22.07E
4. Chlorite	2	310 CMR 22.07E	3	310 CMR 22.07E
5. Chlorine (MRDL)	2	310 CMR 22.07E	3	310 CMR 22.07E
6. Chloramines (MRDL)	2	310 CMR 22.07E	3	310 CMR 22.07E
7. Chlorine dioxide (MRDL) where any two consecutive daily samples at entrance to Distribution System only are above MRDL	2	310 CMR 22.07E	3	310 CMR 22.07E

22.16: continued

Contaminant	MCL/MRDL/TT violations [2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
8. Chlorine dioxide (MRDL), where sample(s) in Distribution System the next day are also above MRDL	2	310 CMR 22.07E	1	310 CMR 22.07E
9. Control of DBP precursors TOC (TT)	2	310 CMR 22.07E	3	310 CMR 22.07E
10. Bench marking and Disinfection profiling	N/A	N/A	3	310 CMR 22.07F
11. Development of monitoring plan	N/A	N/A	3	310 CMR 22.07E
H. **Other Treatment Techniques**				
1. Acrylamide (TT)	2	310 CMR 22.04(10)	N/A	310 CMR 22.04(10)
2. Epichlorohydrin (TT)	2	310 CMR 22.04(10)	N/A	310 CMR 22.04(10)
II. **Unregulated Contaminant Monitoring**: [16]				
A. Unregulated contaminants	N/A	N/A	3	310 CMR 22.07C
B. Nickel	N/A	N/A	3	310 CMR 22.06
III. **Public Notification for Variances and Exemptions**:				
A. Operation under a variance or exemption	3	[17]310 CMR 22.13 310 CMR 22.14	N/A	N/A
B. Violation of conditions of a variance or exemption	2	[18]310 CMR 22.13 310 CMR 22.14	N/A	N/A
IV. **Other Situations Requiring Public Notification**:				
A. Fluoride Secondary Maximum Contaminant level (SMCL) exceedance	3	310 CMR 22.06C	N/A	N/A
B. Exceedance of nitrate MCL for non-community systems, as allowed by the Department.	1	310 CMR 22.13 310 CMR 22.13A	N/A	N/A
C. Availability of unregulated contaminant monitoring data	3	310 CMR 22.07C	N/A	N/A
D. Waterborne Disease Outbreak	1	N/A	N/A	N/A
E. Other waterborne or water supply emergency [19].	1	N/A	N/A	N/A
F. Other situations as determined by the Department	[20] 1, 2, 3	N/A	N/A	N/A
G. Sodium	N/A	N/A	3	310 CMR 22.06A
H. Source water sample positive for Ground Water Rule fecal indicators: *E.coli*, *enterococci*, or colliphage	1	310 CMR 22.26(3)(g)	N/A	N/A
I. Change or failure of Treatment Technique or practice (TT)	2	310 CMR 22.04(4)	N/A	310 CMR 22.04(4)
J. Ground Water Rule Significant Deficiency or source water fecal contamination	3	310 CMR 22.16(13)	N/A	N/A

Table 6 - Endnotes

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 Table, as authorized under 310 CMR 22.16(2)(a) and (3)(a).

22.16: continued

2. MCL-Maximum contaminant level, MRDL-Maximum Residual Disinfectant Level, TT-Treatment Technique.
3. The term Violations of 310 CMR 22.00 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 five NTU based on an average of measurements over two consecutive days shall 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 310 CMR 22.20A, the Surface Water Treatment Rule (SWTR), 310 CMR 22.20D, the Interim Enhanced Surface Water Treatment Rule (IESWTR), or 310 CMR 22.20F, the Long Term 1 Enhanced Surface Water Treatment Rule, 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 310 CMR 22.20D become effective January 1, 2002 for Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving at least 10,000 persons. However, 310 CMR 22.20D has some requirements that become effective as early as April 16, 1999. The Surface Water Treatment Rule, 310 CMR 22.20A, remains in effect for some systems serving at least 10,000 persons even after 2002; the Interim Enhanced Surface Water Treatment Rule, 310 CMR 22.20D, adds additional requirements and does not in many cases supersede the SWTR.
8. The arsenic MCL citations are effective January 23, 2006.
9. The arsenic Tier 3 violation citations are effective January 23, 2006.
10. Failure to take a confirmation sample within 24 hours for nitrate, nitrite or perchlorate after an initial sample exceeds the MCL is a Tier 1 violation. Other monitoring violations for nitrate, nitrite or perchlorate are Tier 3.
11. The uranium MCL Tier 2 violation citations are effective December 8, 2003 for all Community Water Systems.
12. The uranium MCL Tier 3 violation citations are effective December 8, 2003 for all Community Water Systems.
13. Community and non-transient non-community Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving at least 10,000 persons shall comply with the new DBP MCLs, Disinfectant MRDLs, and related monitoring requirements beginning January 1, 2002. All other Community and Non-transient Non-community Water Systems shall meet the MCLs and MRDLs beginning January 1, 2004. Transient non-community Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving at least 10,000 persons using chlorine dioxide as a Disinfectant or oxidant shall comply with the chlorine dioxide MRDL beginning January 1, 2002. Transient non-community Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving at least 10,000 persons and Transient Non-community Water Systems serving fewer than 10,000 persons and Transient Non-community Water Systems using only groundwater not under the direct influence of surface water and using chlorine dioxide as a Disinfectant or oxidant shall comply with the chlorine dioxide MRDL beginning January 1, 2004.
14. 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.
15. 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.
16. Some water systems shall monitor for certain unregulated contaminants listed in 310 CMR 22.07C.
17. This citation refers to 310 CMR 22.13 and 22.14 and requires that "a schedule prescribed for a Public Water System granted a variance [or exemption] shall require compliance by the system".
18. In addition, 310 CMR 22.13A specifies the items and schedule milestones that shall be included in a variance for small systems.
19. Other waterborne Emergencies require a Tier 1 Public Notice under 310 CMR 22.16 (2)(a)7. for situations that do not meet the definition of a Waterborne Disease Outbreak given in 310 CMR 22.02(1) 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 into the source water.
20. The Department may place other situations in any tier they believe appropriate, based on threat to public health.
21. Failure to collect three or more samples for *Cryptosporidium* analysis is a Tier 2 violation requiring special notice as specified in 310 CMR 22.16(12). All other monitoring and testing procedure violations are Tier 3.

22.16: continued

310 CMR 22.16: *Table 7* Standard Health Effects Language for Public Notification			
Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
A. Microbiological Contaminants:			
1a. 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 to 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 found during the assessment(s).
1b. *E. coli*	Zero	MCL violation if any of the following: (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. (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.	*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.
1c. Fecal indicators (GWR) i. *E.coli* ii. enterococci iii. coliphage	 Zero None None	 TT TT TT	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, young children, some of the elderly, and people with severely compromised immune systems.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
1d. Ground Water Rule (GWR) TT violations	None	TT	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.
1e. *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. [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 found during the assessment that we conducted.
1f. 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 310 CMR 22.16(5)(d)2. must be used. When this violation includes failure to complete other actions, the appropriate elements found in 310 CMR 22.16(5)(a) to describe the violation must be used.
2a. Turbidity (MCL)[4]	None	one NTU[5] five 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.
2b. Turbidity (SWTR TT)[6]	None	TT[7]	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.
2c. Turbidity (IESWTR TT) and LT1ESWTR TT)[8]	None	TT	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.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
B. Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), Filter Backwash Recycling Rule (FBRR) and Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) 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).			
5. Heterotrophic plate count (HPC) bacteria[9] (SWTR/IESWTR/LT1ESWTR).			
6. *Legionella* (SWTR/IESWTR/LT1ESWTR).			
7. *Cryptosporidium* (IESWTR/LT1ESWTR/FBRR).			
C. Inorganics			
8. Antimony	0.01	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]	None	0.05	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.
10. Asbestos (fibers > 10 µm)	7MFL[12]	7MFL	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	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	0.01	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 use 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	4	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 younger 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.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
17. Mercury (inorganic)	0	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 younger than six months old 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 syndrome.
19. Nitrite	1	1	Infants younger than six months oldwho 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.
20. Total Nitrate and Nitrite	10	10	Infants younger than six months old 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 syndrome.
21. Perchlorate	None	0.002	Perchlorate interferes with the normal function of the thyroid gland and thus has the potential to affect growth and development and could cause brain damage and other adverse effects, particularly in fetuses and infants.
22. 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.
23. Thallium	0	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:			
24. 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. Adults who drink this water over many years could develop kidney problems or high blood pressure.
25. 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 Chemicals (SOCs):			
26. 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.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
27. 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.
28. 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.
29. Atrazine	0	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.
30. Benzo(a)pyrene (PAHs).	Zero	0	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.
31. Carbofuran	0.04	0.003	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.
32. 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.
33. 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.
34. Di (2-ethylhexyl) adipate	0.4	0.4	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.
35. 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.
36. Dibromochloropropane (DBCP)	Zero	0	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.
37. Dinoseb	0.01	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
38. 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.
39. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
40. 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.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
41. Endrin	0	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
42. Ethylene dibromide	Zero	0	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.
43. 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.
44. Heptachlor	Zero	0	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.
45. Heptachlor epoxide	Zero	0	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.
46. 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.
47. Hexachlorocyclopenta-diene	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.
48. Lindane	0	0	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
49. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
50. 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.
51. 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.
52. 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.
53. Polychlorinated biphenyls (PCBs).	Zero	0.001	Some people who drink water containing PCBs in excess of the MCL over many years could 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 cancer.
54. Simazine	0	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
55. 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

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
			may have an increased risk of getting cancer.
F. Volatile Organic Chemicals (VOCs):			
56. 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 cancer.
57. 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.
58. 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.
59. o-Dichlorobenzene	0.6	0.6	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
60. p-Dichlorobenzene	0.01	0.005	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.
61. 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.
62. 1,1-Dichloroethylene	0.01	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.
63. 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.
64. 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.
65. 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.
66. 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.
67. 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.
68. 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.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
69. Tetrachloroethylene	Zero	0.005	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.
70. 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.
71. 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.
72. 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 could experience problems with their liver, nervous system, or circulatory system.
73. 1,1,2-Trichloroethane	0	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.
74. Trichloroethylene	Zero	0.005	Some people who drink water containing tri-chloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
75. 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.
76. 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:			
77. 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.
78. 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 the MCL over many years may have an increased risk of getting cancer.
79. 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.
80. Uranium	Zero	30 mg/L[16]	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),Byproduct Precursors, Disinfectant Residuals. Where Disinfection 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 acid (HAAs).[18]			
81. Total trihalomethanes (TTHMs)	N/A	0.080[19, 20]	Some people who drink water containing (TTHMs) 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.
82. Haloacetic Acids (HAA)	N/A	0.06021	Some people who drink water containing haloacetic acids in excess of the MCL over many years may

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
			have an increased risk of getting cancer.
83. Bromate	Zero	0.01	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
84. Chlorite	0.08	1	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.
85. 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 experience stomach discomfort.
86. 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.
87a. Chlorine dioxide, where any two 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. *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.
87b. 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. *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.

22.16: continued

Contaminant	MCLG[1] mg/l	MCL[2] mg/l	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) and Massachusetts Drinking Water Regulations:			
88. 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:			
89. 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.
90. 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.

1. MCLG-Maximum Contaminant Level Goal.
2. MCL-Maximum Contaminant Level.
3. [Reserved]
4. The MCL for the monthly Turbidity average is one NTU; the MCL for the two-day average is one NTU for systems that are required to filter but have not yet installed Filtration (310 CMR 22.08).
5. NTU-Nephelometric turbidity unit.
6. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed one NTU. In addition, in filtered systems, 95% of samples each month shall not exceed 0.5 NTU in systems using conventional or Direct Filtration and shall not exceed one NTU in systems using slow sand or diatomaceous earth filtration or other Filtration technologies approved by the Department.
7. TT-Treatment Technique.
8. For systems subject to 310 CMR 22.20D (systems serving at least 10,000 people, using Surface Water or Groundwater 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% of monthly measurements, and the Turbidity level of a system's combined filter effluent shall not exceed one NTU at any time. Systems subject to 310 CMR 22.20D using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration shall meet Turbidity limits set by the Department. For systems subject to 310 CMR 22.20F (systems serving fewer than 10,000 people, using Surface Water or Groundwater Under the Influence of Surface Water) that use conventional or Direct Filtration, after January 1, 2005 the Turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95% of monthly measurements, and the Turbidity level of a system's combined filter effluent must not exceed one NTU at any time. Systems subject to 310 CMR 22.20F 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. 310 CMR 22.20A, 22.20D, and 22.20F 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.
12. Million fibers per liter.
13. Action Level = 0.015 mg/L.
14. Action Level = 1.3 mg/L.
15. Millirems per year.
16. The uranium MCL is effective December 8, 2003 for all Community Water Systems.
17. Picocuries per liter.

22.16: continued

18. Surface water systems and groundwater systems under the direct influence of surface water are regulated under 310 CMR 22.20A. Community and non-transient non-community Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving at least 10,000 persons shall comply with DBP MCLs and Disinfectant Maximum Residual Disinfectant Levels (MRDLs) beginning January 1, 2002. All other Community and Non-transient Non-community Water Systems shall meet the MCLs and MRDLs beginning January 1, 2004. Transient non-community Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving at least 10,000 or more persons using chlorine dioxide as a Disinfectant or oxidant shall comply with the chlorine dioxide MRDL beginning January 1, 2002. Transient non-community Surface Water Sources systems (surface water systems and groundwater systems under the direct influence of surface water) serving fewer than 10,000 persons and Transient Non-community Water Systems using only groundwater not under the direct influence of surface water and using chlorine dioxide as a Disinfectant or oxidant shall comply with the chlorine dioxide MRDL beginning January 1, 2004.
19. Community and Non-transient Non-community Water Systems must comply with TTHM and HAA5 MCLs listed in 310 CMR 22.07F of 0.080 mg/L and 0.060 mg/L, respectively (with compliance calculated as a Locational Running Annual Average) on the schedule in 310 CMR 22.07F(7).
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.

(12) 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) The owner or operator of a Community or Non-community Water System that is required to monitor source water under 310 CMR 22.20G(2) 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 three months of monitoring as specified in 310 CMR 22.20G(2)(c). The notice must be repeated as specified in 310 CMR 22.16(3)(b).

(b) The owner or operator of a Community or Non-community Water System that is required to determine a bin classification under 310 CMR 22.20G(11), or to determine mean *Cryptosporidium* level under 310 CMR 22.20G(13), must notify Persons served by the water system that the determination has not been made as required no later than 30 days after the system has failed report the determination as specified in 310 CMR 22.20G(11)(e) or 310 CMR 22.20G(13)(a), respectively. The notice must be repeated as specified in 310 CMR 22.16(3)(b). The notice is not required if the system is complying with a Department-approved schedule to address the violation.

(c) The form and manner of the public notice must follow the requirements for a Tier 2 Public Notice prescribed in 310 CMR 22.16(3)(c). The public notice must be presented as required in 310 CMR 22.16(5)(c).

(d) 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).

22.16: continued

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.

(13) Special Notice to the Public of Significant Deficiencies or Source Water Fecal Contamination.

(a) In addition to the applicable public notification requirements of 310 CMR 22.16, a community groundwater system that receives notice from the Department of a Significant Deficiency or notification of a fecal indicator positive groundwater source sample that is not invalidated by the Department under 310 CMR 22.26(3)(d) must inform the public served by the water system under 310 CMR 22.16A(8)(g) of the fecal indicator positive source sample or of any Significant 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 groundwater source is determined by the Department to be corrected under 310 CMR 22.26(4)(a)5.

(b) In addition to the applicable public notification requirements of 310 CMR 22.16, a non community groundwater 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, unless otherwise provided for the system by the Department pursuant to 310 CMR 22.16A, 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:

1. The nature of the Significant Deficiency and the date the Significant Deficiency was identified by the Department;

2. The Department approved plan and schedule for correction of the Significant Deficiency, including interim measures, progress to date, and any interim measures completed; and

3. 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.

(c) 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 correction under 310 CMR 22.26(4)(a)7.b.

22.16A: Consumer Confidence Reporting Requirements

(1) Each Community Water System in existence as of September 18, 1998, must deliver its first consumer confidence report to its customers by October 19, 1999, its second report by July 1, 2000, and subsequent reports by July 1st annually thereafter. The first report must contain data collected during, or prior to, calendar year 1998, as provided in 310 CMR 22.16A(4)(h). Each report thereafter must contain data collected prior to or during the previous calendar year as specified at 310 CMR 22.16A(4)(h).

(2) Each Community Water System established after January 1, 1999, must deliver its first consumer confidence report to its customers by July 1st of the year after its first full calendar year in operation and annually thereafter.

(3) A Public Water System that sells or provides water to another Community Water System shall deliver the applicable information required at 310 CMR 22.16A(4), to the buyer or receiving system:

(a) no later than April 19, 1999, by April 1, 2000, and by April 1st annually thereafter, or

(b) on a date mutually agreed upon by the seller and the purchaser, and specifically included in a written contract between the parties.

(4) Content of the Reports. Each Community Water System must provide to its customers an annual report that contains the information specified in 310 CMR 22.16A(4).

(a) Each report must identify the source(s) of the water delivered by the Community Water System by providing information on:

1. The type of the water: *e.g.*, Surface Water, Groundwater; and
2. The commonly used name and the Department's source water identification number (if any) and location of the body (or bodies) of water.

(b) 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, the Public Water 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 shall include a brief summary of the Public Water System's susceptibility to potential sources of contamination, using language provided by the Department.

(c) Each report must include the following definitions for the purpose of 310 CMR 22.16A:

1. 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.
2. 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.

(d) A report for a Community Water System operating under a variance or an exemption issued by the Department must include the following definition: Variances and Exemptions. The Department or EPA permission not to meet an MCL or a Treatment Technique under certain conditions.

(e) A report that contains data on a contaminant, for which the Department or EPA regulates using any of the following terms, must include the applicable definitions for the purpose of 310 CMR 22.16A:

1. Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water.
2. Action Level. The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
3. Maximum Residual Disinfectant Levels 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.
4. Maximum 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 control of microbial contaminants.

(f) Information on Detected Contaminants. 310 CMR 22.16A(4) specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*). It applies to:

22.16A: continued

1. Contaminants subject to an MCL, Action Level, Maximum Residual Disinfectant Level or Treatment Technique (regulated contaminants);
2. Contaminants for which monitoring is required by 310 CMR 22.07C (unregulated contaminants); and
3. Disinfection by-products or microbial contaminants for which monitoring is required by 40 CFR 141.142 and 141.143, except as provided at 310 CMR 22.16A(5)(a), and which are detected in the finished water.

(g) 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.

(h) 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:

1. Where 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 five years need be included.
2. Results of monitoring in compliance with 40 CFR 141.142 and 141.143 need only be included for five 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.

(i) For detected regulated contaminants listed in 310 CMR 22.00, including without limitation in 310 CMR 22.16A(27), the table(s) shall contain:

1. The MCL for that contaminant expressed as a number equal to or greater than 1.0, as provided in 310 CMR 22.16A(27);
2. The MCLG for that contaminant expressed in the same units as the MCL;
3. If there is no MCL for a detected contaminant, the table must indicate that there is a Treatment Technique, Maximum Residual Disinfectant Level, or specify the Action Level, applicable to that contaminant, and the report must include the definitions for Treatment Technique, Maximum Residual Disinfectant Level and/or Action Level, as appropriate, specified at 310 CMR 22.16A(4)(e);
4. For contaminants subject to an MCL, except Turbidity and *E. coli*, the highest contaminant level used to determine compliance with 310 CMR 22.00 and the range of detected levels, as follows:
   a. When compliance with the MCL is based on a single sample or the average of an initial and a confirmation sample: the highest detected level or average at any Sampling Point and the range of detected levels of all Sampling Points expressed in the same units as the MCL.
   b. When 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.
   c. 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 Sampling Points expressed in the same units as the MCL. For the MCLs for TTHM and HAA5 in 310 CMR 22.07E(1)(c), Suppliers of Water shall 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 MCL, the Supplier of Water shall include the Locational Running Annual Averages for all locations that exceed the MCL.
   d. 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 Supplier of Water shall include individual sample results for the IDSE conducted under 310 CMR 22.07F 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.

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e. When rounding of results to determine compliance with the MCL is allowed by 310 CMR 22.00, rounding shall be done prior to multiplying the results by the factor listed in 310 CMR 22.16A(27).

5. For Turbidity.

a. When it is reported pursuant to 310 CMR 22.08, the highest average monthly value.

b. When it is reported pursuant to the requirements of 310 CMR 22.20A(2), the highest monthly value. The report shall include an explanation of the reasons for measuring Turbidity.

c. When it is reported pursuant to 310 CMR 22.20A(4), 22.20D or 22.20F, the highest single measurement and the lowest monthly percentage of samples meeting the Turbidity limits specified in 310 CMR 22.20A(4), 22.20D or 22.20F for the Filtration technology being used. The report shall include an explanation of the reasons for measuring Turbidity.

6. For Lead and Copper. For each contaminant, the 90th percentile value of the most recent round of sampling, and the number of sampling sites exceeding the Action Level.

7. For Total Coliform analytical results until March 31, 2016.

a. The highest monthly number of total coliform-positive samples for Public Water Systems collecting fewer than 40 samples per month; or

b. The highest monthly percentage of positive samples for Public Water Systems collecting at least 40 samples per month.

8. For *E. coli*: the total number of *E. coli*-positive samples; and

9. The likely source(s) of detected contaminants to the best of the Supplier of Water's knowledge. Specific information regarding contaminants may be available in Sanitary Surveys and source water assessments, and should be used when available to the Supplier of Water. If the Supplier of Water lacks specific information on the likely source, the report shall include one or more of the typical sources for that contaminant listed in 310 CMR 22.16A(27) that is most applicable to the system.

(j) 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 should contain a separate column for each service area and the report should identify each separate Distribution System. Alternatively, systems could produce separate reports tailored to include data for each service area.

(k) 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 in 310 CMR 22.16A(27).

(l) 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.

(5) Information on *Cryptosporidium*, Radon, and other Contaminants.

(a) If the system performed any monitoring for *Cryptosporidium*, including monitoring performed to satisfy the requirements of 40 CFR 141.143, which indicates that *Cryptosporidium* may be present in the source water or the finished water, the report must include:

1. A summary of the results of the monitoring; and
2. An explanation of the significance of the results.

(b) If the system performed any monitoring for radon which indicates that radon may be present in the finished water, the report must include:

1. The results of the monitoring; and
2. An explanation of the significance of the results.

(c) If the system performed additional monitoring which indicates the presence of other contaminants in the finished water, the Public Water System is strongly encouraged to report any results which may indicate a health concern. The Department considers detects above a proposed MCL or health advisory level to indicate possible health concerns. For such contaminants, the Department recommends that the report include:

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1. The results of the monitoring; and
2. An explanation of the significance of the results noting the existence of a health advisory or a proposed regulation.

(6) In addition, to the requirements of 310 CMR 22.16A(4)(k), the report must note any violation that occurred during the year covered by the report of a requirement listed in 310 CMR 22.16A(6)(a) through (g), 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.

(a) Monitoring and reporting of compliance data;

(b) Filtration and Disinfection. 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.

(c) Lead and Copper Control. For systems which fail to take one or more actions prescribed by 310 CMR 22.06B(1)(d)(1), (3), (4) or (5), the report must include the applicable language of 310 CMR 22.16A(27) for lead, copper, or both.

(d) Treatment Techniques for Acrylamide and Epichlorohydrin. For systems which violate the requirements of 310 CMR 22.04(10), the report must include the relevant language from 310 CMR 22.16A(27).

(e) Recordkeeping of compliance data.

(f) Special monitoring requirements prescribed by 310 CMR 22.07C and 22.06A; and

(g) Violation of the terms of a Variance, an Exemption, or an administrative or judicial order.

(7) Variances and Exemptions. If a system is operating under the terms of a Variance or an Exemption issued under 310 CMR 22.13, 22.13A or 22.14, the report must contain:

(a) An explanation of the reasons for the Variance or Exemption;

(b) The date on which the Variance or Exemption was issued;

(c) 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

(d) A notice of any opportunity for public input in the review, or renewal, of the Variance or Exemption.

(8) Additional Information.

(a) 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 in 310 CMR 22.16A(8)(a)1. through 3., or systems may use their own comparable language with Department approval. The report also must include the language of paragraph 310 CMR 22.16A(8)(a)4.

1. 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 can pick up substances resulting from the presence of animals or from human activity.
2. Contaminants that may be present in source water include:
   a. Microbial contaminants, such as Viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
   b. 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.
   c. Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
   d. Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

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e. Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

3. In order to ensure that tap water is safe to drink, the Department and EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. FDA and 105 CMR 570.000: *The Manufacture, Collection, and Bottling of Water and Carbonated Nonalcoholic Beverages* establish limits for contaminants in bottled water which must provide the same protection for public health.

4. 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) or your local water supplier.

(b) The report must include the PWSID#, address, telephone number of the owner, operator, or designee of the Community Water System as a source of additional information concerning the report.

(c) In communities with 10% or greater, or greater than 1000 people (whichever is lesser) of non-English speaking residents, the report must contain information in the appropriate language(s) regarding the importance of the report. In communities serving 25% or greater of non-English speaking residents, the report must contain a statement in the appropriate language(s) which includes 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.

(d) 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.

(e) 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.

(f) The Public Water System shall include any additional language as specified by the Department.

(g) Systems Required to Comply with 310 CMR 22.26.

1. Any groundwater system that receives notice from the Department of a Significant Deficiency or notice from a laboratory of a fecal indicator-positive groundwater source sample that is not invalidated by the Department under 310 CMR 22.26(3)(d) must inform its customers of any Significant Deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive groundwater source sample in the next report. The system must continue to inform the public annually until the Department determines that particular Significant Deficiency is corrected or the fecal contamination in the groundwater source is addressed under 310 CMR 22.26(4)(a). Each report must include the following elements.

a. The nature of the particular Significant Deficiency or the source of the fecal contamination (if the source is known) and the date the Significant Deficiency was identified by the Department or the dates of the fecal indicator-positive groundwater source samples;

b. If the fecal contamination in the groundwater source has been addressed under 310 CMR 22.26(4)(a) and the date of such action;

c. For each Significant Deficiency or fecal contamination in the groundwater source that has not been addressed under 310 CMR 22.26(4)(a), the Department-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed; and

d. If the system receives notice of a fecal indicator-positive groundwater source sample that is not invalidated by the Department under 310 CMR 22.26(3)(d), the potential health effects using the health effects language of 310 CMR 22.16A(27).

2. 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 310 CMR 22.16A(8)(g)1.

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(h) Systems Required to Comply with the Revised Total Coliform Rule (310 CMR 22.05).

1. Any Supplier of Water required to perform a Level 1 Assessment or a Level 2 Assessment that is not due to an *E. coli* MCL violation shall include in the report the language provided in 310 CMR 22.16A(8)(h)1.a.; and as appropriate 310 CMR 22.16A(8)(h)1.b. and c., inserting the appropriate information where indicated; and the language provided in 310 CMR 22.16A(8)(h)1.d.i. and ii., if appropriate.

a. 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.

b. 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.

c. 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.

d. Any Supplier of Water 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.

2. Any Supplier of Water required to perform a Level 2 Assessment due to an *E. coli* MCL violation shall include in the report the language provided in 310 CMR 22.16A(8)(h)2.a. and b., inserting the appropriate information where indicated; and the language provided in 310 CMR 22.16A(8)(h)2.c.i. and ii., if appropriate.

a. *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 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.

b. 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.

c. Any Supplier of Water that has failed to complete the required assessment or correct all identified Sanitary Defects, is in violation of the Treatment Technique requirement and shall 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.

3. If a Supplier of Water detects *E. coli* and has violated the *E. coli* MCL, then in addition to completing the table as required in 310 CMR 22.16A(4)(i)4., the Supplier of Water shall also include one or more of the following statements to describe any noncompliance, as applicable:

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a. We had an *E. coli*-positive repeat sample following a total coliform- positive routine sample.

b. We had a total coliform-positive repeat sample following an *E. coli*-positive routine sample.

c. We failed to take all required repeat samples following an *E. coli*-positive routine sample.

d. We failed to test for *E. coli* when any repeat sample tests positive for total coliform.

4. If a Supplier of Water detects *E. coli* and has not violated the *E. coli* MCL, in addition to completing the table as required in 310 CMR 22.16A(4)(i)4., the Supplier of Water may include a statement that explains that although they have detected *E. coli*, they are not in violation of the *E. coli* MCL.

(9) Required Additional Health Information. 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 infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

(10) Beginning in the report due by July 1, 2002, a Community Water System which detects arsenic at levels above 0.005 mg/L, and up to and including 0.010 mg/L:

(a) Shall include in its report a short informational statement about arsenic, using language such as: While your drinking water meets EPA's standard 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 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.

(b) May write its own educational statement, but only in consultation with and approval of the Department.

(c) Beginning in the report due by July 1, 2002 and ending January 22, 2006, a community water system that detects arsenic above 0.010 mg/L and up to and including 0.05 mg/L shall include the arsenic health effects language prescribed by 310 CMR 22.16A(27).

(11) A Community Water System which detects nitrate at levels above 5 mg/l, but below the MCL:

(a) 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 younger than six months old. 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.

(b) May write its own educational statement, but only in consultation with and approval of the Department.

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(12) Every report must include the following lead-specific information:

(a) 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 two minutes before using 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 800-426-4791 or at http://water.epa.gov/drink/info/lead/index.cfm.

(b) A system may write its own educational statement, but only in consultation with and with written approval of the Department.

(13) Community Water Systems that detect TTHM above 0.080 mg/l, but below the MCL listed in 310 CMR 22.07 as an annual average, monitored and calculated under the provisions of 310 CMR 22.07, must include health effects language prescribed in 310 CMR 22.16A(27).

(14) Report Delivery and Recordkeeping. Except as provided in 310 CMR 22.16A(20), each Community Water System must mail or otherwise directly deliver one copy of the Consumer Confidence Report to each customer.

(15) The Community Water System must make a good faith effort to reach consumers who do not get water bills, and are required to take a minimum of three of the following actions:

(a) Post report in the lobby of apartment complexes;
(b) Place an ad in a local newspaper stating where copies are available;
(c) Announce availability of the consumer confidence report on local radio stations;
(d) Post consumer confidence report in Town Hall;
(e) Place copies of the consumer confidence report in the local public library;
(f) Post a notice (in main lobby of apartment complexes) stating that the consumer confidence report is posted on a website, and give the website address;
(g) Publish the report in local newspaper(s);
(h) Deliver the report to community organizations.

(16) No later than the date the Community Water System is required to distribute the report to its customers, the system shall submit:

(a) two copies of the consumer confidence report and the related attachments to the Department, one of which will be submitted to the applicable Department regional office and one will be submitted to the Boston office; and

(b) a certification, using the Department's form, that the report has been distributed to customers, and that the information is correct and consistent with the compliance monitoring data previously submitted to the Department.

(17) 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 its local Board of Health or any other agency identified by the Department.

(18) Each Community Water System must make its reports available to the public upon request.

(19) Each Community Water System serving 100,000 or more persons must post its most recent report to a publicly-accessible site on the Internet.

(20) A Community Water System serving fewer than 10,000 persons has the option of mailing or directly delivering copies of the consumer confidence report to each customer, as provided in 310 CMR 22.16A(14), or, alternatively, such system must comply with the following notice requirements:

(a) Publish the report in one or more local newspapers serving the area in which the system is located;

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(b) Inform the customers that the reports will not be mailed. Notification shall be either in the newspapers in which the reports are published or by a statement in a bill or newsletter; and

(c) Make the reports available to the public upon request.

(21) A Community Water System serving 500 or fewer persons may forego the requirements of 310 CMR 22.16A(20)(a) and (b), if the system provides a notice at least once per year to its customers by mail, door-to-door delivery or by posting in an appropriate location, that the report shall be available upon request.

(22) Any system subject to 310 CMR 22.16A, must retain copies of its Consumer Confidence Report for no less than three years.

(23) A Non-community Water System shall comply with the following:

(a) Post a Consumer Confidence Report within 30 days of notification from the Department that the report is available. Posting must be in a conspicuous location(s) for the public to read. The report shall remain posted until a new report is made available.

(b) The Non-community Water System must retain copies of its Consumer Confidence Report for no less than three years and make it available to the public upon request.

(24) Consumer Confidence Reporting Requirements. (Reserved)

(25) Consumer Confidence Report by the Department for Any Public Water System Subject to 310 CMR 22.16A. The Department may prepare and issue to the public a report as required by 310 CMR 22.16A on behalf of the Public Water System. The Public Water System remains legally responsible for ensuring that the requirements of 310 CMR 22.16A are met. The Department reserves the right to issue on behalf of the Public Water System the report to the public when not required by 310 CMR 22.16A in the event of a significant health problem. The Public Water System shall be responsible for all fees incurred by the Department as a result of issuing such report.

(26) A Public Water System receiving water from a source approved by the Department under an Emergency agreement shall comply with 310 CMR 22.16A(4) for the Emergency Source unless otherwise approved in writing by the Department.

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(27) Charts for Regulated Contaminants, Unregulated Contaminants, and Secondary Contaminants.

(a) Table 1: Regulated Contaminants Chart

Key:

AL=Action Level
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)
NTU=Nephelometric Turbidity Units
pCi/L=picocuries per liter (a measure of radioactivity)
ppm=parts per million, or milligrams per liter (mg/L)
ppb=parts per billion, or micrograms per liter (ug/L)
ppt=parts per trillion, or nanograms per liter
ppq=parts per quadrillion, or picograms per liter
TT=Treatment Technique

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
Microbiological Contaminants						
1. *Cryptosporidium*	TT	-	TT	0	Discharged especially where water is contaminated with sewage or animal wastes.	Some people who drink water containing *Cryptosporidium* could experience severe gastrointestinal effects.
2. *Giardia lamblia*	TT	-	TT	0	Discharged especially where water is contaminated with sewage or animal wastes.	Some people who drink water containing *Giardia lamblia* could experience severe gastrointestinal effects.
3. Heterotrophic plate count	TT	-	TT	N/A	Heterotrophic plate count is an indicator method that measures a range of naturally-occurring bacteria in the environment.	Heterotrophic plate count is not associated with health effects but is a method that measures the bacterial quality of the water as an indicator of the adequacy of water treatment.
4. *Legionella*	TT	-	TT	0	Natural sources; multiplies in heating and air-conditioning systems.	Some people who use drinking water containing *Legionella* could experience Legionnaire's Disease, a type of pneumonia.

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Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
5. Total Coliform Bacteria	TT	-	TT	N/A	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, 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.
6. *E. coli*	Routine and repeat samples are total coliform-positive and either is *E. coli*-positive or Supplier of Water fails to take repeat samples following *E. coli*-positive routine sample or Supplier of Water fails to analyze total coliform-positive repeat sample for *E. coli*			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, 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.

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Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
7. Fecal Indicators a. (*E. coli*, enterococci, or coliphage) Groundwater Rule	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, young children, some of the elderly, and people with severely compromised immune systems.
8. Total organic carbon	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 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 increase risk of getting cancer.
9. Turbidity	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.

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Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
10. Viruses (enteric)	TT	-	TT	0	Discharged especially where water is contaminated with sewage or animal wastes	Some people who drink water containing Viruses could experience severe gastrointestinal effects.
Radioactive Contaminants						
11. Beta/photon emitters	4 mrem/yr	-	4 mrem/yr	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 containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
12. Alpha emitters	15 pCi/l	-	15 pCi/l	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.
13. Combined radium	5 pCi/l	-	5 pCi/l	0	Erosion of natural deposits	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.
14. Uranium	0.030 mg/l	1000	30 ppb[1]	0	Erosion of natural deposits	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.

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Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
Inorganic Contaminants						
15. Antimony	0.006 mg/l	1000	6 ppb	6 ppb	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.
16. Arsenic	0.01 mg/l	1000	10 ppb	N/A	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics 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.
17. Asbestos	7 MFL	-	7 MFL	7 MFL	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.
18. Barium	2 mg/l	-	2 ppm	2 ppm	Discharge of drilling wastes; discharge from metal refineries; erosion of 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.
19. Beryllium	0.004 mg/l	1000	4 ppb	4 ppb	Discharge from electrical, aerospace, and defense industries; erosion of natural deposits	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
20. Bromate	0.010 mg/l	1000	10 ppb	0	By-product of drinking water Disinfection	Some people who drink water containing bromate in excess of the MCL over many years have an increased risk of getting cancer.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
21. Cadmium	0.005 mg/l	1000	5 ppb	5 ppb	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.
22. Chloramines	MRDL= 4 mg/l	-	MRDL= 4 ppm	MRDLG= 4 ppm	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 who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
23. Chlorine	MRDL= 4 mg/l	-	MRDL= 4 ppm	MRDLG= 4 ppm	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 people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
24. Chlorine dioxide	MRDL= 0 .8 mg/l	1000	800 ppb	MRDLG= 800 ppb	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.
25. Chlorite	1 mg/l	-	1 ppm	0.8 ppm	By-product of drinking water Disinfection	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
26. Chromium	0.1 mg/l	1000	100 ppb	100 ppb	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.
27. Copper	AL=1.3 mg/l	-	AL=1.3 ppm	1.3 ppm	Corrosion of household plumbing systems; erosion of natural deposits; 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.
28. Cyanide	0.2 mg/l	1000	200 ppb	200 ppb	Discharge from 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.
29. Fluoride[3]	4 mg/l	-	4 ppm	4 ppm	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories	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. Children may get mottled teeth.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
30. Lead	AL= 0.015 mg/l	1000	AL=15 ppb	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.
31. Mercury [inorganic]	0.002 mg/l	1000	2 ppb	2 ppb	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills; runoff from cropland	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
32. Nitrate	10 mg/l	-	10 ppm	10 ppm	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	Infants younger than six months old 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 syndrome.
33. Nitrite	1 mg/l	-	1 ppm	1 ppm	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	Infants younger than six months old who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
34. Perchlorate	0.002 mg/l	1000	2 ppb	N/A	Rocket propellants, fireworks, munitions, flares, blasting agents	Perchlorate interferes with the normal function of the thyroid gland and thus has the potential to affect growth and development, causing brain damage and other adverse effects, particularly in fetuses and infants. Pregnant women, the fetus, infants, children younger than 12 years old, and people with a hypothyroid condition are particularly susceptible to perchlorate toxicity.
35. Selenium	0.05 mg/l	1000	50 ppb	50 ppb	Discharge from 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.
36. Thallium	0.002 mg/l	1000	2 ppb	0.5 ppb	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
Synthetic Organic Contaminants Including Pesticides and Herbicides						
37. 2,4-D (ppb)	0.07 mg/l	1000	70 ppb	70 ppb	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.
38. 2,4,5-TP [Silvex]	0.05 mg/l	1000	50 ppb	50 ppb	Residue of banned herbicide	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
39. 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.
40. Alachlor	0.002 mg/l	1000	2 ppb	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.
41. Atrazine	0.003 mg/l	1000	3 ppb	3 ppb	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
42. Benzo(a)pyrene [PAH]	0.0002 mg/l	1,000,000	200 ppt	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.
43. Carbofuran (ppb)	0.04 mg/l	1000	40 ppb	40 ppb	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.
44. Chlordane	0.002 mg/l	1000	2 ppb	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.
45. Dalapon	0.2 mg/l	1000	200 ppb	200 ppb	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.
46. Di(2-ethylhexyl) adipate	0.4 mg/l	1000	400 ppb	400 ppb	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 toxic effects such as weight loss, liver enlargement, or possible reproductive difficulties.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
47. Di(2-ethylhexyl) phthalate	0.006 mg/l	1000	6 ppb	0	Discharge from rubber and chemical factories	Some people who drink water containing di(2-ethylhexyl) phthalate well in excess of the MCL over many years may have prob-lems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
48. Dibromochloro-propane (DBCP)	0.0002 mg/l	1,000,000	200 ppt	0	Runoff/leaching from soil fumigant used on soybeans, cotton, 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.
49. Dinoseb	0.007 mg/l	1000	7 ppb	7 ppb	Runoff from herbicide used on soybeans and vegetables	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
50. Diquat	0.02 mg/l	1000	20 ppb	20 ppb	Runoff from herbicide use	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
51. Dioxin [2, 3, 7, 8-TCDD] (ppq)	0.00000003 mg/l	1,000,000,000	30 ppq	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
52. Endothall	0.1 mg/l	1000	100 ppb	100 ppb	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.
53. Endrin	0.002 mg/l	1000	2 ppb	2 ppb	Residue of banned insecticide	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
54. 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.
55. Ethylene dibromide	0.00002 mg/l	1,000,000	20 ppt	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.
56. Glyphosate	0.7 mg/l	1000	700 ppb	700 ppb	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
57. Heptachlor	0.0004 mg/l	1,000,000	400 ppt	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.
58. Heptachlor epoxide	0.0002 mg/l	1,000,000	200 ppt	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.
59. Hexachloro-benzene	0.001 mg/l	1000	1 ppb	0	Discharge from metal refineries and agricultural chemical factories	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.
60. Hexachlorocy-clopenta-diene	0.05 mg/l	1000	50 ppb	50 ppb	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.
61. Lindane	0.0002 mg/l	1,000,000	200 ppt	200 ppt	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
62. Methoxychlor	0.04 mg/l	1000	40 ppb	40 ppb	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.
63. Oxamyl [Vydate]	0.2 mg/l	1000	200 ppb	200 ppb	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.
64. PCBs [Polychlorinated biphenyls]	0.0005 mg/l	1,000,000	500 ppt	0	Runoff from landfills; discharge of waste chemicals	Some people who drink water containing PCBs in excess of the MCL over many years could 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.
65. Pentachloro-phenol	0.001 mg/l	1000	1 ppb	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.
66. Picloram	0.5 mg/l	1000	500 ppb	500 ppb	Herbicide runoff	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
67. Simazine	0.004 mg/l	1000	4 ppb	4 ppb	Herbicide runoff	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
68. Toxaphene	0.003 mg/l	1000	3 ppb	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
Volatile Organic Contaminants						
69. Benzene	0.005 mg/l	1000	5 ppb	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.
70. Carbon tetrachloride	0.005 mg/l	1000	5 ppb	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.
71. Chlorobenzene	0.1 mg/l	1000	100 ppb	100 ppb	Discharge from chemical and agricultural 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.
72. o-Dichlorobenzene	0.6 mg/l	1000	600 ppb	600 ppb	Discharge from industrial chemical factories	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
73. p-Dichlorobenzene	0.005 mg/l	1000	5 ppb	5 ppb	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.
74. 1,2-Dichloroethane	0.005 mg/l	1000	5 ppb	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
75. 1,1-Dichloroethylene	0.007 mg/l	1000	7 ppb	7 ppb	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.
76. cis-1,2-Dichloroethylene	0.07 mg/l	1000	70 ppb	70 ppb	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.
77. trans-1,2-Dichloroethylene	0.1 mg/l	1000	100 ppb	100 ppb	Discharge from industrial chemical factories	Some people who drink water containing trans-1,2-dichloroethylene well in exc•ess of the MCL over many years could experience problems with their liver.
78. Dichloromethane	0.005 mg/l	1000	5 ppb	0	Discharge from pharmaceutical and chemical factories	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.
79. 1,2-Dichloropropane	0.005 mg/l	1000	5 ppb	9	Discharge from industrial chemical factories	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
80. Ethylbenzene	0.7 mg/l	1000	700 ppb	700 ppb	Discharge from industrial chemical factories	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
81. Haloacetic Acids (HAA5)	0.060 mg/l	1000	60 ppb	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.
82. Styrene	0.1 mg/l	1000	100 ppb	100 ppb	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.
83. Tetrachloroethylene	0.005 mg/l	1000	5 ppb	0	Discharge from factories and dry cleaners and asbestos cement lined pipes	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.
84. 1,2,4-Trichlorobenzene	0.07 mg/l	1000	70 ppb	70 ppb	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 experience changes in their adrenal glands.
85. 1,1,1-Trichloroethane	0.2 mg/l	1000	200 ppb	200 ppb	Discharge from metal degreasing sites and other factories	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
86. 1,1,2-Trichloro-ethane	0.005 mg/l	1000	5 ppb	3 ppb	Discharge from industrial 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 systems.
87. Trichloroethylene	0.005 mg/l	1000	5 ppb	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.
88. TTHMs [Total Trihalomethanes]	0.08 mg/l	1000	80 ppb	N/A	By-product of drinking water Disinfection	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.
89. Toluene	1 mg/l	-	1 ppm	1 ppm	Discharge from petroleum factories	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.

22.16A: continued

Contaminant	Traditional MCL	To convert for CCR, multiply by	MCL in CCR units	MCLG in CCR units	Major Sources in Drinking Water	Health Effects Language
90. Vinyl Chloride	0.002 mg/l	1000	2 ppb	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.
91. Xylenes	10 mg/l (10,000 ppb)	1000	10 ppm 10,000 ppb	10 ppm	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.

(b) Table 2 - Unregulated Contaminants Chart.

Sources to Drinking Water and Health Effects

Key:
CASRN - Chemical Abstract Services Registry Number
ORSG - Office of Research and Standards Guideline
mg/L - milligrams per liter (same as ppm)
ppm- parts per million
ppb - parts per billion
ppt - parts per trillion
pCi/L - Picocuries per liter

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Acetone (67641)	6.3 mg/L	-	6.3 ppm	Discharge from industrial production and use, in automobile exhaust, from landfills and natural sources	Some people who drink water containing acetone at high concentrations for many years could experience effects on the blood, kidney, liver, and reproductive system.
Aldicarb (116063)	0.003 mg/L	1000	3 ppb	Run-off from use as a pesticide	Some people who drink water containing aldicarb at high concentrations for many years could experience effects on the central nervous system.
Aldicarb sulfone (1646884)	0.002 mg/L	1000	2 ppb	Degraded from aldicarb by plants	Some people who drink water containing aldicarb sulfone in high concentrations for many years could experience effects on the central nervous system.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Aldicarb sulfoxide (74839)	0.004 mg/L	1000	4 ppb	Degraded from aldicarb by plants	Some people who drink water containing aldicarb sulfoxide in high concentrations for many years could experience effects on the central nervous system.
Aldrin	*	-	-	Run-off from insecticide use	Some people who drink water containing aldrin in high concentrations for many years could experience liver damage, kidney effects.
4-androstene-3,17-dione (63058)	*	-	-	-	-
Bromobenzene (108861)	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing bromobenzene in high concentrations for many years could experience central nervous system effects.
Bromomethane (methyl bromide) (74839)	0.01 mg/L	1000	10 ppb	Run-off from use as a fumigant	Some people who drink water containing bromomethane at high concentrations for many years could experience digestive tract effects, and headaches.
Bromodichloromethane (75274)	*	-	-	Trihalomethane; by-product of drinking water chlorination	Some people who drink water containing bromodichloromethane at high concentrations for many years could experience liver and kidney problems.
Bromochloromethane (Halon 1001) (74975)	*	-	-	-	-
Bromoform (75252)	*	-	-	Trihalomethane; by- product of drinking water chlorination	Some people who drink water containing bromoform at high concentrations for many years could experience liver and kidney problems.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Butachlor (23184669)	*	-	-	Run-off from use as a herbicide	Some people who drink water containing butachlor at high concentrations for many years could experience liver effects.
1,3-Butadiene (106990)	*	-	-	-	-
Butylbenzene isomers (n;sec;tert)	*	-	-	Run-off from industrial use	Some people who drink water containing butylbenzene isomers at high concentrations for many years could experience central nervous system effects.
Carbaryl (63252)	*	-	-	Run-off from use as an insecticide	Some people who drink water containing carbaryl at high concentrations for many years could experience kidney and liver effects.
Chlorate (14866683)	*	-	-	-	-
Chlorodifluoromethane (HCFC-22) (75456)	*	-	-	-	-
Chloroethane (75003)	*	-	-	Discharge from industrial uses	Some people who drink water containing chloroethane at high concentrations for many years could experience dizziness, nausea, and vomiting.
Chloroform (67663)	0.07 mg/L	1000	70 ppb	Trihalomethane; by-product of drinking water chlorination. [In non-chlorinated sources, chloroform may be naturally occurring.]	Some people who drink water containing chloroform at high concentrations for many years could experience liver and kidney problems and may have an increased risk of cancer.
Chloromethane (methyl chloride) (74873)	*	-	-	Discharge from industrial uses	Some people who drink water containing chloromethane at high concentrations for many years could experience dizziness and fatigue.
o-Chlorotoluene (95498)	*	-	-	Discharge from industrial use	Some people who drink water containing o-chlorotoluene at high concentrations for many years could experience central nervous system effects.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Chromium-6 (18540299)	*	-	-	-	-
Cobalt (7440484)	*	-	-	-	-
Dibromochloromethane (124481)	*	-	-	Trihalomethane; by-product of drinking water chlorination	Some people who drink water containing dibromochloromethane at high concentrations for many years could experience liver and kidney problems.
Dicamba (1918009)	*	-	-	Run-off from use as a herbicide	Some people who drink water containing dicamba at high concentrations for many years could experience central nervous system effects.
m-Dichlorobenzene (541731)	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing m-dichlorobenzene at high concentrations for many years could experience damage to red blood cells.
Dichlorodifluoromethane (Freon 12) (75718)	1.4 mg/L	-	1.4 ppm	Discharge from use as a refrigerant	Some people who drink water containing dichlorodifluoromethane at high concentrations for many years could experience dizziness and headaches.
1,1-Dichloroethane (75343)	0.07 mg/L	1000	70 ppb	Discharge from use as a degreasing agent	Some people who drink water containing 1,1-dichloroethane at high concentrations for many years could experience liver and kidney effects.
2,2-Dichloropropane	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing 2,2-dichloropropane at high concentrations for many years could experience central nervous system effects.
1,3-Dichloropropane (142289)	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing 1,3-dichloropropane at high concentrations for many years could experience central nervous system effects.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
1,1-Dichloropropene	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing 1,1-dichloropropene at high concentrations for many years could experience central nervous system effects.
1,3-Dichloropropene (cis,trans) (542756)	0.0004 mg/L	1,000,000	400 ppt	Run-off from use as a nematocide	Some people who drink water containing cis or trans-1.3-dichloropropene at high concentrations for many years could experience irritation of the eyes, ears, nose, and throat or cancer.
Dieldrin (60571)	*	-	-	Run-off from pesticide application	Some people who drink water containing dieldrin at high concentrations for many years could experience liver damage, convulsions, or cancer.
1,4-Dioxane (123911)	0.0003 mg/L	1000	0.3 ppb	Discharge from chemical manufacturing and landfills	Some people who drink water containing 1,4-dioxane at high concentrations for many years could experience chronic kidney and liver effects and liver cancer.
Enteroviruses (N/A)	*	-	-	-	-
Equilin (474862)	*	-	-	-	-
17-B-estradiol (50282)	*	-	-	-	-
Estrone (53167)	*	-	-	-	-
Ethylene glycol (107211)	14 mg/L	-	14 ppm	Run-off from use as a deicing chemical; discharge from antifreeze and industrial solvents	Some people who drink water containing ethylene glycol at high concentrations for many years could experience effects on the kidneys, nervous system, and the heart.
17-a-ethynylestradiol (ethinyl estradiol) (57636)	*	-	-	-	-

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Hexachlorobutadiene (87683)	*	-	-	Discharge from use as an industrial solvent	Some people who drink water containing hexachlorobutadiene at high concentrations for many years could experience kidney effects and effects on a fetus.
3-Hydroxycarbofuran	*	-	-	Breakdown product from the use of the pesticide carboxyfuran	Some people who drink water containing 3-hydroxycarbofuran at high concentrations for many years could experience liver effects.
Isopropylbenzene (98828)	*	-	-	Discharge from chemical manufacturing	Some people who drink water containing isopropylbenzene at high concentrations for many years could experience central nervous system effects.
Isopropyltoluene	*	-	-	Discharge from chemical manufacturing	Some people who drink water containing isopropyltoluene at high concentrations for many years may experience central nervous system effects.
Methyl ethyl ketone (78933)	0.35 mg/L	1000	350	Discharge from use as a production solvent and degreaser	Some people who drink water containing methyl ethyl ketone at high concentrations for many years could experience effects on the kidney.
Methyl isobutyl ketone (108101)	4.0 mg/L	-	4 ppm	Discharge from use as a production and extraction solvent	Some people who drink water containing methyl isobutyl ketone at high concentrations for many years could experience effects on the kidney and liver.
Methyl tertiary butyl ether or MTBE (1634044)	0.07 mg/L	1000	70 ppb	Fuel additive; leaks and spills from gasoline storage tanks	Some people who drink water containing methyl tertiary butyl ether at high concentrations for many years could experience chronic effects on the kidney and liver and possible cancer.
Methomyl (16752775)	*	-	-	Runoff from use as an insecticide	Some people who drink water containing methomyl at high concentrations for many years could experience kidney effects.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Metolachlor (51218452)	0.1 mg/L	1000	100 ppb	Run-off from use as a herbicide	Some people who drink water containing metolochlor at high concentrations for many years could experience cancer.
Metribuzin (21087649)	*	-	-	Run-off from use as a herbicide	Some people who drink water containing metribuzin at high concentrations for many years could experience liver and kidney effects.
Molybdenum (7439987)	*	-	-	-	-
Naphthalene (91203)	0.140 mg/L	1000	140 ppb	Discharge from use in mothballs and other domestic products	Some people who drink water containing naphthalene at high concentrations for many years could experience damage to red blood cells, nausea and vomiting.
Nickel (7440020)	0.1 mg/L	1000	100 ppb	Discharge from domestic wastewater, landfills, and mining and smelting operations	Some people who drink water containing nickel at high concentrations for many years could experience effects on the lung, stomach, blood, liver, kidneys, immune system, reproduction, and development.
N-nitrosodimethylamine (NDMA) (62759)	*	-	-	Discharge from industrial use; as a by-product of drinking water treatment; produced from naturally occurring precursor chemicals	Some people who drink water containing NDMA at high concentrations as well as infants born to pregnant women who drink the water may experience an increased risk of cancer. This chemical may also produce liver disease and kidney effects after short-term exposure to high doses or long-term exposure to lower doses.
Noroviruses (N/A)	*	-	-	-	-
Perfluorooctanesulfonic Acid (PFOS) (1763231)	*	-	-	-	-
Perfluorooctanoic Acid (PFOA) (335671)	*	-	-	-	-

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Perfluorobutanesulfonic Acid (PFBS) (375735)	*	-	-	-	-
Perfluorohexanesulfonic Acid (PFHxS) (355464)	*	-	-	-	-
Perfluoroheptanoic Acid (PFHpA) (375859)	*	-	-	-	-
Perfluorononanoic Acid (PFNA) (375951)	*	-	-	-	-
Petroleum hydrocarbons Total P.H. Aliphatics C5-C8 (30080) C9-C12(30089) C9-C18(30092) C19-C36(30057) Aromatics C9-C10(30087) C11-C22(30048)	0.2 mg/L 0.3 mg/L 0.7 mg/L 0.7 mg/L 14.0 mg/L 0.2 mg/L 0.2 mg/L	1000 1000 1000 1000 0 1000 1000	200 ppb 300 ppb 700 ppb 700 ppb 14 ppm 200 ppb 200 ppb	Discharge from the production, distribution, storage, and use of petroleum in transportation and industrial applications	Some people who drink water containing petroleum hydrocarbons at high concentrations for many years could experience effects on the central nervous system, blood, immune system, liver, spleen, kidneys, developing fetus, and lungs.
Propachlor (1918167)	*	-	-	Runoff from use as a herbicide	Some people who drink water containing propachlor at high concentrations for many years could experience liver effects.
n-propylbenzene (103651)	*	-	-	Discharge from chemical manufacturing	Some people who drink water containing n-propylbenzene at high concentrations for many years may experience central nervous system effects.
Radon-222 (14869677)	10,000 pCi/L	-	10,000 pCi/L	Natural sources	Some people who drink water containing radon-222 at high concentrations for many years could experience cancer of the lung.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
Sodium (7440235)	20 mg/L	-	20 ppm	Discharge from the use and improper storage of sodium-containing deicing compounds or in water-softening agents	Some people who drink water containing sodium at high concentrations for many years could experience an increase in blood pressure.
Strontium (7440246)	*	-	-	-	-
Sulfate	*	-	-	Natural sources	Some people who drink water containing sulfate at high concentrations for many years could experience diarrhea.
Tertiary-amyl methyl ether (TAME) (994058)	0.09 mg/L	1000	90 ppb	Discharge from use as an octane enhancer and oxygenate in gasoline	Some people who drink water containing TAME at high concentrations for many years could experience effects on the kidney and liver and possible cancer.
Tertiary butyl alcohol (TBA) (75650)	0.12 mg/L	1000	120 ppb	Degraded from MTBE; discharged from use as an octane enhancer and oxygenate in gasoline	Some people who drink water containing TBA at high concentrations for many years could experience effects on the kidney and bladder and possible cancer.
Testosterone (58220)	*	-	-	-	-
1,1,1,2-Tetrachloroethane (630206)	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing 1,1,1,2-tetrachloroethane at high concentrations for many years could experience liver effects.
1,1,2,2-Tetrachloroethane (79345)	*	-	-	Discharge from use in dry cleaning	Some people who drink water containing 1,1,2,2-tetrachloroethane at high concentrations for many years could experience nausea, vomiting and liver damage.
Tetrahydrofuran (109999)	1.3 mg/L	-	1.3 ppm	Discharge from use as an adhesive for joining pipes in water treatment systems and as a production solvent	Some people who drink water containing tetrahydrofuran at high concentrations for many years could experience effects on the central nervous system, liver, kidney, and lung and possible cancer.

22.16A: continued

Chemical (CASRN)	ORSG	To convert for CCR, multiply by	ORSG in CCR units	Source to Drinking Water	Health Effects
1,2,3-Trichlorobenzene	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing 1,2,3-trichlorobenzene at high concentrations for many years could experience liver effects.
1,1,2-Trichloro-1,2,2-tri-fluoroethane (76131)	210 mg/L	-	210 ppm	Discharge from use as a cleaning agent, production solvent, and blowing agent	Some people who drink water containing 1,1,2-trichloro-1,2,2-tri-fluoroethane at high concentrations for many years could experience problems on the nervous system.
Trichlorofluoromethane (Freon 11) (75694)	*	-	-	Discharge from use as a refrigerant	Some people who drink water containing trichlorofluoromethane at high concentrations for many years could experience central nervous system effects.
1,2,3-Trichloropropane (96184)	*	-	-	Discharge from use in paint and varnish removers	Some people who drink water containing 1,2,3-trichloropropane at high concentrations for many years could experience liver damage.
1,2,4-Trimethylbenzene (95636)	*	-	-	Discharge from use in dyes and paints	Some people who drink water containing 1,2,4-trimethylbenzene at high concentrations for many years could experience central nervous system effects.
1,3,5-Trimethylbenzene (108678)	*	-	-	Discharge from use in chemical manufacturing	Some people who drink water containing 1,3,5-trimethylbenzene at high concentrations for many years could experience central nervous system effects.
Vanadium (7440622)	*	-	-	-	-

* There is no ORS Guideline issued as yet for these contaminants. Please contact the MassDEP Office of Research and Standards (ORS) at 617-292-5598 for health risk information for these chemicals. Other useful guidance can be found at http://www.mass.gov/dep/water/drinking/standards/orsg.htm and http://water.epa.gov/drink/stacndards/hascience.cfm.

(c) Table 3 - Secondary Contaminants Chart.

Sources to Drinking Water and Health and/or Aesthetic Effects

Key:
CASRN - Chemical Abstract Services Registry Number
SMCL - Secondary Maximum Contaminant Level
mg/L - milligram per liter (same as ppm)
ppm - parts per million

22.16A: continued

C.U. - Color Unit ppb - parts per billion
T.O.N. - Threshold odor numbers

Chemical (CASRN)	SMCL	To convert for CCR, multiply by	SMCL in CCR units	Source to Drinking Water	Health and/or Aesthetic Effects
Aluminum	0.2 mg/L	1000	200 ppb	Residue from water treatment process: erosion of natural deposits	May produce colored water.
Chloride	250 mg/L	-	250 ppm	Runoff and leaching from natural deposits; seawater influence	May produce a salty taste.
Color	15 C.U.	-	15 C.U.	Naturally occurring material	May produce a visible tint.
Copper	1 mg/L	-	1 ppm	Internal corrosion of household plumbing; erosion of natural deposits	May produce a metallic taste; blue-green staining.
Corrosivity	Non-corrosive	-	-	Balance of hydrogen, carbon, and oxygen in water, affected by temperature and other factors	May produce a metallic taste; corroded pipes; fixture staining.
Fluoride	2.0 mg/L	-	2 ppm	Erosion of natural deposits	May produce tooth discoloration.
Foaming agents	0.5 mg/L	1000	500 ppb	Municipal and industrial waste discharge	May produce froth; cloudiness; bitter taste; odor.
Iron	0.3 mg/L	1000	300 ppb	Natural and industrial sources as well as aging and corroding Distribution Systems and household pipes	Use of water containing iron at concentrations above the secondary MCL may result in aesthetic issues including the staining of laundry and plumbing fixtures and water with an unpleasant metallic taste and rusty odor.

22.16A: continued

Chemical (CASRN)	SMCL	To convert for CCR, multiply by	SMCL in CCR units	Source to Drinking Water	Health and/or Aesthetic Effects
Manganese[5]	0.05 mg/L (0.30 mg/L, ORSG)	1000	50 ppb (300 ppb, ORSG	Natural sources as well as discharges from industrial uses	Drinking water may naturally have manganese and, when concentrations are greater than 50 ppb, the water may be discolored and taste bad. Over a lifetime, the EPA recommends that people drink water with manganese levels less than 300 ppb and over the short term, EPA recommends that people limit their consumption of water with levels over 1000 ppb, primarily due to concerns about possible neurological effects. Children younger than one year old should not be given water with manganese concentrations over 300 ppb, nor should formula for infants be made with that water for more than a total of ten days throughout the year.
Odor	3 T.O.N.	-	3 T.O.N.	Naturally occurring organic materials that form ions when in water; seawater influence	May produce a "rotten-egg", musty, or chemical smell.
pH	6.5-8.5	-	6.5-8.5	Runoff and leaching from natural deposits; seawater influence	Low pH may produce: bitter metallic taste; corrosion High pH may produce a slippery feel; soda taste; deposits.
Silver	0.10 mg/L	1000	100 ppb	Naturally occurring element	May produce skin discoloration; graying of the white part of the eye.
Sulfate	250 mg/L	-	250 ppm	Runoff and leaching from natural deposits; industrial wastes	May produce a salty taste.
Total dissolved solids (TDS)	500 mg/L	-	500 ppm	Runoff and leaching from natural deposits; seawater influence	May produce hardness; deposits; colored water; staining; salty taste.
Zinc	5 mg/L	-	5 ppm	Corrosion of household plumbing systems; erosion of natural deposits	May produce a metallic taste.

[5] EPA has established a lifetime “Health Advisory” (HA) of 0.3 mg/L and an acute HA at 1.0 mg/L for Manganese and this HA contains a precautionary statement that "for infants younger than six months, the lifetime Health Advisory of 0.3 mg/L be used even for an acute exposure of ten days, because of the concerns for differences in manganese content in human milk and formula and the possibility of a higher absorption and lower excretion in young infants". MassDEP extended that age to one year out of concerns for formula use up to that age and the potential susceptibility of this early life stage to excessive manganese exposure and potential resultant toxicity.

Please go to http://water.epa.gov/drink/contaminants/secondarystandards.cfm for additional information on secondary contaminants.

22.17: Record Maintenance

All suppliers of water shall retain on their premises or at a convenient location near their premises in a form admissible as evidence in Massachusetts Courts the following records:

(1) Records of bacteriological analyses made pursuant to 310 CMR 22.00 shall be kept for not less than five years. Records of microbiological analyses and turbidity analyses made pursuant to 310 CMR 22.20G shall be kept for not less than five years. Records of analysis for other than microbiological contaminants (including total coliform, fecal coliform, and heterotrophic plate count), residual disinfectant concentration, other parameters necessary to determine disinfection effectiveness (including temperature and pH measurements), and turbidity shall be retained for not less than 12 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that such summaries are in a form admissible as evidence in Massachusetts Courts and shall include at least the following information in a form that demonstrates an unbroken chain of custody of the samples analyzed from sampling through analysis and includes at least the following:

(a) The date, place and time of sampling, the full name of the person who collected the sample and the agency or organization for which that person works;
(b) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;
(c) Date of analysis;
(d) Laboratory and person responsible for performing analysis;
(e) The analytical technique/method and instruments used; and
(f) The results of the analysis.

(2) Records of action taken by the system to correct violation of 310 CMR 22.00 shall be kept for a period not less than three years after the last action taken with respect to the particular violation involved.

(3) 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 local, State or Federal agency, shall be kept for a period not less than ten years after completion of the sanitary survey involved.

(4) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than five years following the expiration of such variance or exemption.

(5) Records concerning the use of chemicals added to the water supply shall be kept for not less than five years. Said records shall include the information prescribed in 310 CMR 22.15(4).

(6) Records of the sizes and materials of construction of all water mains, records of materials used in joints of water mains, and records of the materials of construction of all services shall be maintained.

(7) Each supplier of water shall be responsible for maintaining current inventory information for the public water system in its charge and shall retain inventory records of public water systems for not less than 12 years. Said records shall include the information prescribed in 310 CMR 22.15(5).

(8) A record of the most recent vulnerability determination, including the monitoring results and other data supporting the determination, the Department's findings based on the supporting data and any additional bases for such determination; except that it shall be kept in perpetuity or until a more current vulnerability determination has been issued.

(9) A record of all current monitoring requirements and the most recent monitoring frequency decision pertaining to each contaminant, including the monitoring results and other data supporting the decision, the Department's findings based on the supporting data and any additional bases for such decision; except that the record shall be kept in perpetuity or until a more recent monitoring frequency decision has been issued.

22.17: continued

(10) A record of the most recent asbestos repeat monitoring determination, including the monitoring results and other data supporting the determination, the Department's findings based on the supporting data and any additional bases for the determination and the repeat monitoring frequency; except that these records shall be maintained in perpetuity or until a more current repeat monitoring determination has been issued.

(11) Copies of the public notices issued pursuant to 310 CMR 22.16 and certifications made to the Department pursuant to 310 CMR 22.15(3)(b) shall be kept for three years after issuance.

(12) Each supplier of water who is subject to the requirements of 310 CMR 22.20F shall, in addition to recordkeeping requirements under 310 CMR 22.20A(6), maintain records as follows:

(a) Individual Filter Turbidity Requirements. The results of individual filter monitoring, conducted in accordance with 310 CMR 22.20D(6)(b) and 22.20F(7)(a) through (e), must be kept for at least three years.

(b) Disinfection Profiling. The results of the profile (including raw data and analysis), conducted in accordance with 310 CMR 22.20D(3)(b) and 22.20F(4)(a) through (g), must be kept indefinitely.

(c) Disinfection Benchmarking. The benchmark (including raw data and analysis), conducted in accordance with 310 CMR 22.20D(3)(c) and 22.20F(5)(a) through (e), must be kept indefinitely.

(13) Copies of monitoring plans developed pursuant to 310 CMR 22.07F shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under 310 CMR 22.17(1), except as specified elsewhere in 310 CMR 22.17.

22.18: Right of Entry

All suppliers of water shall authorize agents and employees of the Commonwealth, upon presentation of their credentials, to enter their premises, excluding dwelling places, without a warrant for the purpose of inspecting, surveying and sampling public water systems, whether or not the Commonwealth has evidence that the system is in violation of an applicable legal requirement.

22.19: Distribution System Requirements

In order to protect the distribution system of a public water system from contamination the following requirements shall be applied:

(1) All service connections shall have a minimum residual water pressure at street level of at least 20 pounds per square inch under all design conditions of flow.

(2) Water Storage Tanks. All water storage tanks used for the storage of ground or treated water which are connected to a distribution system of a public water system shall be covered and constructed and located so as to adequately protect the water from contamination. Tank vents and overflow pipes shall be properly screened to prevent contamination and not be directly connected to sanitary sewers or to storm drainage systems. Sewers, drains, standing water and similar sources of possible contamination must be kept at least 50 feet from the tank. Water main pipe, pressure tested to 50 pounds per square inch without leakage, may be used for gravity sewers at distances greater than 20 feet and less than 50 feet from said water storage tank.

(3) Storage Reservoirs. Open or uncovered earth embankment or reinforced concrete reservoirs, which are connected to a distribution system of a public water system, and used to store ground or treated water whose intended purpose is to equalize hourly and daily fluctuations of water, may continue to be used provided that said facility complies with the requirements of 310 CMR 22.20A.

22.19: continued

(4) Construction Materials Evaluation. Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the Department:

(a) Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing;
(b) Copper from piping and alloys, service lines, and home plumbing;
(c) Galvanized piping, service lines, and home plumbing;
(d) Ferrous piping materials such as cast iron and steel; and
(e) Asbestos cement pipe.

(5) Identification and Reporting of Other Materials of Construction. In addition, the Department may require identification and reporting of other materials of construction present in distribution systems that may contribute contaminants to the drinking water such as:

(a) Vinyl lined asbestos cement pipe; and
(b) Coal tar lined pipes and tanks.

(6) All suppliers of water shall develop, update and maintain maps and any relevant associated databases of their water system distribution system that include locations of wells, surface water intakes, treatment facilities, pumping stations, storage tanks, hydrants, direction of flow, pressure zones, sample collection points and other information, such as piping materials and pipe sizes, as requested by the Department. The supplier shall make these maps available to the Department upon request.

22.20A: Surface Water Treatment Rule

(1) General Requirements.

(a) 310 CMR 22.20A establishes criteria under which Filtration is required as a Treatment Technique for Public Water Systems supplied by Surface Water Sources and groundwater sources under the direct influence of surface water. In addition, 310 CMR 22.20A establishes Treatment Technique requirements in *lieu* of Maximum Contaminant Levels for the following contaminants:

1. *Giardia lamblia*;
2. Viruses;
3. Heterotrophic plate count bacteria;
4. *Legionella*; and
5. Turbidity.

(b) Each Supplier of Water with a Surface Water Source, or groundwater source under the direct influence of surface water, must provide treatment of that source water that complies with the Treatment Technique requirements set forth in 310 CMR 22.20A. The Treatment Technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

1. At least 99.9% (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; and
2. At least 99.99% (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.

(c) A Supplier of Water using a Surface Water Source or groundwater source under the direct influence of surface water shall be deemed in compliance with the requirements of 310 CMR 22.20A(1)(a) and (b) if:

1. It meets the requirements for avoiding Filtration in 310 CMR 22.20A(2) and the Disinfection requirements in 310 CMR 22.20A(3)(a); or
2. It meets the Filtration requirements in 310 CMR 22.20A(4) and the Disinfection requirements in 310 CMR 22.20A(3)(b).

(d) Each Supplier of Water using a Surface Water Source or a groundwater source under the direct influence of surface water must be operated by a Certified Operator in compliance with 310 CMR 22.11B.

(e) In addition to complying with requirements of 310 CMR 22.20A, systems serving at least 10,000 people shall also comply with the requirements of 310 CMR 22.20D.

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(f) In addition to complying with the requirements of 310 CMR 22.20A, each Supplier of Water that serves fewer than 10,000 people must also comply with the requirements in 310 CMR 22.20F.

(2) Criteria for Avoiding Filtration. A Supplier of Water that uses a Surface Water Source must meet all of the conditions in 310 CMR 22.20A(2)(a) and (b) and is subject to 310 CMR 22.20A(2)(c) beginning June 29, 1991, unless the Department has notified it in writing that Filtration is required. A Supplier of Water that uses a groundwater source under the direct influence of surface water must meet all of the conditions in 310 CMR 22.20A(2)(a) and (b) and is subject to 310 CMR 22.20A(2)(c) beginning 18 months after the Department determines that it is under the direct influence of surface water, or June 29, 1991, whichever is later, unless the Department has notified it in writing that Filtration is required. If the Department determines in writing, before June 29, 1991 that Filtration is required, the Supplier of Water must have installed Filtration and meet the criteria for filtered systems specified in 310 CMR 22.20A(3)(b) and (4) by June 29, 1993. Within 18 months of the failure of a system using a Surface Water Source or a groundwater source under the direct influence of surface water to meet any one of the requirements in 310 CMR 22.20A(2)(a) and (b) or after June 29, 1993, whichever is later, the Supplier of Water must have installed Filtration and meet the criteria for filtered systems specified in 310 CMR 22.20A(3)(b) and (4).

(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 310 CMR 22.20A(5)(a)1. and (b)1. in representative samples of the source water immediately prior to the first or only Point of Disinfectant Application in at least 90% of the measurements made for the six previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliform, the fecal coliform criterion, but not the total coliform criterion, in 310 CMR 22.20A(2)(a)1. must be met.

2. The Turbidity level cannot exceed one NTU (measured as specified in 310 CMR 22.20A(5)(a)1. and (b)2. in representative samples of the source water immediately prior to the first or only Point of Disinfectant Application except that five or fewer Turbidity units may be allowed if the Supplier of Water can demonstrate to the Department that the higher Turbidity does not do any of the following:

a. Interfere with Disinfection.

b. Prevent maintenance of an effective Disinfectant agent throughout the Distribution System; or

c. Interfere with microbiological determinations.

3. The Turbidity level cannot exceed five NTU (at any time) unless:

a. The Department determines that any such event was caused by circumstances that were unusual and unpredictable; and

b. As a result of any such event, there have not been more than two 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 five NTU. An "event" is a series of consecutive days during which at least one Turbidity measurement each day exceeds five NTU.

(b) Site Specific Conditions.

1. A Supplier of Water must meet the requirements of 310 CMR 22.20A(3)(a)1. at least 11 of the 12 previous months that its system served water to the public on an ongoing basis, unless the system fails to meet the requirements during two of the 12 previous months that the system served water to the public, and the Department determines that at least one of the failures was caused by circumstances that were unusual and unpredictable.

2. A Supplier of Water must meet the requirements of 310 CMR 22.20A(3)(a)2. at all times its system serves water to the public unless otherwise approved by the Department.

3. A Supplier of Water must meet the requirements of 310 CMR 22.20A(3)(a)3. at all times its system serves water to the public unless the Department determines that any such failure was caused by circumstances that were unusual and unpredictable.

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4. A Supplier of Water must meet the requirements of 310 CMR 22.20A(3)(a)4. on an ongoing basis, unless the Department determines that any such failure was not caused by a deficiency in treatment of the source water.

5. A Supplier of Water must maintain a Watershed Protection/Control Program that adequately minimizes the potential for contamination by *Giardia lamblia* cysts, *Cryptosporidium oocysts* and Viruses. During onsite inspection, the Department will determine whether the Watershed Protection/Control Program is adequate to minimize the potential for contamination by *Giardia lamblia* cysts, *Cryptosporidium oocysts* and Viruses in the source water. The adequacy of the Watershed Protection/Control Program to prevent potential contamination of the source water and other contaminants must be based on:

a. The comprehensiveness of the watershed review;

b. The effectiveness of the system's program to monitor and control detrimental activities occurring in the Watershed; and

c. Extent to which the water system has maximized land ownership and/or controlled land use within the Watershed.

d. At a minimum, a Watershed Protection/Control Program shall include the following information:

i. a Watershed description, including maps and accompanying narratives of major physical features, components of the water system, and hydrological characteristics;

ii. the Watershed characteristics and activities which may have an adverse effect on source water quality;

iii. a risk assessment and plan for controlling detrimental activities/events that may have an adverse impact on source water quality;

iv. a plan for monitoring Raw Water quality parameters at locations vulnerable to contamination from detrimental activities;

v. demonstrated control through land ownership and/or land use restrictions on all human activities within the Watershed which may have an adverse impact on the microbiological quality of the source water; and

vi. a management plan for staffing, training and maintaining effective day to day operations (including Emergency response to contamination) and implementing a Department-approved Watershed Control/Protection Program.

vii. a description of activities in the Watershed that affect water quality, projects what adverse activities are expected to occur in the future, describes how the Supplier of Water expects to address them and otherwise complies with 310 CMR 22.20B(9) and 22.21(4), if applicable.

e. The Supplier of Water shall submit an annual report on Department-approved forms to the Department. The annual report shall identify any special concerns about the Watershed and how they are being handled;

6. The Supplier of Water shall be subject to an annual on site inspection by the Department or a Person designated by the Department to assess the Watershed Protection/Control Program and Disinfection treatment process. A report of the on site inspection which summarizes all findings must be prepared every year. The on site inspection must indicate to the Department's satisfaction that the Watershed Protection/ Control Program and Disinfection treatment process are adequately designed and maintained. The on site inspection must include:

a. A review of the effectiveness of the Watershed Protection/Control Program Plan;

b. A review of the physical condition of the source intake and how well it is protected;

c. A review of the system's equipment maintenance program to ensure there is low probability for failure of the Disinfection process;

d. An inspection of the Disinfection equipment for physical deterioration;

e. A review of operating procedures;

f. A review of data records to ensure that all required tests are being conducted and recorded and Disinfection is effectively practiced; and

g. Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

22.20A: continued

7. 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.

8. A Supplier of Water must comply with the Maximum Contaminant Level (MCL) for *E. coli* in 310 CMR 22.05(8) 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.

9. Each Supplier of Water shall comply with the requirements for Trihalomethanes in 310 CMR 22.07(1) and (2) until December 31, 2001. After January 1, 2002, the Public Water System shall comply with the requirements for Total Trihalomethanes, Haloacetic Acids (Five), bromate, chlorite, chlorine, chloramines and chlorine dioxide as appropriate or applicable depending on Disinfectant used and in accordance with 310 CMR 22.07E.

(c) Treatment Technique Violations.

1. A Supplier of Water shall be deemed in violation of a Treatment Technique requirement if it:

a. fails to meet any one of the criteria in 310 CMR 22.20A(2)(a) or (b) and/or which the Department has notified in writing that Filtration is required; or

b. fails to install Filtration by the date specified in 310 CMR 22.20A(2).

2. A Supplier of Water that has not installed Filtration is in violation of a Treatment Technique requirement if:

a. the Turbidity level (measured as specified in 310 CMR 22.20A(5)(a)1. and (b)2.) in a representative sample of the source water immediately prior to the first or only point of Disinfection exceeds one NTU unless five or fewer NTU units have been allowed by the Department; or

b. its system is identified as a source of a Waterborne Disease Outbreak.

(3) Disinfection. A Supplier of Water that uses a Surface Water Source and does not provide Filtration treatment must provide the Disinfection treatment specified in 310 CMR 22.20A(3)(a) beginning December 29, 1991, unless the Department notifies it in writing that Filtration is required. A Supplier of Water that uses a groundwater source under the direct influence of surface water and does not provide Filtration treatment must provide Disinfection treatment specified in 310 CMR 22.20A(3)(a) beginning December 29, 1991, or 18 months after the Department determines that the groundwater source is under the influence of surface water, whichever is later, unless the Department has notified it in writing that Filtration is required. If the Department has determined that Filtration is required, the Supplier of Water must comply with any interim Disinfection requirements the Department deems necessary before Filtration is installed. A Supplier of Water that uses a Surface Water Source that provides Filtration treatment must provide the Disinfection treatment specified in 310 CMR 22.20A(3)(b) beginning June 29, 1993, or beginning when Filtration is installed, whichever is later. A Supplier of Water that uses a groundwater source under the direct influence of surface water and provides Filtration treatment must provide Disinfection treatment as specified in 310 CMR 22.20A(3)(b) by June 29, 1993, or beginning when Filtration is installed, whichever is later. Failure to meet any requirement in 310 CMR 22.20A(3) after the applicable date is a Treatment Technique violation.

(a) Disinfection requirements for Public Water Systems that do not provide Filtration. A Supplier of Water that does not provide Filtration treatment must provide Disinfection treatment as follows:

1. The Disinfection treatment must be sufficient to ensure at least 99.9% (3 log) inactivation of *Giardia lamblia* cysts and 99.99% (4 log) inactivation of Viruses, 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 Supplier of Water must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in 310 CMR 22.20A(5)(b)3., and 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 Supplier of Water 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 CT99.9 values other than those specified in 310 CMR 22.20A(5)(b)3.: *Tables 2.1* and *Table 3.1* in or other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by 310 CMR 22.20A(3)(a).

22.20A: continued

2. The Disinfection system must have 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 unless otherwise approved by the Department.

3. The Residual Disinfectant Concentration in the water entering the Distribution System, measured as specified in 310 CMR 22.20A(5)(a)2. and (b)5., cannot be less than 0.2 mg/l for more than four hours.

4. The Residual Disinfectant Concentration in the Distribution System measured as free chlorine, total chlorine, combined chlorine, or chlorine dioxide, as specified in 310 CMR 22.20A(5)(a)2. and (b)6., cannot be undetectable in more than 5% of the samples each month, for any two consecutive months that the system serves water to the public. Water in the Distribution System with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in 310 CMR 22.20A(5)(a)1., is deemed to have a detectable Disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5% in one month, for any two consecutive months.

$$V = \frac{c + d + e}{a + b} \; x \; 100$$

Where:

a = number of instances where the Residual Disinfectant Concentration is measured;

b = number of instances where the Residual Disinfectant Concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the Residual Disinfectant Concentration is measured but not detected and no HPC is measured;

d = number of instances where the Residual Disinfectant Concentration is measured but not detected and where the HPC is >500/ml; and

e = number of instances where the Residual Disinfectant Concentration is not measured and HPC is >500/ml.

(b) Disinfection Requirements for Public Water Systems Which Provide Filtration. A Supplier of Water that provides Filtration treatment must provide Disinfection treatment as follows:

1. a. The Disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99% (2-log) removal of *Cryptosporidium*, at least 99.9% (3 log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99% (4 log) inactivation and/or removal of Viruses, as determined by the Department.

   b. Failure to provide this Disinfection treatment on a daily basis constitutes a treatment technique violation of 310 CMR 22.20A(3)(b)1. The Department must be notified within 24 hours of the failure to provide Disinfection as required.

2. The Residual Disinfectant Concentration in the water entering the Distribution System, measured as specified in 310 CMR 22.20A(5)(a)2. and (c)2., cannot be less than 0.2 mg/l for more than four hours.

3. The Residual Disinfectant Concentration in the Distribution System, measured as free chlorine, total chlorine, combined chlorine, or chlorine dioxide, as specified in 310 CMR 22.20A(5)(a)2. and (c)3., cannot be undetectable in more than 5% of the samples each month, for any two consecutive months that the system serves water to the public. Water in the Distribution System with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in 310 CMR 22.20A(5)(a)1., is deemed to have a detectable Disinfectant residual for purposes of determining compliance with this requirement. Thus the value "V" in the following formula cannot exceed 5% in one month, for any two consecutive months.

22.20A: continued

$$V = \frac{c + d + e}{a + b} \times 100$$

Where:

a = number of instances where the Residual Disinfectant Concentration is measured;
b = number of instances where the Residual Disinfectant Concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;
c = number of instances where the Residual Disinfectant Concentration is measured but not detected and no HPC is measured;
d = number of instances where no Residual Disinfectant Concentration is measured but not detected and where the HPC is >500/ml; and
e = number of instances where the Residual Disinfectant Concentration is not measured and HPC is >500/ml.

(4) Filtration. A Supplier of Water that uses a Surface Water Source or a groundwater source under the direct influence of surface water, and does not meet all of the criteria in 310 CMR 22.20A(2)(a) and (b) for avoiding Filtration, must provide treatment consisting of both Disinfection, as specified in 310 CMR 22.20A(3)(b), and Filtration treatment which complies with the requirements of 310 CMR 22.20A(4) by June 29, 1993, or within 18 months of the failure to meet any one of the criteria for avoiding Filtration in 310 CMR 22.20A(2)(a) and (b), whichever is later. Failure to meet any requirement of 310 CMR 22.20A after the date specified in 310 CMR 22.20A(4) is a Treatment Technique violation.

(a) Conventional Filtration Treatment or Direct Filtration.

1. Beginning January 1, 2002, systems using conventional and Direct Filtration treatment serving at least 10,000 people shall meet the Turbidity requirements in 310 CMR 22.20D(4) and (5).

2. Beginning January 1, 2005, systems serving less than 10,000 people must meet the Turbidity requirements in 310 CMR 22.20F(6) and (7).

(b) Slow Sand Filtration.

1. For systems using Slow Sand Filtration, the Turbidity level of representative samples of a system's filtered water must be less than or equal to one NTU in at least 95% of the measurements taken each month, measured as specified in 310 CMR 22.20A(5)(a)1. and (c)1.

2. The Turbidity level of representative samples of a system's filtered water must at no time exceed five NTU, measured as specified in 310 CMR 22.20A(5)(a)1. and (c)1.

(c) Diatomaceous Earth Filtration.

1. For systems using Diatomaceous Earth Filtration, the Turbidity level of representative samples of a system's filtered water must be less than or equal to one NTU in at least 95% of the measurements taken each month, measured as specified in 310 CMR 22.20A(5)(a)1. and (c)1.

2. The Turbidity level of representative samples of a system's filtered water must at no time exceed five NTU, measured as specified in 310 CMR 22.20A(5)(a)1. and (c)1.

(d) Other Filtration Technologies. Each Supplier of Water may use a Filtration technology not listed in 310 CMR 22.20A(4)(a) through (c), 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 310 CMR 22.20A(3)(b), consistently achieves 99.9% removal and/or inactivation of *Giardia lamblia* cysts and 99.99% removal and/or inactivation of Viruses. For a Supplier of Water that makes this demonstration, the requirements of 310 CMR 22.20A(3)(b) apply. Beginning January 1, 2002, a Supplier of Water serving at least 10,000 people shall meet the requirements for other Filtration technologies as required in 310 CMR 22.20D(4)(b). Beginning January 1, 2005, a Supplier of Water serving fewer than 10,000 people must meet the requirements for other Filtration technologies as required in 310 CMR 22.20F(6)(c).

22.20A: continued

(5) Analytical and Monitoring Requirements.

(a) Analytical Requirements. Only the analytical method(s) specified in 310 CMR 22.20A(5)(a), or otherwise approved by EPA, may be used to demonstrate compliance with the requirements of 310 CMR 22.20A(2), through (4). Measurements for pH, temperature, Turbidity, and Residual Disinfectant Concentrations must be conducted by a certified operator. Measurements for total coliform, fecal coliform, and HPC must be conducted by a laboratory certified by the Department to do such analyses. The following procedures shall be performed in accordance with the publications listed in the 310 CMR 22.20A(6). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the methods published in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association, 1015 Fifteenth Street, N.W., Washington, D.C. 20005; copies of the Minimal Medium ONPG MUG Method as set forth in the article *National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliform and Escherichia coli from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method* (Edberg *et al.*), Applied and Environmental Microbiology, Volume 54, pp.1594 1601, June 1988 (as amended under Erratum, Applied and Environmental Microbiology, Volume 54, p. 3197, December 1988), may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, Colorado, 80235; and copies of the Indigo Method as set forth in the article *Determination of Ozone in Water by the Indigo Method* (Bader and Hoigne), may be obtained from Ozone Science & Engineering, Pergamon Press Ltd., Fairview Park, Elmsford, New York 10523. Copies may be inspected at the U.S. Environmental Protection Agency, Room EB15, 401 M Street, S.W., Washington, D.C. 20460 or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700 Washington, D.C.

1. Public Water Systems must conduct analysis of pH and temperature in accordance with one of the methods listed in 310 CMR 22.06B(10). Public Water Systems must conduct analysis of total coliforms, fecal coliforms, Heterotrophic bacteria, and Turbidity in accordance with one of the following analytical methods and by using analytical test procedures contained in Technical Notes on Drinking Water Methods, EPA-600/R-94-173, October 1994, which is available at NTIS PB95-104766.

Organism	Methodology	Citiation[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[11]	2130 B
Turbidity[13]		180.1[9]
	Nephelometric Method	Method 2[10]
	Nephelometric Method	10133[12]
	Great Lakes Instruments	
	Hach Filter Trak	

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1, 6, 7, 9 and 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 regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, 1200 Pennsylvania Ave., NW., Washington, DC 20460 (Telephone: 202-260-3027); or at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, D.C. 20408.

22.20A: continued

[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, D.C. 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 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 eight hours. Systems must 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%.

[4] Media should cover inverted tubes at least ½ to ⅔ after the sample is added.

[5] No requirement exists to run the completed phase on 10% 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), 1200 Pennsylvania Ave., NW, Washington, DC 20460, EPA 600/J-99/225.

[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°C.

[9] *Methods for the Determination of Inorganic Substances in Environmental Samples*, EPA/600/R-93/100, August 1993. Available at NTIS, PB94-121811.

[10] GLI Method 2, *Turbidity*, November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, Wisconsin 53223.

[11] 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., 1 IDEXX Drive, Westbrook, ME 04092, telephone 800-321-0207.

[12] A description of the Hach Filter Trak 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.

[13] Styrene divinyl benzene beads (*e.g.*, AMCO-AEPA-1 or equivalent) and stabilized formazin (*e.g.*, Hach StablCal or equivalent) are acceptable substitutes for formazin.

2. Public Water Systems must measure Residual Disinfectant Concentrations with one of the following methods in the following table. Residual Disinfectant Concentrations for free chlorine and combined chlorine also may be measured by using digital meter versions of DPD colorimetric test kits. Suppliers serving less than or equal to 3,300 persons may use non-digital meter DPD colorimetric test kits. Free chlorine and total chlorine may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision 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. In addition, Public Water Systems may use 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.

22.20A: continued

Residual	Methodology	Methods SM[1]	SM Online[2]	Other
Free Chlorine	Amperometric Titration	4500-Cl D	4500-C1 D-00	D 1253-033
	DPD Ferrous Titrimetric	4500-Cl F	4500-C1 F-00	
	DPD Colorimetric	4500-Cl G	4500-C1 G-00	
Total Chlorine	Syringaldazine (FACTS)	4500-Cl H	4500 C1 H-00	
	Amperometric Titration	4500-Cl D	4500 C1 D-00	D 1253-03[3]
	Amperometric Titration (low level measurement)	4500-Cl E	4500 C1 E-00	
	DPD Ferrous Titrimetric	4500-Cl F	4500 C1 F-00	
Chlorine Dioxide	DPD Colorimetric	4500-Cl G	4500 C1 G-00	
	Iodometric Electrode	4500-Cl I	4500 C1 I-00	
	Amperometric Titration	4500-ClO_2 C 4500-ClO_2 D	4500-ClO2 C-00	
	DPD Method	4500-ClO_2 E		
	Amperometric Titration		4500 C1O2 E-00	
Ozone	Spectrophotometric	4500-O_3 B		327.0, Revision 1.1[4]
	Indigo Method		4500-O3 B-97	

[1] All the listed Disinfectant residual methods are contained in the 18th, 19th, and 20th editions of *Standard Methods for the Examination of Water and Wastewater*, 1992, 1995, and 1998; the cited methods published in any of these three editions may be used.

[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] 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.

(b) Monitoring Requirements for Systems that Do Not Provide Filtration. A Supplier of Water that uses a Surface Water Source and does not provide Filtration treatment must begin monitoring, as specified in 310 CMR 22.20A(5)(b) beginning May 1, 1990, unless the Department has notified it in writing that Filtration is required, in which case the Department may specify alternative monitoring requirements, as appropriate, until Filtration is in place. A Supplier of Water that uses a groundwater source under the direct influence of surface water and does not provide Filtration treatment must begin monitoring as specified in 310 CMR 22.20A(5)(b) beginning December 31, 1990 or six months after the Department determines that the groundwater source is under the direct influence of surface water, whichever is later, unless the Department has notified it in writing that Filtration is required, in which case the Department may specify alternative monitoring requirements, as appropriate, until Filtration is in place.

1. Fecal coliform or total coliform density measurements as required by 310 CMR 22.20A(2)(a)1. must be performed on representative source water samples immediately prior to the first or only Point of Disinfectant Application. The Supplier of Water must sample for fecal or total coliform at the following minimum frequency each week the system serves water to the public:

22.20A: continued

System Size (Persons Served)	Samples/Week[1]
< 500	1
501- 3,300	2
3,301-10,000	3
10,001-25,000	4
> 25,000	5

[1] Must be taken on separate days.

In addition, 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 one NTU (these samples count towards the weekly coliform sampling requirement) unless the Department determines that the Supplier of Water for logistical reasons outside of the supplier's control, cannot have the sample analyzed within 30 hours of collection.

2. Turbidity measurements as required by 310 CMR 22.20A(2)(a)2. 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 Supplier of Water 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.

3. The total inactivation ratio for each day that the system is in operation must be determined based on the CT99.9 values in 310 CMR 22.20A(5)(b)3.: *Tables 1.1* through *1.6*, *Table 2.1* and *Table 3.1*. The parameters necessary to determine the total inactivation ratio must be monitored as follows:

a. The temperature of the disinfected water must be measured at least once per day at each Residual Disinfectant Concentration Sampling Point.

b. 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.

c. The Disinfectant Contact Time(s) ("T") must be determined for each day during peak hourly flow.

d. The Residual Disinfectant Concentration(s) ("C") of the water before or at the first customer must be measured each day during peak hourly flow.

e. 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 CT99.9 values other than those specified in 310 CMR 22.20A(5)(b)3.: *Table 2.1* and *Table 3.1* in are adequate to demonstrate that the system is achieving the minimum inactivation rates required by 310 CMR 22.20A(3)(a)1.

TABLE 1.1 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF
GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 0.5°C OR LOWER*

	Free Residual	pH						
	(mg/l)	< 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

22.20A: continued

* These CT values achieve greater than a 99.99% 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 1.2 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 5.0°C*

Free Residual (mg/l)	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

* These CT values achieve greater than a 99.99% 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. If no interpolation is used, use the CT99.9 value at the lower temperature, and at the higher pH.

TABLE 1.3 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 10°C*

Free Residual (mg/l)	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

22.20A: continued

* These CT values achieve greater than a 99.99% 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 1.4 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 15°C*

Free Residual (mg/l)	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

* These CT values achieve greater than a 99.99% 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 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 20°C*

Free Residual (mg/l)	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

22.20A: continued

* These CT values achieve greater than a 99.99% 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 1.6 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 25°C* AND HIGHER

	Free Residual	pH						
	(mg/l)	≤ 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

* These CT values achieve greater than a 99.99% 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 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION OF
GIARDIA LAMBLIA CYSTS BY CHLORINE DIOXIDE AND OZONE*

	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

* These CT values achieve greater than 99.99% 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.

TABLE 3.1 - 310 CMR 22.20A
CT VALUES ($CT_{99.9}$) FOR 99.9% INACTIVATION
OF *GIARDIA LAMBLIA* CYSTS BY CHLORAMINE*

Temperature					
≤ 1°C	5°C	10°C	15°C	20°C	≥ 25°C
3,800	2,200	1,850	1,500	1,100	750

22.20A: continued

* These values are for pH values of 6 through 9. These CT values may be assumed to achieve greater than 99.99% 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 on on-site studies or other information, as approved by the State, that the system is achieving at least 99.99% 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.

4. The total inactivation ratio must be calculated as follows:
   a. If the system uses only one Point of Disinfectant Application, the Supplier of Water 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% *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:

         A. Determine $\frac{CTcalc}{CT_{99.9}}$ for each sequence.

         B. A $\frac{(CTcalc)}{(CT_{99.9})}$ dd the values together $\frac{(CTcalc)}{(CT_{99.9})}$

         C. If , then the $\frac{(CTcalc)}{CT_{99.9}} \geq 1.0$ 99.9% *Giardia lamblia* inactivation

         requirement has been achieved.

   b. If the system uses more than one Point of Disinfectant Application before or at the first customer, the Supplier of Water 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

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

   must be calculated using the method in 310 CMR 22.20A(5)(b)4.a.ii. to determine if the Supplier of Water is in compliance with 310 CMR 22.20A(3)(a).
   c. Although not required, the total percent inactivation for a system with one or more points of Residual Disinfectant Concentration following equation:

$$Percent\ Inactivation + 100 - \frac{100}{10^z}$$

$$where\ z = 3\ x \sum \frac{(CTcalc)}{(CT_{99.9})}$$

22.20A: continued

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, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in *lieu* of continuous monitoring, but for no more than five 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*
≤ 500	1
501-1,000	2
1,001-2,500	3
2,501-3,300	4

* 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 Residual Disinfectant Concentration falls below 0.2 mg/l in a system using grab sampling in *lieu* of continuous monitoring, the Supplier of Water must take a grab sample every four hours until the Residual Disinfectant Concentration is equal to or greater than 0.2 mg/l.

6. The Residual Disinfectant Concentration must be measured at least at the same points in the Distribution System and at the same time as total coliform are sampled, as specified in 310 CMR 22.05, except that the Department may allow a Supplier of Water which uses both a Surface Water Source or a groundwater source under direct influence of surface water, and a groundwater 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 310 CMR 22.20A(5)(a)1., may be measured in *lieu* of Residual Disinfectant Concentration.

(c) Monitoring Requirements for Systems Using Filtration Treatment. A Supplier of Water that uses a Surface Water Source or a groundwater source under the influence of surface water and provides Filtration treatment must monitor in accordance with 310 CMR 22.20A(5)(c) beginning June 29, 1993, or when Filtration is installed, whichever is later.

1. Turbidity measurements as required by 310 CMR 22.20A(4) must be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A Supplier of Water 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. For any systems using Slow Sand Filtration, the Department may reduce the sampling frequency to no less than once per day if it determines that less frequent monitoring is sufficient to indicate effective Filtration performance.

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, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in *lieu* of continuous monitoring, but for no more than five 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 each day prescribed below:

System size by population	Samples/day*
≤500	1
501-1,000	2
1,001-2,500	3
2,501-3,300	4

* The day's samples cannot be taken at the same time. The sampling intervals are subject to Department review and approval.

22.20A: continued

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 coliform are sampled, as specified in 310 CMR 22.05, except that the Department may allow a Supplier of Water which uses both a Surface Water Source or a groundwater source under direct influence of surface water, and a groundwater 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 310 CMR 22.20A(5)(a)1., may be measured in *lieu* of Residual Disinfectant Concentration.

(6) Reporting and Recordkeeping Requirements.

(a) A Supplier of Water that uses a Surface Water Source and does not provide Filtration treatment must report monthly to the Department the information specified in 310 CMR 22.20A(6)(a) beginning May 1, 1990, unless the Department has notified the Supplier of Water in writing that Filtration is required in writing, in which case the Department may specify alternative reporting requirements, as appropriate, until Filtration is in place. A Supplier of Water that uses a groundwater source under the direct influence of surface water and does not provide Filtration treatment must report monthly to the Department the information specified in 310 CMR 22.20A(6)(a) beginning December 31, 1990 or six months after the Department determines that the groundwater source is under the direct influence of surface water, whichever is later, unless the Department has notified it 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 ten days after the end of each month the system serves water to the public. Information that must be reported includes:

a. The cumulative number of months for which results are reported.

b. The number of fecal and/or total coliform samples, whichever are analyzed during the month (if a system monitors for both, only fecal coliform must be reported), the dates of sample collection, and the dates when the Turbidity level exceeded one NTU.

c. The number of samples during the month that had equal to or less than 20/100 ml fecal coliform and/or equal to or less than 100/100 ml total coliform, whichever are analyzed.

d. The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous six months the system served water to the public.

e. The cumulative number of samples that had equal to or less than 20/100 ml fecal coliform or equal to or less than 100/100 ml total coliform, whichever are analyzed, during the previous six months the system served water to the public.

f. The percentage of samples that had equal to or less than 20/100 ml fecal coliform or equal to or less than 100/100 ml total coliform, whichever are analyzed, during the previous six months the system served water to the public.

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

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

i. For the first 120 months of recordkeeping, the dates and cumulative number of events during which the Turbidity exceeded five NTU, and after ten years of recordkeeping for Turbidity measurements, the dates and cumulative number of events during which the Turbidity exceeded five NTU in the previous 120 months the system served water to the public.

2. Disinfection information specified in 310 CMR 22.20A(5)(b) must be reported to the Department within ten days after the end of each month the system serves water to the public. Information that must be reported includes:

22.20A: continued

a. For each day, the lowest measurement of Residual Disinfectant Concentration in mg/l in water entering the Distribution System.

b. 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.

c. The daily Residual Disinfectant Concentration(s) (in mg/l) and Disinfectant Contact Time(s) (in minutes) used for calculating the CT value(s).

d. If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine Disinfection.

e. The daily measurement(s) of water temperature in C following each point of Disinfection.

f. 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 ((CTcalc/$CT_{99.9}$)) before or at the first customer.

g. 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.

h. The following information on the samples taken in the Distribution System in conjunction with total coliform monitoring pursuant to 310 CMR 22.20A(3):

i. Number of instances where the Residual Disinfectant Concentration is measured;

ii. Number of instances where the Residual Disinfectant Concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

iii Number of instances where the Residual Disinfectant Concentration is measured but not detected and no HPC is measured;

iv. Number of instances where the Residual Disinfectant Concentration is measured but not detected and where HPC is >500/ml;

v. Number of instances where the Residual Disinfectant Concentration is not measured and HPC is >500/ml;

vi. For the current and previous month the system served water to the public, the value of "V" in the following formula:

$$V = \frac{c + d + e}{a + b} \; x \; 100$$

Where

a = the value in 310 CMR 22.20A(6)(a)2.h.i.
b = the value in 310 CMR 22.20A(6)(a)2.h.ii.
c = the value in 310 CMR 22.20A(6)(a)2.h.iii.
d = the value in 310 CMR 22.20A(6)(a)2.h.iv.
e = the value in 310 CMR 22.20A(6)(a)2.h.v.

i. A system need not report the data listed in 310 CMR 22.20A(6)(a)2.a., and c. through f., if all data listed in 310 CMR 22.20A(6)(a)2.a. through f. remains on file at the system, and the Department determines that:

i. The Supplier of Water has submitted to the Department all the information required by 310 CMR 22.20A(6)(a)2.a. through h. for at least 12 months; and

ii. The Department has determined that the system is not required to provide Filtration treatment.

3. No later than January 10th of each year, each Supplier of Water must provide to the Department a report which summarizes its compliance with all watershed control program requirements specified in 310 CMR 22.20A(2)(b)5.

4. No later than January 10th of each year each system must provide to the Department a report on the on site inspection conducted during that year pursuant to 310 CMR 22.20A(2)(b)6. unless the on site inspection was conducted by the Department.

5. Each Supplier of Water, upon discovering that a Waterborne Disease Outbreak potentially attributable to its water system has occurred, must report that occurrence to the Department as soon as possible, but no later than by the end of the next business day.

22.20A: continued

6. If at any time the Turbidity exceeds five NTU, the Supplier of Water must consult with the Department as soon as practical, but not later than 24 hours after the exceedance is known, in accordance with the public notification requirements under 310 CMR 22.16(3)(b)3.

7. If at any time the residual falls below 0.2 mg/l in the water entering the Distribution System, the Supplier of Water must notify the Department as soon as possible, but no later than by the end of the next business day. The Supplier of Water 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 four hours.

(b) A Supplier of Water that uses a Surface Water Source or a groundwater source under the direct influence of surface water and provides Filtration treatment must report monthly to the Department the information specified in 310 CMR 22.20A(6)(b) beginning June 29, 1993, or when Filtration is installed, whichever is later.

1. Turbidity measurements as required by 310 CMR 22.20A(5)(c)1. must be reported within ten days after the end of each month the system serves water to the public. Information that must be reported includes:

a. The total number of filtered water Turbidity measurements taken during the month.

b. 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 310 CMR 22.20A(4) for the Filtration technology being used.

c. The date and value of any Turbidity measurements taken during the month which exceed five NTU.

2. Disinfection information specified in 310 CMR 22.20A(5)(c) must be reported to the Department within ten days after the end of each month the system serves water to the public. Information that must be reported includes:

a. For each day, the lowest measurement of Residual Disinfectant Concentration in mg/l in water entering the Distribution System.

b. 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.

c. The following information on the samples taken in the Distribution System in conjunction with total coliform monitoring pursuant to 310 CMR 22.20A(3):

i. Number of instances where the Residual Disinfectant Concentration is measured;

ii. Number of instances where the Residual Disinfectant Concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

iii. Number of instances where the Residual Disinfectant Concentration is measured but not detected and no HPC is measured;

iv. Number of instances where Residual Disinfectant Concentration is measured but not detected and where HPC is >500/ml;

v. Number of instances where the Residual Disinfectant Concentration is not measured and HPC is >500/ml;

vi. For the current and previous month the system serves water to the public, the value of "V" in the following formula:

$$V = \frac{c + d + e}{a + b} \; x \; 100$$

Where

a = the value in 310 CMR 22.20A(6)(b)2.c.i.
b = the value in 310 CMR 22.20A(6)(b)2.c.ii.
c = the value in 310 CMR 22.20A(6)(b)2.c.iii.
d = the value in 310 CMR 22.20A(6)(b)2.c.iv.
e = the value in 310 CMR 22.20A(6)(b)2.c.v.

d. A Supplier of Water need not report the data listed in 310 CMR 22.20A(6)(b)2.a. if all data listed in 310 CMR 22.20A(6)(b)2.a. through c. remains on file at the system and the Department determines that the system has submitted all the information required by 310 CMR 22.20A(6)(b)2.a. through c. for at least 12 months.

22.20A: continued

3. A Supplier of Water, upon discovering that a Waterborne Disease Outbreak potentially attributable to its water system has occurred, must report that occurrence to the Department as soon as possible, but no later than by the end of the next business day.
4. If at any time the Turbidity exceeds five NTU, the Supplier of Water must consult with the Department as soon as practical, but not later than 24 hours after the exceedance is known, in accordance with the public notification requirements under 310 CMR 22.16(3)(b)3.
5. If at any time the residual falls below 0.2 mg/l in the water entering the Distribution System, the Supplier of Water 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 four hours.

(7) Review of Filtration Determinations.

(a) The Department's determination whether a Supplier of Water must provide Filtration will be made in writing based on the criteria set forth in 310 CMR 22.20A(2). The Supplier of Water shall publish a copy of the Department's determination in a newspaper of general circulation in the area served by the Supplier of Water within ten days of receipt of the same. The determination will include a statement that the Supplier of Water and Persons served by the system may request a hearing in accordance with 310 CMR 22.20A(7)(b). Within ten days of publication, the Supplier of Water shall submit an affidavit to the Department attesting to the fact that the determination has been published.

(b) The Supplier of Water, and any Person served by the system, may request review of the determination at a public hearing by submitting a written request to the Regional Director at the Department's Regional Office that serves the area where the Public Water System at issue is located within 15 days of the date of publication.

(c) Following receipt of a request for a public hearing, the Department will give notice of the hearing by mail to the Supplier of Water and, if the request was made by a Person other than the Supplier of Water, to the Person who submitted the request. The Supplier of Water shall publish a copy of the notice of hearing in a newspaper of general circulation in the area served by the system within ten days of receipt of the same. Within ten days of publication, the Supplier of Water shall submit an affidavit to the Department attesting to the fact that the notice has been published.

(d) The Department will accept written comments from the public relevant to the determination up to at least 14 days following the hearing. A determination following the hearing that a Supplier of Water must provide Filtration will not be subject to further review; a determination that a Supplier of Water meets all of the criteria for avoiding Filtration will be subject to the Department's on going review. In the event the Department finds that a Supplier of Water no longer meets any one of the criteria for avoiding Filtration, the Department will issue a determination in writing that will be subject to review at a public hearing in accordance with 310 CMR 22.20A(7).

22.20B: Surface Water Supply Protection

(1) To protect surface waters used as sources of drinking water supply from contamination, the requirements of 310 CMR 22.20B shall apply to Zones A, B, C of a surface water source, except at:

(a) Rivers and streams designated as Class B waters pursuant to 314 CMR 4.00: *Massachusetts Surface Water Quality Standards* which are used as drinking water sources and are not impounded at some point by means of a dam or dike to create a reservoir at which the water supply intake is located;

(b) Emergency sources approved by the Department under the provisions of M.G.L. c. 21G.

(2) On and after January 1, 2001, a public water system shall prohibit the following new or expanded land uses within the Zone A of its surface water sources.

(a) All underground storage tanks,

(b) Above-ground storage of liquid hazardous material as defined in M.G.L. c. 21E, or liquid propane or liquid petroleum products, except as follows:

1. The storage is incidental to:
   a. normal household use, outdoor maintenance, or the heating of a structure;

22.20B: continued

b. use of emergency generators;

c. a response action conducted or performed in accordance with M.G.L. c. 21E and 310 CMR 40.000: *Massachusetts Contingency Plan* and which is exempt from a ground water discharge permit pursuant to 314 CMR 5.05(14); and

2. The storage is either in container(s) or above-ground tank(s) within a building, or outdoors in covered container(s) or above-ground tank(s) in an area that has a containment system designed and operated to hold either 10% of the total possible storage capacity of all containers, or 110% of the largest container's storage capacity, whichever is greater. However, these storage requirements do not apply to the replacement of existing tanks or systems for the keeping, dispensing or storing of gasoline provided the replacement is performed in accordance with applicable state and local requirements;

(c) Treatment or disposal works subject to 314 CMR 3.00: *Surface Water Discharge Permit Program* or 5.00: *Ground Water Discharge Permit Program*, except the following:

1. the replacement or repair of an existing treatment or disposal works that will not result in a design capacity greater than the design capacity of the existing treatment or disposal works;

2. treatment or disposal works for sanitary sewage if necessary to treat existing sanitary sewage discharges in non-compliance with 310 CMR 15.000: *The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage*, provided the facility owner demonstrates to the Department's satisfaction that there are no feasible siting locations outside of the Zone A. Any such facility shall be permitted in accordance with 314 CMR 5.00: *Ground Water Discharge Permit Program* and shall be required to disinfect the effluent. The Department may also require the facility to provide a higher level of treatment prior to discharge;

3. treatment works approved by the Department designed for the treatment of contaminated ground or surface waters and operated in compliance with 314 CMR 5.05(3) or (13).

4. discharge by public water system of waters incidental to water treatment processes.

(3) (a) All on-site subsurface sewage disposal systems, as defined in 310 CMR 15.000: *The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage*, within Zones A, B, and C, shall be in compliance with the requirements of 310 CMR 15.000.

(b) Within the Zone A of all surface water supplies and tributaries as defined in 310 CMR 22.02, all sewer lines and appurtenances are prohibited, except as required to eliminate existing or potential pollution to the water supply, or where the crossing of tributaries is necessary to construct a public sewer system. Where the exception is met, watertight construction of sewer lines and manholes shall be used.

(c) Within 1,000 feet of surface water supplies and tributaries, all pumping stations shall have standby power and high water alarms telemetered to an appropriate location that is manned at all times. An emergency contingency plan must be developed by the owner of the wastewater treatment facility and submitted to the Department for approval.

(d) Beyond 1,000 feet, and within the watershed of surface water supplies, the Department may in specific circumstances, after review, require additional controls when deemed necessary for protection of public health.

(4) No stabling, hitching, standing, feeding or grazing of livestock or other domestic animals shall be located, constructed, or maintained within 100 feet of the bank of a surface water source or tributary thereto. Owners and operators of agricultural operations should consult the Massachusetts Department of Agricultural Resources *On-farm Strategies to Protect Water Quality - An Assessment & Planning Tool for Best Management Practices* (December 1996) for information about technical and financial assistance programs related to erosion and sediment control and nutrient, pest, pesticide, manure, waste, grazing, and irrigation management.

22.20B: continued

(5) No burial shall be made, except by permission in writing by the Board of Water Commissioners or like body having jurisdiction over such source of supply, in any cemetery or other place within 100 feet of the high water mark of a source of public water supply or tributary thereto. No lands not under the control of cemetery authorities and used for cemetery purposes, from which lands the natural drainage flows into said source of water supply or tributary thereto, shall be taken or used for cemetery purposes until a plan and sufficient description of the lands is presented to the Department and until such taking or use is expressly approved in writing by the Department.

(6) No person shall swim, wade or bathe in any public surface water source and no person shall, unless permitted by written permit by the Board of Water Commissioners or like body having jurisdiction over such source, fish in; enter or go in any boat, seaplane, or other vehicle; enter upon the ice for any purpose, including the cutting or taking of ice; or cause or allow any animal to go into, or upon, any surface water source or tributary thereto.

(7) Enforcement. A public water system has the following enforcement responsibilities with respect to protection of the Zone A, B, and C of its surface water source(s)

(a) A public water system shall conduct regular and thorough inspections of Zones A, B, and C to determine and enforce compliance with 310 CMR 22.20B. The public water system shall take prompt enforcement actions against persons violating 310 CMR 22.20B, and report all such enforcement actions to the Department in the system's Annual Statistical Report the results of the regular inspections made during the preceding calendar year. The report shall include the number and dates of the inspections, the number, nature and outcome of violations found, and enforced against by the public water system, and the general condition of the watershed at the time of the last inspection.

(b) the public water system shall document on a form provided by the Department and submitted to the Department in calendar year 2001, that the public water system has established a protocol that provides the system with an opportunity to review and comment on all proposed new or expanded land uses or activities within the watershed of its surface water source(s) to local boards, commissions and other authorities with primary responsibilities for approving such uses and activities.

(c) The Department may take enforcement actions against any public water system which fails to carry out its enforcement responsibilities under 310 CMR 22.20B, or may enforce directly against persons violating 310 CMR 22.20B.

(8) No person shall apply herbicides to any surface water body including but not limited to any reservoir and their tributaries, which serve as a source of public water supply without a permit issued by the Department pursuant to M.G.L. c. 111, § 5E. This requirement does not apply to the application of algaecides containing copper by the public water system. However, the public water system shall notify the Department in writing prior to the application of such algaecides.

22.20C: Surface Water Supply Protection for New and Expanded Class A Surface Water Sources

(1) Source Approval.

(a) A public water system shall obtain prior written approval of the Department for:

1. the development of a new surface water source;
2. the physical expansion of an existing surface water source or the replacement or modification of an existing intake structure;
3. any increase in withdrawal from an existing surface water source in excess of the permitted threshold volume as defined in 310 CMR 36.00: *Massachusetts Water Resources Management Program*; or
4. placing an existing unapproved or inactive surface water on-line.

(b) Persons seeking Department approval for any of the activities described in 310 CMR 22.20C(1)(a) are required to follow the procedures set forth in the "Guidelines and Policies for Public Water System".

(c) In determining whether to grant such approval, the Department will apply the criteria set forth in 310 CMR 22.20C and the *Guidelines and Policies for Public Water Systems*.

(d) The Department will not grant its approval pursuant to 310 CMR 22.20C(1), unless the public water system demonstrates to the Department’s satisfaction that the system:

22.20C: continued

1. complies with the applicable *Guidelines and Policies for Public Water Systems*;
2. meets all applicable water quality standards set forth in 310 CMR 22.00, and will meet the requirements of 310 CMR 22.20A through 22.20C;
3. has delineated and mapped Zones A, B and C of the proposed surface water source and provided a map depicting existing land uses existing within Zones A, B and C;
4. has developed a Surface Water Supply Protection Plan in accordance with the *Department's Guidelines and Policies for Public Water Systems* and *Developing a Local Surface Water Supply Protection Plan* (revised May 2000), which shall be updated by the public water system, with a copy submitted to the Department, every three years thereafter; and
5. has developed a reservoir and watershed public control plan, to specify allowable and non-allowable uses on existing public surface water sources and within adjacent public surface water supplier-owned lands at new and existing sources, and contains provisions for public education, inspection, and enforcement;
6. obtain a permit or permit amendment for any withdrawal, in accordance with the Water Management Act, M.G.L. c. 21G, and 310 CMR 36.00: *Massachusetts Water Resources Management Program*.

(e) Municipal Source.

1. No new municipal surface water source, or physical expansion of an existing surface water source shall be placed on line or allowed to expand, unless:
   a. For those portions of Zone A that are within the municipal boundaries, has adopted and has in effect surface water protection zoning or nonzoning controls that prohibit siting within the Zone A of each source the land uses set forth in 310 CMR 22.20C(2) unless the land uses are designed in accordance with the performance standards specified in 310 CMR 22.20C(2); and
   b. Those portions of Zone A that are outside of the municipal boundaries have zoning or nonzoning controls in effect that prohibit the siting within Zone A of land uses set forth in 310 CMR 22.20C(2) unless the land uses are designed in accordance with the performance standards specified in 310 CMR 22.20C(2), or the municipal supplier of water demonstrates to the Department's satisfaction that it has used best efforts to have such zoning or nonzoning controls adopted and in effect; and
   c. the municipality has submitted to the Department a copy of the adopted zoning or nonzoning controls, if any, including any local legislation that provides a variance, waiver or exemption process related to surface water protection zoning and nonzoning controls applicable to the Zone A of the municipal source.
2. An owner or operator of a municipal surface water source that will increase its withdrawal of water by more than the threshold volume, as defined in 310 CMR 36.00: *Massachusetts Water Resources Management Program*, shall, within two years of the effective date of a Water Management Act permit or permit amendment that authorizes the increase:
   a. For those portions in the Zone A that are within the municipal boundaries, adopt and have in effect surface water protection zoning or nonzoning controls that prohibit siting within the Zone A of the source the land uses set forth in 310 CMR 22.20C(2), unless the land uses are designed in accordance with the performance standards specified in 310 CMR 22.20C(2);and
   b. for those portions of the Zone A that are outside of the municipal boundaries have zoning or nonzoning controls in effect that prohibit the siting within Zone A of land uses set forth in 310 CMR 22.20C(2) unless the land uses are designed in accordance with performance standards specified in 310 CMR 22.20C(2), or the municipal supplier of water demonstrates to the Department's satisfaction that it has used best efforts to have such zoning or nonzoning controls adopted and in effect; and
   c. submit to the department a copy of the zoning or nonzoning controls in effect and any local legislation that provides a variance or exemption process related the surface water protection zoning and nonzoning controls.

22.20C: continued

(f) Non-municipal Sources. No new surface water source, or existing surface water source physically expanding that will be used in a non-municipal public water system owned or operated by a non-municipal entity shall be placed on-line or allowed to expand until the public water system has demonstrated to the Department's satisfaction that it has used its best efforts to have all municipalities in which Zone A of the surface water source is located establish zoning or nonzoning controls that prohibit siting within Zone A the land uses set forth in 310 CMR 22.20C(2), unless the land uses are designed in accordance with the performance standards specified in 310 CMR 22.02C(2). An owner or operator of a non-municipal surface water source that will increase its withdrawal of water by more than the threshold volume, as defined in 310 CMR 36.00: *Massachusetts Water Resources Management Program*, shall, within two years of the effective date of a Water Management Act permit or permit amendment that authorizes the increase, meet these same best effort requirements.

(g) The proponent may meet the requirements set forth in 310 CMR 22.20C(1)(e) and 310 CMR 22.20C(1)(f) by demonstrating that the water supplier has acquired land for water supply purposes or the existing rights in perpetuity or for a specific period of years stated in the form of a restriction, easement, covenant or condition in a deed or other instrument, or other mechanism approved by the Department, prohibiting the siting within Zone A of the land uses set forth in 310 CMR 22.20C(2).

(h) Amendment or Repeal of Zoning/Nonzoning Controls. No public water system surface water source shall remain on-line more than 120 days following the amendment or repeal of surface water protection zoning or nonzoning controls protecting that surface water source, or the expiration of any rights stated in a deed or other instrument approved pursuant to 310 CMR 22.20C(1)(g), unless the Department finds in writing that the water supplier meets the requirements set forth in 310 CMR 22.20C(1)(e) or (f), whichever is applicable, or grants a variance in accordance with 310 CMR 22.20C(3).

(i) Water Supply Emergency. The Department may exempt a water supplier from any of the requirements set forth in 310 CMR 22.20C(1) while a declaration of a state of water supply emergency pursuant to M.G.L. c. 21G is in effect. In the event that the Department declares a state of water supply emergency, the surface water source shall operate, for the duration of the state of water supply emergency, as directed by the Department.

(2) Restricted Activities upon Surface Water Sources and Within Protection Zones. Required Surface Water Protection Controls Applicable to Zone A: Surface water protection zoning and nonzoning controls submitted to the Department in accordance with 310 CMR 22.20C(1), shall collectively prohibit the siting of the following new land uses within Zone A:

(a) land uses described in 310 CMR 22.20B(2);

(b) facilities that, through their acts or processes, generate, treat, store or dispose of hazardous waste that are subject to M.G.L. c. 21C and 310 CMR 30.000: *Hazardous Waste*, except for the following:

1. very small quantity generators, as defined by 310 CMR 30.000: *Hazardous Waste*;
2. treatment works approved by the Department designed in accordance with 314 CMR 5.00: *Ground Water Discharge Permit Program* for the treatment of contaminated ground or surface waters;

(c) sand and gravel excavation operations;

(d) uncovered or uncontained storage of fertilizers;

(e) uncovered or uncontained storage of road or parking lot de-icing and sanding materials;

(f) storage or disposal of snow or ice, removed from highways and streets outside the Zone A, that contains deicing chemicals;

(g) uncovered or uncontained storage of manure;

(h) junk and salvage operations;

(i) motor vehicle repair operations;

(j) cemeteries (human and animal) and mausoleums;

(k) solid waste combustion facilities or handling facilities as defined at 310 CMR 16.00: *Site Assignment Regulations for Solid Waste Facilities*;

(l) land uses that result in the rendering impervious of more than 15%, or more than 20% with artificial recharge, or 2500 square feet of any lot, whichever is greater; and

(m) commercial outdoor washing of vehicles, commercial car washes.

22.20C: continued

(3) Department Variances.

(a) The Department may grant a variance from the requirements of 310 CMR 22.20C(1)(f) to a proponent that, despite its best efforts, is unable to adopt one or more of the requirements set forth in 310 CMR 22.20C(2) if the Department finds that strict compliance with such requirements would result in an undue hardship and would not serve to further the intent of 310 CMR 22.20A through 22.20C.

(b) The Department will consider the following factors in making the finding necessary to grant a variance pursuant to 310 CMR 22.20C(3):

1. the reasonableness of available alternatives to the proposed surface water source;
2. the overall effectiveness of existing land use controls and other measures on the protection of the proposed surface water source and any other water sources used by the supplier of water;
3. the nature and extent of the risk of contamination to the proposed surface water source that would result from the granting of the variance; and
4. whether the variance is necessary to accommodate an overriding community, regional, state, or national public interest;
5. These factors need not be weighed equally, nor must all of these factors be present for the Department to grant a variance. The presence of any single factor may be sufficient for the granting of a variance.

(c) A variance granted pursuant to 310 CMR 22.20C(3) shall be conditioned on such monitoring, public education or other requirements as the Department may prescribe.

(d) Requests for variances shall be made in writing and clearly state the provision or requirement from which the variance is sought and the reasons and facts that support the granting of a variance, and shall include an evaluation of the reasonableness of alternatives to the proposed surface water source.

(e) Within 14 days of filing a request for variance under 310 CMR 22.20C(3)(a), the proponent filing the request shall notify persons served by the supplier of water by direct mail and by publication on not less than three consecutive days in a newspaper of general circulation in the service area of the supplier of water. The notice shall include:

1. the provision or requirement from which the variance is being sought;
2. the identity of the proponent of the surface water source;
3. the identity of the person requesting the variance, the address where a copy of the request for variance will be available for public inspection, and the times it will be available; and
4. a statement that the Department will receive written comments concerning the request from the public for a 30 day period commencing on the last date of newspaper publication.

(f) Each proponent submitting a request for variance shall submit to the Department a copy of the public notice required by 310 CMR 22.20C(3)(e) and affidavits attesting to the fact that the notices have been given. The Department will receive written comments concerning the request from the public for a 30-day period commencing on the last date of newspaper publication.

(g) Within 30 days of the close of the comment period, each proponent requesting a variance under 310 CMR 22.20C(3)(a) shall respond in writing to all reasonable public comments received by the Department.

(h) The Department may schedule a public hearing on any request for variance submitted in accordance with 310 CMR 22.20C(3) if it determines on the basis of the public comments received that such a hearing is in the public interest. In the event that the Department schedules a hearing, the proponent filing the request shall notify persons served by the supplier of water of the hearing by publication on not less than three consecutive days in a newspaper of general circulation in the service area of the supplier of water. In addition, the proponent filing the request shall notify each person who submitted written comment concerning the request to the Department by direct mail. The proponent filing the request shall submit to the Department a copy of the public notices required by 310 CMR 22.20C(3)(h), and an affidavit attesting to the fact that the notices have been given, prior to the hearing. Proponents filing a request for a variance under 310 CMR 22.20C(3) shall pay in full the cost of any hearing scheduled.

22.20C: continued

(i) Within 30 days of the grant of a variance under 310 CMR 22.20C(3), any proponent who receives a variance shall notify persons served by the supplier of water of the granting of the variance, including any conditions imposed by the Department, by direct mail and by publication on not less than three consecutive days in a newspaper of general circulation in the service area of the supplier of water. The proponent who receives the variance shall submit to the Department a copy of the public notices and an affidavit attesting to the fact that the notices have been given upon completion of the public notification.

22.20D: Interim Enhanced Surface Water Treatment Rule

(1) General Requirements.

(a) 310 CMR 22.20D establishes requirements for filtration and disinfection that are in addition to criteria established under 310 CMR 22.20A. The requirements of 310 CMR 22.20D apply to all public water supplies serving at least 10,000 people, beginning January 1, 2002 unless otherwise specified. 310 CMR 22.20D establishes or extends treatment technique requirements in lieu of maximum contaminant levels for the following contaminants:

1. *Giardia lamblia*;
2. Viruses;
3. Heterotrophic plate count bacteria;
4. *Legionella;*
5. *Cryptosporidium*; and
6. Turbidity.

(b) Each supplier of water serving at least 10,000 people using a surface water source, or ground water source under the direct influence of surface water shall provide treatment of its source water that complies with the treatment technique requirements set forth in 310 CMR 22.20D in addition to the requirements identified in 310 CMR 22.20A. The treatment technique requirements set out in 310 CMR 22.20D consist of installing and properly operating water treatment processes which reliably achieve:

1. At least 99% (2-log) removal of *Cryptosporidium* between a point where water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems.
2. Compliance with the profiling and benchmark requirements under the provisions of 310 CMR 22.20D(3).

(c) A public water system subject to the requirements of 310 CMR 22.20D is deemed to be in compliance with the requirements of 310 CMR 22.20D(1)(a) and (b) if:

1. It meets the requirements for avoiding filtration in 310 CMR 22.20A(2) and 22.20D(2) and the disinfection requirements in 310 CMR 22.20A(3) and 22.20D(3); or,
2. It meets the applicable filtration requirements in either 310 CMR 22.20A(4) or 22.20D(4) and the disinfection requirements in 310 CMR 22.20A(3) and 22.20D(3).

(d) A supplier of water is not permitted to construct uncovered finished water storage facilities.

(e) A supplier of water that uses a surface water source or ground water source under the direct influence of surface water that did not conduct disinfection profiling under 310 CMR 22.20D(3)(b) because they served fewer than 10,000 persons when such monitoring was required, but serve more than 10,000 persons prior to January 14, 2005 must comply with 310 CMR 22.20D(1), (2) and (4) through (6). These systems must also consult with the Department to establish a disinfection benchmark. A supplier of water that decides to make a significant change to its disinfection practice, as described in 310 CMR 22.20D(3)(c)1.a. through e. must consult with the Department prior to making such change.

(2) Criteria for Avoiding Filtration. 310 CMR 22.20D(2) establishes criteria for avoiding filtration for a supplier of water that uses a surface water source or a ground water source under the influence of surface water to serve a population of at least 10,000 people in addition to the requirements of 310 CMR 22.20A(2). Each supplier of water shall meet all of the following conditions:

(a) Site-specific Conditions. In addition to site-specific conditions in 310 CMR 22.20A(2)(b), a supplier of water shall maintain the watershed control program under 310 CMR 22.20A(2)(b)5. to minimize the potential for contamination by *Cryptosporidium oocysts* in the source water. The watershed control program shall, for *Cryptosporidium*:

22.20D: continued

1. Identify watershed characteristics and activities which may have an adverse effect on source water quality; and,
2. Monitor the occurrence of activities that may have an adverse effect on source water quality.

(b) During the onsite inspection conducted under the provisions of 310 CMR 22.20A(2)(b)(3), the Department will determine whether the watershed control program established under 310 CMR 22.20A(2)(b)5. is adequate to limit potential contamination by *Cryptosporidium oocysts*.

(3) Disinfection Profiling and Benchmarking. 310 CMR 22.20D(3) establishes criteria that the Department will use to determine public water systems that are required to profile. A supplier of water subject to the requirements of 310 CMR 22.20D(3) had to determine its TTHM annual average using the procedure in 310 CMR 22.20D(3)(a) and its HAA5 annual average using the procedure of 310 CMR 22.20D(3)(b). The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring.

(a) Determination of Systems Required to Profile.

1. The TTHM annual average is the annual average determined during the same period as was used for the HAA5 annual average:
   a. A supplier of water who collected data under the provisions of the "Information Collection Rule"(ICR) was required to use the results of the samples collected during the last four quarters of required monitoring under the "disinfection byproduct and related monitoring" of the ICR.
   b. A supplier of water who used "grandfathered" HAA5 occurrence data that met the provisions of 310 CMR 22.20D(3)(a)2.b. shall use TTHM data collected at the same time under the provisions of 310 CMR 22.07E.
   c. A supplier of water who used HAA5 occurrence data that met the provisions of 310 CMR 22.20D(3)(a)2.c.(i) was required to use TTHM data collected at the same time under the provisions of 310 CMR 22.07(2) and 22.07E.
2. The HAA5 annual average is the annual average during the same period as was used for the TTHM annual average with the following provisions:
   a. A supplier of water who collected data under the Information Collection Rule shall have used the results of the samples collected during the last four quarters of required monitoring under the ICR.
   b. A supplier of water who collected four quarters of HAA5 occurrence data that met the routine monitoring sample number and location requirements for TTHMs in 310 CMR 22.07E(1), (2) and the handling and analytical method requirements of the ICR may use that data to determine whether the requirements of 310 CMR 22.20D(3) apply.
   c. A supplier of water who did not collect four quarters of HAA5 occurrence data that met the provisions of either 310 CMR 22.20D(3)(a)2.a. and b. by March 31, 1999 must either:
      (i) have conducted monitoring for HAA5 that met the routine monitoring sample number and location requirements for TTHM in 310 CMR 22.07(2) and 22.07E and the handling and analytical method requirements of 310 CMR 22.07E to determine the HAA5 annual average and whether the requirements of 310 CMR 22.07C(3) apply, which monitoring shall have been completed so that the applicability determination could be made no later than March 31, 2000; or,
      (ii) comply with all other provisions of 310 CMR 22.20D(3)(b)2. as if the HAA5 monitoring had been conducted and the results required compliance with 310 CMR 22.20D(3)(b).
3. The supplier of water may request the Department approve a more representative annual data set than the data set determined in 310 CMR 22.20D(3)(a)1. or 2. for the purpose of determining applicability of the requirements of 310 CMR 22.20D(3). A representative data set was to be determined based on the following:
   a. Whether the method of collection was in accordance with 310 CMR 22.07(2), 22.07E and 22.20D(3);
   b. Whether the annual set presented is representative of the plant's current and/or long-term disinfection practices.
4. The Department may require that a system use a more representative annual data set than the data set determined under 310 CMR 22.20D(3)(a)1. or 2. for the purpose of determining applicability of the requirements of 310 CMR 22.20D.

22.20D: continued

5. The supplier of water must have submitted data to the Department on the schedule as shown below:

a. A supplier of water who collected TTHM and HAA5 data under the provisions of Information Collection Rule (ICR), as was required by 310 CMR 22.20D(3)(a)1.a. and 2.a., must have submitted the results of the samples collected during the last 12 months of required monitoring under the ICR not later than December 31, 1999.

b. A supplier of water who collected four consecutive quarters of data that met the routine monitoring sample number and location for TTHM in 310 CMR 22.07A and 310 CMR 22.07E for handling and analytical method requirements, as was allowed by 310 CMR 22.20D(3)(a)1.b. and 2.b., must have submitted that data to the Department not later than April 16, 1999. Until the Department has approved the data, the system shall conduct monitoring for HAA5 using the monitoring requirements specified under 310 CMR 22.20D(3)(a) 2.c.

c. A supplier of water who conducted monitoring for HAA5 using the monitoring requirements specified by 310 CMR 22.20D(3)(a)1.c. and 2.c.(i), must have submitted TTHM and HAA5 data not later than March 31, 2000.

d. A supplier of water who elected to comply with all other provisions of 310 CMR 22.20D(3) as if the HAA5 monitoring had been conducted and the results required compliance with 310 CMR 22.20D(3)(a), as was allowed under 310 CMR 22.20D(3)(a)2.c.(i), must have notified the Department in writing of their election not later than March 31, 2000.

e. If the supplier of water elected to request that the Department approve a more representative annual data set than the data set determined under 310 CMR 22.20D(3)(a)2.a., the system must have submitted this request in writing not later than March 31, 2000.

6. Any supplier of water having either a TTHM annual average greater than or equal to 0.064 mg/L or an HAA5 annual average greater than or equal to 0.048 mg/L during the period identified in 310 CMR 22.20D(3)(a)1. and 2. shall comply with 310 CMR 22.20D(3)(b).

7. An owner or operator of a consecutive systems was not required to develop a disinfection profile; however, they are required to meet the requirements of 310 CMR 22.07E.

(b) Disinfection Profiling.

1. A supplier of water who meets the criteria in 310 CMR 22.20D(3)(a)6. shall develop a disinfection profile of their disinfection practice for a period of up to three years.

2. A supplier of water shall monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the $CT_{99.9}$ values in 310 CMR 22.20A(5)(b): *Tables 1.1* through *1.6*, *2.1*, and *3.1* and 310 CMR 22.20D(3): *Tables C1* through *C13*, as appropriate, through the entire treatment plant. The supplier of water shall have begun this monitoring not later than April 1, 2000. As a minimum, the supplier of water using a single point of disinfectant application prior to entrance to the distribution system shall conduct monitoring in accordance with 310 CMR 22.20D(3)(b)2.a. through d. A supplier of water using a system with more than one point of disinfectant application shall conduct the monitoring in accordance with 310 CMR 22.20D(3)(b)2.a. through d. for each disinfection segment. The supplier of water shall monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in 310 CMR 22.20A(5), as follows:

a. The temperature of the disinfected water shall be measured once daily at each residual disinfectant concentration sampling point during peak hourly flow.

b. If the system uses chlorine, the pH of the disinfected water shall be measured once daily at each chlorine residual disinfectant concentration sampling point during peak hourly flow.

c. The disinfectant contact time(s) ("T") shall be determined for each day during peak hourly flow.

d. The residual disinfectant concentration(s) ("C") of the water before or at the first customer and prior to each additional point of disinfection shall be measured daily during peak hourly flow.

22.20D: continued

3. In *lieu* of the monitoring conducted under the provisions of 310 CMR 22.20D(3)(b)2. to develop the disinfection profile, the supplier of water may have elected to meet the requirements of paragraph 310 CMR 22.20D(3)(b)3.a. In addition to the monitoring conducted under the of 310 CMR 22.20D(3)(b)2. to develop the disinfection profile, the system may elect to meet the requirements of 310 CMR 22.20D(3)(b)3.b.

a. A supplier of water who has three years of existing operational data could have submitted that data, a profile generated using that data, and a request that the Department approve the use of that data in *lieu* of monitoring under the provisions of 310 CMR 22.20D(3)(b)2. not later than March 31, 2000. This data shall be representative of *Giardia lamblia* inactivation through the entire treatment plant and not just of certain treatment segments. Until the Department approves this request, the supplier of water is required to conduct monitoring under the provisions of 310 CMR 22.20D(3)(b)2.

b. In addition to the disinfection profile generated under 310 CMR 22.20D(3)(b)2., a supplier of water who has existing operational data may use that data to develop a disinfection profile for additional years. The supplier of water may use these additional yearly disinfection profiles to develop a benchmark under the provisions of 310 CMR 22.20D(3)(c). The Department will determine whether these operational data are substantially equivalent to data collected under the provisions of 310 CMR 22.20D(3)(b)2. These data shall be representative of inactivation through the entire treatment plant, and not just of certain treatment segments.

4. The supplier of water shall calculate the total inactivation ratio as follows:

a. If the supplier of water uses only one point of disinfectant application, the supplier of water may determine the total inactivation ratio for the disinfection segment based on either of the methods below:

(i) Determine one inactivation ratio CTcalc/$CT_{99.9}$ before or at the first customer during peak hourly flow; or,

(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. Under this alternative, the supplier of water shall calculate the total inactivation ratio by determining CTcalc/$CT_{99.9}$ for each sequence and then add the CTcalc/CT 99.9 values together:

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

b. If the supplier of water uses more than one point of disinfectant application before the first customer, the supplier of water shall 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 supplier of water shall calculate the CTcalc/$CT_{99.9}$ value of each segment and S(CTcalc/$CT_{99.9}$) using the method in 310 CMR 22.20D(3)(b)4.a.

c. The supplier of water shall determine the total logs of inactivation (z) by multiplying the value calculated in 310 CMR 22.20D(b)4.a. or b. by 3.0 as shown below:

$$z = 3 \times \sum \frac{(CTcalc)}{(CT_{99.9})}$$

$$Percent\ Inactivation + 100 - \frac{100}{10^z}$$

5. Each supplier of water who uses either chloramines or ozone for primary disinfection shall also calculate the logs of inactivation for Viruses using a method approved by the Department.

6. A supplier of water who uses mixed oxidants shall calculate the overall "CT" by finding the summation of the individual "CTs" of each disinfectant within the mix.

7. Each supplier of water shall retain the disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the Department for review as part of sanitary surveys conducted by the Department.

22.20D: continued

(c) Disinfection Benchmarking.

1. Each supplier of water required to develop a disinfection profile under the provisions of 310 CMR 22.20D(a) and (b) who decides to make a significant change to a disinfection practice shall consult with the Department prior to making the change. A significant change to disinfection practice is any of the following:

a. A change to the point of disinfection;

b. A change to the disinfectant(s) used in the treatment plant;

c. A change to the disinfection process;

d. A physical modification(s) that directly or indirectly effects the detention time of any unit process;

e. Any other modification identified by the Department.

2. Each supplier of water who proposes to modify its disinfection practice shall calculate the disinfection benchmark using the following procedure:

a. For each year of profiling data collected and calculated under 310 CMR 22.20D(3)(b), the supplier of water shall determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The supplier of water shall determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* of inactivation by the number of values calculated for that month.

b. The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of the monthly logs of *Giardia lamblia* inactivation in each year of profiling data.

3. Each supplier of water who uses either chloramines or ozone for primary disinfection shall also calculate the disinfection benchmark for Viruses using a method approved by the Department.

4. Each supplier of water shall submit the information required in 310 CMR 22.20D(3)(c) and the information required in 310 CMR 22.20D(3)(c)4.a. through c. to the Department as part of the consultation process including:

a. A description of the proposed change

b. The disinfection profile for *Giardia lamblia* (and, if necessary, Viruses) under 310 CMR 22.20D(3)(b) and benchmark as required by 310 CMR 22.20D(3)(c)2.; and

c. An analysis of how the proposed change will affect the current levels of disinfection.

(4) Filtration. Each supplier of water using a system subject to the requirements of 310 CMR 22.20D that does not meet all of the criteria of 310 CMR 22.20D(2) and the criteria in 310 CMR 22.20A(2) for avoiding filtration shall provide treatment consisting of both disinfection, as specified in 310 CMR 22.20A(3)(b), and filtration treatment that complies with the requirements of 310 CMR 22.20A(4)(b) or (c) and 22.20D(4)(a) or (b) and by December 31, 2001.

(a) Conventional Filtration Treatment or Direct Filtration.

1. Each supplier of water using conventional filtration or direct filtration, shall maintain a turbidity level in representative samples of a system's filtered water of less than or equal to 0.3 NTU in at least 95% of the measurements taken each month, measured as specified in 310 CMR 22.20A(5)(a) and (c).

2. Each supplier of water must maintain a turbidity level of representative samples of a system's filtered water that at no time exceed one NTU, measured as specified in 310 CMR 22.20A(5)(a) and (c).

3. A supplier of water who uses lime softening may acidify representative samples prior to analysis in accordance with a protocol approved by the Department.

(b) Filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration.

1. A supplier of water may use a filtration technology not listed in 310 CMR 22.20A(4)(b) or (c) or 22.20D(4)(a) if the supplier of water 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 310 CMR 22.20A(3)(b), consistently achieves 99.9% removal and/or inactivation of *Giardia lamblia* cysts and 99.99% removal and/or inactivation of Viruses, and 99% removal of *Cryptosporidium oocysts*, and the Department approves the use of the filtration technology. For each approval, the supplier of water shall maintain the turbidity level of representative samples of the system's filtered water at less than or equal to 0.3 NTU at least 95% of the time and that the system shall not exceed one NTU at any time.

22.20D: continued

2. The performance standards of slow sand filters and diatomateous earth filters are the same as indicated in 310 CMR 22.20A.

(5) Monitoring Requirements for Systems Using Filtration Treatment.

(a) In addition to monitoring required by 310 CMR 22.20A(5), a supplier of water who relies upon a public water system subject to the requirements of 310 CMR 22.20D that provides conventional filtration treatment or direct filtration shall conduct continuous monitoring of turbidity for each individual filter using an approved method in 310 CMR 22.20A(5)(a), and shall calibrate turbidimeters using the procedure specified by the manufacturer. The supplier of watershall record the results of individual filter monitoring every 15 minutes.

(b) If there is a failure in the continuous turbidity monitoring equipment, the supplier of water shall conduct grab sampling every four hours in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment.

(6) Reporting and Recordkeeping Requirements. In addition to the reporting and recordkeeping requirements in 310 CMR 22.20A(6), a supplier of water who is subject to the requirements of 310 CMR 22.20D who provides conventional filtration treatment or direct filtration shall report monthly to the Department the information specified in 310 CMR 22.20D(6)(a) and (b) beginning January 1, 2002. In addition to the reporting and recordkeeping requirements in 310 CMR 22.20A(6), a supplier of water who is subject to the requirements of 310 CMR 22.20D that provides filtration approved under 310 CMR 22.20D(4)(b) shall report monthly to the Department the information specified in 310 CMR 22.20D(6)(a) beginning January 1, 2002. This reporting in 310 CMR 22.20D(6)(a) is in *lieu* of the reporting specified in 310 CMR 22.20A(6).

(a) The supplier of water shall report turbidity measurements as required by 310 CMR 22.20D(4) within ten days after the end of each month the system serves water to the public. Information that shall be reported to the Department includes:

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 turbidity limits specified in 310 CMR 22.20D(4)(a) or (b).
3. The date and value of any turbidity measurements taken during the month which exceed one NTU for systems using conventional filtration treatment or direct filtration, or exceed the maximum level set by the Department in 310 CMR 22.20D(4)(b).

(b) The supplier of water shall maintain the results of individual filter monitoring taken as required in 310 CMR 22.20D(5) for at least three years. Each supplier of water shall report that individual filter turbidity monitoring was conducted in accordance with 310 CMR 22.20D(5) within ten days after the end of each month the system serves water to the public. Each supplier of water shall report individual filter turbidity measurement results taken under 310 CMR 22.20D(5) within ten days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions in 310 CMR 22.20D(6)(b)1. through 3. Each supplier of water who uses lime softening may apply to the Department for alternative exceedance levels for the levels specified in 310 CMR 22.20D(6)(b)1. through 4. if the supplier can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance. A supplier of water shall report the filter number, the turbidity measurement, and the date(s) on which an exceedance occurred for any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart. In addition, the supplier of water shall either produce a filter profile for the filter within seven days of the exceedance (if the supplier 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.

1. 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 supplier of water shall report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the supplier of water shall either produce a filter profile for the filter within seven 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.

22.20D: continued

2. 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 supplier of water shall report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the supplier of water shall conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self-assessment shall 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.

3. 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 supplier of water shall report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the supplier of water shall arrange for the Department to conduct a Comprehensive Performance Evaluation no later than 30 days following the exceedance and have the evaluation completed no later than 90 days following the exceedance.

(c) Additional Reporting Requirements.

1. If at any at time the turbidity exceeds one NTU in representative samples of filtered water in a system using conventional treatment or direct filtration, the supplier of water shall inform the Department as soon as possible, but not later than the end of the next business day.

2. If at any at time the turbidity exceeds one NTU in representative samples of filtered water in a system using filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the supplier of water shall inform the Department as soon as possible, but not later than the end of the next business day.

22.20E: Filter Backwash Recycling Rule

(1) Applicability. Each supplier of water using a surface water source or ground water source under direct influence of surface water that employs conventional filtration, direct filtration, softening, or contact clarification treatment and that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes shall meet the requirements in 310 CMR 22.20E(2) through (4).

(2) Reporting. Each supplier of water using a surface water source or ground water source under direct influence of surface water that employs conventional filtration, direct filtration, softening, or contact clarification treatment shall 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 shall include, at a minimum, the information specified in 310 CMR 22.20E(2)(a) and (b).

(a) A plant schematic showing the origin of all flows that 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.

(b) 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.

(3) Treatment Technique Requirement. Each supplier of water using a surface water source or ground water source under direct influence of surface water that employs conventional filtration, direct filtration, softening, or contact clarification treatment 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 filtration, direct filtration, softening, or contact clarification system 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 shall be completed no later than June 8, 2006.

22.20E: continued

(4) Recordkeeping. The system shall collect and retain on file recycle flow information specified in 310 CMR 22.20E(4)(a) through (f) for review and evaluation by the Department beginning June 8, 2004:

(a) Copy of the recycle notification and information submitted to the Department under 310 CMR 22.20E(2),

(b) List of all recycle flows and the frequency with which they are returned,

(c) Average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in minutes,

(d) Typical filter run length and a written summary of how filter run length is determined,

(e) The type of treatment provided for the recycle flow, and

(f) 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.

22.20F: Long Term 1 Enhanced Surface Water Treatment Rule

(1) General Requirements.

(a) 310 CMR 22.20F establishes requirements for filtration and disinfection that are in addition to criteria under 310 CMR 22.20A. The requirements of 310 CMR 22.20F apply to public water systems serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water, beginning January 1, 2005 unless otherwise specified. 310 CMR 22.20F establishes or extends treatment technique requirements in *lieu* of maximum contaminant levels for the following contaminants:

1. *Giardia lamblia*;
2. Viruses;
3. Heterotrophic plate count bacteria;
4. *Legionella*;
5. *Cryptosporidium*; and
6. Turbidity.

(b) Each supplier of water serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water shall provide treatment of its source water that complies with the treatment technique requirements set forth in 310 CMR 22.20F in addition to the requirements identified in 310 CMR 22.20A. The treatment technique requirements set out in 310 CMR 22.20F consist of installing and properly operating water treatment processes that reliably achieve:

1. At least 99% (2-log) removal of *Cryptosporidium* between a point where water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems.
2. Compliance with the profiling and benchmark requirements in 310 CMR 22.20F(4)(a) through (5)(e).

(c) A public water system subject to the requirements of 310 CMR 22.20F shall also meet the following requirements:

1. It shall cover any finished water reservoir that started construction on or after March 15, 2002 as described in 310 CMR 22.20F(2)(a) and (b).
2. If it is an unfiltered system, it shall comply with the updated watershed control requirements described in 310 CMR 22.20F(3)(a) through (c).
3. If it is a community or non-transient non-community water systems, it shall develop a disinfection profile as described in 310 CMR 22.20F(4)(a) through (g).
4. If it is considering making a significant change to its disinfection practices, it shall develop a disinfection benchmark and consult with the Department for approval of the change as described in 310 CMR 22.20F(5)(a) through (e).
5. If it is a filtered system, it shall comply with the combined filter effluent requirements as described in 310 CMR 22.20F(6)(a) through (d).
6. If it is a filtered system that uses conventional or direct filtration, it shall comply with the individual filter turbidity requirements as described in 310 CMR 22.20F(7)(a) through (e).
7. It shall comply with the applicable reporting and record keeping requirements as described in 310 CMR 22.20F(8)(a) and (b).

22.20F: continued

(2) Finished Water Reservoirs.

(a) Each supplier of water serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water is subject to 310 CMR 22.20F(2)(b).

(b) If the supplier of water begins construction of a finished water reservoir on or after March 15, 2002 the reservoir shall be covered. Finished water reservoirs for which the supplier of water began construction prior to March 15, 2002 are not subject to 310 CMR 22.20F(2), but are subject to 310 CMR 22.20A.

(3) Additional Watershed Control Requirements for Unfiltered Systems.

(a) Each supplier of water serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water which does not provide filtration shall continue to comply with all of the filtration avoidance criteria in 310 CMR 22.20A(2), as well as the additional watershed control requirements in 310 CMR 22.20F(3)(b).

(b) The supplier of water must take any additional steps necessary to minimize the potential for contamination by *Cryptosporidium oocysts* in the source water. The supplier of water's watershed control program shall, for *Cryptosporidium*:

1. Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

2. Monitor the occurrence of activities, which may have an adverse effect on source water quality.

(c) During an onsite inspection conducted under the provisions of 310 CMR 22.20A(2)(b)5., the Department will determine whether the watershed control program is adequate to limit potential contamination by *Cryptosporidium oocysts*. The adequacy of the program will be based on the comprehensiveness of the watershed review; the effectiveness of the program to monitor and control detrimental activities occurring in the watershed; and the extent to which the supplier of water has maximized land ownership and/or controlled land use within the watershed.

(4) Disinfection Profiling.

(a) Each supplier of water, community or non-transient non-community water system, serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water shall develop a disinfection profile unless the Department determines that the system's profile is unnecessary. The Department may approve the use of a more representative data set for disinfection profiling than the data set required in 310 CMR 22.20F(4)(c) through (g).

(b) The Department may only determine that a system's profile is unnecessary if a system's TTHM and HAA5 levels are below 0.064 mg/L and 0.048 mg/L, respectively. To determine these levels, TTHM and HAA5 samples must be collected after January 1, 1998, during the month with the warmest water temperature, and at the point of maximum residence time in the distribution system.

(c) A disinfection profile shall be developed using the following three steps:

1. The supplier of water shall collect data for several parameters from the plant as required in 310 CMR 22.20F(4)(d) over the course of 12 months. If the system serves between 500 and 9,999 persons the supplier of water must begin to collect data no later than July 1, 2003. If the system serves fewer than 500 persons the supplier of water must begin to collect data no later than January 1, 2004;

2. The supplier of water shall use the data to calculate weekly log inactivation as required in 310 CMR 22.20F(4)(e) and (f); and

3. The supplier of water shall use these weekly log inactivations to develop a disinfection profile as specified in 310 CMR 22.20F(4)(g).

(d) The supplier of water shall monitor the following parameters to determine the total log inactivation using the analytical methods in 310 CMR 22.20A(5)(a), once per week on the same calendar day, over 12 consecutive months:

1. The temperature of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

2. If the system uses chlorine, the pH of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

22.20F: continued

3. The disinfectant contact time(s) ("T") during peak hourly flow; and
4. The residual disinfectant concentration(s) ("C") of the water before or at the first customer and prior to each additional point of disinfection during peak hourly flow.

(e) Use the tables in 310 CMR 22.20A(5)(b)3.e. to determine the appropriate $CT_{99.9}$ value. The supplier of water shall calculate the total inactivation ratio as follows, and multiply the value by 3.0 to determine the log inactivation of *Giardia lamblia*:

1. If the supplier of water uses only one point of disinfectant application, the supplier of water shall determine the total inactivation ratio for the disinfection segment based on either of the following methods:
   a. Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow; or
   b. 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. Under this alternative, the system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then add the ($CTcalc/CT_{99.9}$) values together to determine ($3CTcalc/CT_{99.9}$).
2. If the supplier of water uses more than one point of disinfectant application before the first customer, the supplier of water shall determine the ($CTcalc/CT_{99.9}$) 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 using the procedure specified in 310 CMR 22.20F(4)(e)1.b.

(f) If the supplier of water uses chloramines, ozone, or chlorine dioxide for primary disinfection, the supplier of water shall also calculate the logs of inactivation for Viruses and develop an additional disinfection profile for Viruses using methods approved by the Department.

(g) Each supplier of water will use each log inactivation as a data point in the disinfection profile. The supplier of water will have obtained 52 measurements (one for every week of the year). This will allow the supplier of water and the Department the opportunity to evaluate how microbial inactivation varied over the course of the year by looking at all 52 measurements (the Disinfection Profile). The supplier of water shall retain the Disinfection Profile data in graphic form, such as a spreadsheet, which must be available for review by the Department as part of a sanitary survey. The supplier of water shall use this data to calculate a benchmark if they are considering changes to disinfection practices.

(5) Disinfection Benchmark.

(a) A supplier of water serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water required to develop a disinfection profile under 310 CMR 22.20F(4), shall develop a Disinfection Benchmark if the supplier of water decides to make a significant change to the disinfection practice. The supplier of water shall consult with the Department for approval before implementing a significant disinfection practice change.

(b) Significant changes to disinfection practice include:

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.

(c) If the supplier of water is considering a significant change to its disinfection practice, the supplier of water shall calculate a disinfection benchmark(s) as described in 310 CMR 22.20F(5)(d) and (e) and provide the benchmark(s) to the Department. The supplier of water may only make a significant disinfection practice change after consulting with and obtaining the approval of the Department. The system shall submit the following information to the Department as part of the consultation and approval process:

1. A description of the proposed change,
2. The disinfection profile for *Giardia lamblia* (and, if necessary, Viruses) and disinfection benchmark,
3. An analysis of how the proposed change will affect the current levels of disinfection, and
4. Any additional information requested by the Department.

22.20F: continued

(d) If the supplier of water is making a significant change to its disinfection practice, the supplier of water shall calculate a disinfection benchmark using the following procedure:

1. Using the data the supplier of water collected to develop the Disinfection Profile, determine the average *Giardia lamblia* inactivation for each calendar month by dividing the sum of all *Giardia lamblia* inactivations for that month by the number of values calculated for that month.
2. Determine the lowest monthly average value out of the twelve values. This value becomes the disinfection benchmark.

(e) If the supplier of water uses chloramines, ozone or chlorine dioxide for primary disinfection, the supplier of water shall calculate the disinfection benchmark from the data the system collected for Viruses to develop the disinfection profile in addition to the *Giardia lamblia* disinfection benchmark calculated under 310 CMR 22.20F(5)(d). This viral benchmark shall be calculated in the same manner used to calculate the *Giardia lamblia* disinfection benchmark in 310 CMR 22.20F(5)(d).

(6) Combined Filter Effluent Requirements.

(a) Each supplier of water that serves fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water is required to filter, and each supplier of water that utilizes filtration other than slow sand filtration or diatomaceous earth filtration shall meet the combined filter effluent (CFE) turbidity requirements of 310 CMR 22.20F(6)(b) through (d). If the supplier of water uses slow sand or diatomaceous earth filtration the supplier of water is not required to meet the CFE turbidity limits of 310 CMR 22.20F, but such supplier of water shall continue to meet the CFE turbidity limits in 310 CMR 22.20A(4).

(b) Each supplier of water that serves fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water is required to filter, and each supplier of water that utilizes filtration other than slow sand filtration or diatomaceous earth filtration shall meet two strengthened CFE turbidity limits as follows:

1. The first CFE turbidity limit is a "95th percentile" turbidity limit that the system shall meet in at least 95% of the turbidity measurements taken each month. Measurements must continue to be taken as described in 310 CMR 22.20A(5)(b)1. and 3. Monthly reporting shall be completed according to 310 CMR 22.20F(8).
    a. If the supplier of water uses conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 0.3 NTU in at least 95% of the measurements taken each month, measured as specified in 310 CMR 22.20A(5)(a) and (c).
    b. If the supplier of water uses "alternative filtration" the turbidity level of representative samples of the system's filtered water shall be less than or equal to 0.3 NTU in at least 95% of the measurements taken each month, measured as specified in 310 CMR 22.20A(5)(a) and (c).
2. The second CFE turbidity limit is a "maximum" turbidity limit that the system may not exceed at any time during the month. Measurements shall continue to be taken as described in 310 CMR 22.20A(5)(b)1. and 3. Monthly reporting shall be completed according to 310 CMR 22.20F(8)(a). The following is a description of the required limits for specific filtration technologies:
    a. If the supplier of water uses conventional filtration or direct filtration, the "maximum" turbidity level is one NTU.
    b. If the supplier of water uses "alternative filtration" the "maximum" turbidity level is one NTU.

(c) Each supplier of water that serves fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water that uses a system that consists of alternative filtration (filtration other than slow sand filtration, diatomaceous earth filtration, conventional filtration, or direct filtration) is required to conduct a demonstration. The supplier of water shall demonstrate to the Department, using pilot plant studies or other means, that the system's filtration, in combination with disinfection treatment, consistently achieves:

1. 99% removal of *Cryptosporidium oocysts*;
2. 99.9% removal and/or inactivation of *Giardia lamblia* cysts; and
3. 99.99% removal and/or inactivation of Viruses.

22.20F: continued

(d) Each supplier of water serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water that practices lime softening, may acidify representative CFE turbidity samples prior to analysis using a protocol approved by the Department.

(7) Individual Filter Turbidity Requirements.

(a) Each supplier of water serving fewer than 10,000 people using a surface water source or ground water source under the direct influence of surface water that utilizes conventional filtration or direct filtration, shall conduct continuous monitoring of turbidity for each individual filter at the filtration facility. The following requirements apply to continuous turbidity monitoring:

1. Monitoring must be conducted using an approved method in 310 CMR 22.20A(5)(a);
2. Calibration of turbidimeters shall be conducted using procedures specified by the manufacturer;
3. Results of turbidity monitoring shall be recorded at least every 15 minutes;
4. Monthly reporting must be completed according to 310 CMR 22.20F(8)(a); and
5. Records shall be maintained according to 310 CMR 22.20F(8)(b).

(b) If there is a failure in the continuous turbidity monitoring equipment, the supplier of water shall conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is back on-line. The system has 14 days to resume continuous monitoring before a violation is incurred.

(c) If the system only consists of one or two, the supplier of water may conduct continuous monitoring of the CFE turbidity in lieu of individual filter effluent turbidity monitoring. Continuous monitoring shall meet the same requirements set forth in 310 CMR 22.20F(7)(a)1. through 4. and (b).

(d) If the supplier of water conducts continuous turbidity monitoring, follow-up action is required as follows:

1. If the turbidity of an individual filter or the turbidity of the CFE for systems with two filters that monitor CFE in *lieu* of individual filters exceeds 1.0 NTU in two consecutive recordings 15 minutes apart, the supplier of water shall report to the Department by the tenth day of the following month and include the filter number(s), corresponding date(s), turbidity value(s) which exceeded 1.0 NTU, and the cause (if known) for the exceedance(s).
2. If the supplier of water was required to report to the Department for three months in a row and turbidity exceeded 1.0 NTU in two consecutive recordings 15 minutes apart at the same filter or CFE for systems with two filters that monitor CFE in *lieu* of individual filters, the supplier of water shall conduct a self-assessment of the filter(s) within 14 days of the day the filter exceeded 1.0 NTU in two consecutive measurements for the third straight month unless a Comprehensive Performance Evaluation (CPE) as specified in 310 CMR 22.20F(7)(d)3. was required. Systems with two filters that monitor CFE in *lieu* of individual filters shall conduct a self-assessment on both filters. 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. If a self-assessment is required, the date that it was triggered and the date that it was completed shall be included.
3. If the supplier of water was required to report to the Department for two months in a row and turbidity exceeded 2.0 NTU in two consecutive recordings 15 minutes apart at the same filter or CFE for systems with two filters that monitor CFE in *lieu* of individual filters, the supplier of water shall arrange to have a CPE conducted by the Department no later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. If a CPE has been completed by the Department within the 12 prior months or the supplier of water and the Department are jointly participating in an ongoing Comprehensive Technical Assistance (CTA) project at the system, a new CPE is not required. If conducted, a CPE must be completed and submitted to the Department no later than 120 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month.

22.20F: continued

(e) If the supplier of water practices lime softening, the supplier of water may apply to the Department for alternative turbidity exceedance levels for the levels specified in 310 CMR 22.20F(7)(d). The supplier of water shall be able to demonstrate to the Department that higher turbidity levels are due to lime carryover only, and not due to degraded filter performance.

(8) Reporting and Recordkeeping.

(a) In addition to the reporting and recordkeeping requirements in 310 CMR 22.20A, each supplier of water who is subject to the requirements of 310 CMR 22.20F shall report the following information to the Department at the frequency specified, if the supplier of water is subject to the specific requirement.

1. Combined filter requirements that shall be reported within ten days after the end of each month shall include:
   a. The total number of filtered water turbidity measurements taken during the month.
   b. 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 310 CMR 22.20F(7).
   c. The date and value of any turbidity measurements taken during the month which exceed 1.0 NTU for systems using conventional filtration treatment or direct filtration, or exceed the maximum level set by the Department 310 CMR 22.20F(7).
2. The individual turbidity requirements that shall be reported within ten days after the end of each month, except as otherwise provided in 310 CMR 22.20F(8)2.c. and 310 CMR 22.20F(8)2.e., shall include:
   a. That the supplier of water conducted individual filter turbidity monitoring during the month.
   b. The filter number(s), corresponding date(s), and turbidity value(s) that exceeded 1.0 NTU during the month, and the cause (if known) for the exceedance(s) but only in if two consecutive measurements exceeded 1.0 NTU.
   c. If a self-assessment is required, the date that it was triggered and the date that it was completed. If the self-assessment was triggered during the last four days of the month, the date that it was triggered and the date that it was completed shall be reported within 14 days after the date the self-assessment was triggered.
   d. If a CPE is required and the date that it was triggered.
   e. Copy of completed CPE report within 120 days after the CPE was triggered.
3. Disinfection Profiling shall include:
   a. Results of optional monitoring that show TTHM levels <0.064 mg/l and HAA5 levels <0.048 mg/l (only if the system wishes to forgo profiling) or that the system has begun disinfection profiling.
      i. For systems serving 500–9,999 by July 1, 2003;
      ii. For systems serving fewer than 500 by January 1, 2004.
4. Disinfection Benchmarking shall include: A description of the proposed change in disinfection, the system's disinfection profile for *Giardia lamblia* (and, if necessary, Viruses) and disinfection benchmark, and an analysis of how the proposed change will affect the current levels of disinfection anytime a significant change in disinfection practices is being considered.

(b) Each supplier of water who is subject to the requirements of 310 CMR 22.20F shall, in addition to recordkeeping requirements under 310 CMR 22.20A(6), maintain records in accordance with 310 CMR 22.17(12).

22.20G: Long Term Two Enhanced Surface Water Treatment Rule

(1) General Requirements.

(a) 310 CMR 22.20G establishes or extends Treatment Technique requirements in *lieu* of Maximum Contaminant Levels for *Cryptosporidium*. These requirements are in addition to requirements for Filtration and Disinfection in 310 CMR 22.20A, 22.20D, and 22.20F.

(b) Applicability. 310 CMR 22.20G applies to all suppliers of water using a Surface Water Source, or groundwater source under the direct influence of surface water.

22.20G: continued

1. Wholesale Systems, as defined in 310 CMR 22.02, must comply with the requirements of 310 CMR 22.20G based on the population of the largest system in the Combined Distribution System.
2. The requirements of 310 CMR 22.20G for filtered systems apply to systems required by National Primary Drinking Water Regulations and 310 CMR 22.00 to provide Filtration treatment, whether or not the system is currently operating a Filtration system.
3. The requirements of 310 CMR 22.20G for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the Filtration avoidance criteria in 310 CMR 22.20A, 22.20D, and 22.20F, as applicable.

(c) Requirements. Systems subject to 310 CMR 22.20G must comply with the following requirements:

1. Systems must conduct an initial and a second round of source water monitoring for each plant supplied by a Surface Water Source, or groundwater source under the direct influence of surface water. This monitoring may include sampling for *Cryptosporidium*, *E. coli*, and Turbidity as described in 310 CMR 22.20G(2) through (7), to determine what level, if any, of additional *Cryptosporidium* treatment the public water supplier 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 310 CMR 22.20G(9) through (10).
3. Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in 310 CMR 22.20G(11) and provide additional treatment for *Cryptosporidium*, if required, as described in 310 CMR 22.20G(12). All unfiltered systems must provide treatment for *Cryptosporidium* as described in 310 CMR 22.20G(13). Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in 310 CMR 22.20G(14).
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 310 CMR 22.20G(15).
5. Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in 310 CMR 22.20G(19) through (23).
6. Systems must comply with the applicable recordkeeping and reporting requirements described in 310 CMR 22.20G(16) and (17).

(2) Source Water Monitoring.

(a) Initial Round of Source Water Monitoring. Systems must conduct the following monitoring on the schedule in 310 CMR 22.20G(2)(c) unless they meet the monitoring exemption criteria in 310 CMR 22.20G(2)(d).

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. a. 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.
   b. 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 310 CMR 22.20G(2)(a)4. The system must notify the Department no later than three months prior to the date the system is otherwise required to start *E. coli* monitoring under 310 CMR 22.20G(2)(c).
4. Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted in accordance with the requirements of 310 CMR 22.20G(2)(a)3.:
   a. For systems using Lake/Reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/ 100 mL.
   b. For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/ 100 mL.

22.20G: continued

c. The system does not conduct *E. coli* monitoring as described in 310 CMR 22.20G(2)(a)3.

d. Systems using Groundwater under the Direct Influence of Surface Water must comply with the requirements of 310 CMR 22.20G(2)(a)4. based on the *E. coli* level that applies to the nearest Surface Water body. If no Surface Water body is nearby, the system must comply based on the requirements that apply to systems using Lake/Reservoir sources.

5. For filtered systems serving fewer than 10,000 people, the Department may approve monitoring for an indicator other than *E. coli* under 310 CMR 22.20G(2)(a)3. The Department also may approve an alternative to the *E. coli* concentration as specified in 310 CMR 22.20G(2)(a)4.a., b. or d. to trigger *Cryptosporidium* monitoring. This approval by the Department will be provided to the system in writing and will 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 310 CMR 22.20G(11).

6. Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.

7. Systems may sample more frequently than required under 310 CMR 22.20G(2) 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 310 CMR 22.20G(2)(a), unless they meet the monitoring exemption criteria in 310 CMR 22.20G(2)(d). Systems must conduct this monitoring on the schedule in 310 CMR 22.20G(2)(c).

(c) Monitoring Schedule. Systems must begin the monitoring required in 310 CMR 22.20G(2)(a) and (b) no later than the month beginning with the date listed in 310 CMR 22.20G: *Table 1*.

310 CMR 22.20G: *Table 1*
SOURCE WATER MONITORING STARTING DATES

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:
At least 100,000 people	October 1, 2006	April 1, 2015
From 50,000 to 99,999 people	April 1, 2007	October 1, 2015
From 10,000 to 49,999 people	April 1, 2008	October 1, 2016
Fewer than 10,000 and monitor for *E. coli*[1]	October 1, 2008	October 1, 2017
Fewer than 10,000 and monitor for *Cryptosporidium*[2]	April 1, 2010	April 1, 2019

[1] Applies only to filtered systems.
[2] Applies to filtered systems that meet the conditions of 310 CMR 22.20G(2)(a)4. and unfiltered systems.

(d) Monitoring Avoidance.

1. Filtered systems are not required to conduct source water monitoring under 310 CMR 22.20G 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 310 CMR 22.20G(12).

2. Unfiltered systems are not required to conduct source water monitoring under 310 CMR 22.20G 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 310 CMR 22.20G(13).

22.20G: continued

3. If a system chooses to provide the level of treatment in 310 CMR 22.20G(2)(d)1. or 2., as applicable, rather than start source water monitoring, the system must notify the Department in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under 310 CMR 22.20G(3). 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 310 CMR 22.20G(14).

(e) Plants Operating Only Part of the Year. Suppliers of water with plants served by a Surface Water Source or groundwater source under the direct influence of surface water that operate for only part of the year must conduct source water monitoring in accordance with 310 CMR 22.20G, 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 groundwater under the direct influence of surface water after the system is required to begin monitoring under 310 CMR 22.20G(2)(c) must monitor the New Source on a schedule the Department approves. Source water monitoring must meet the requirements of 310 CMR 22.20G. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of 310 CMR 22.20G(11) and (12) or (13), as applicable, for the New Source on a schedule the Department approves.

2. The requirements of 310 CMR 22.20G(2)(f) apply to suppliers of water with a Surface Water Source or groundwater source under the direct influence of surface water that begin operation after the monitoring start date applicable to the system's size under 310 CMR 22.20G(2)(c).

3. The system must begin a second round of source water monitoring no later than six years following initial bin classification under 310 CMR 22.20G(11) or determination of the mean *Cryptosporidium* level under 310 CMR 22.20G(13), as applicable.

(g) Failure to collect any source water sample required under 310 CMR 22.20G(2) in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of 310 CMR 22.20G(3) through (7) is a monitoring violation.

(h) Grandfathering Monitoring Data. Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in 310 CMR 22.20G(2)(c) to meet the initial source water monitoring requirements in 310 CMR 22.20G(a). Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under 310 CMR 22.20G(2)(h) must meet the requirements in 310 CMR 22.20G(8).

(3) Sampling Schedules.

(a) Systems required to conduct source water monitoring under 310 CMR 22.20G(2) must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

1. Systems must submit sampling schedules no later than three months prior to the applicable date listed in 310 CMR 22.20G(2)(c) for each round of required monitoring.

2. a. Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under 310 CMR 22.20G(2)(a) to EPA electronically at https://intranet.epa.gov/lt2/.

b. 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 or the Department approves.

22.20G: continued

3. Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring 310 CMR 22.20G(2)(a) to the Department.

4. Systems must submit sampling schedules for the second round of source water monitoring 310 CMR 22.20G(2)(b) to the Department.

5. If 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 310 CMR 22.20G(3)(b)1. or 2. 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. a. 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 310 CMR 22.20G(5), or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

b. 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 310 CMR 22.20G(3)(b) for any source water sample required under 310 CMR 22.20G(2) 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.

(4) Sampling Locations.

(a) Systems required to conduct source water monitoring under 310 CMR 22.20G(2) must collect samples for each plant that treats a Surface Water Source, or a groundwater source under the direct influence of surface water. 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 310 CMR 22.20G(2) 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 specified in 310 CMR 22.20G(4)(b)2.

2. The Department may approve a system to collect a source water sample after chemical treatment. To grant this approval, the Department will 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 310 CMR 22.20D(4)(b) or 22.20F(6)(c), 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 the *Massachusetts Drinking Water Guidelines and Policies, Appendix N*, Requirements for Microbial Toolbox Options for Meeting *Cryptosporidium* Treatment Requirements under the Long Term 2 Enhanced Surface Water Treatment Rule for Public Water Systems.

22.20G: continued

(e) Multiple Sources. Systems with plants that use multiple water sources, including multiple Surface Water Sources and blended Surface Water and groundwater sources, must collect samples as specified in 310 CMR 22.20G(4)(e)1. or 2. 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 310 CMR 22.20G(4)(e)2.a. or b. for sample analysis.

a. 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.

b. 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 310 CMR 22.20G(3). 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) Analytical Methods.

(a) *Cryptosporidium*. Systems must analyze for *Cryptosporidium* using *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA,* 2005, United States Environmental Protection Agency, EPA–815-R–05–002 or *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA,* 2005, United States Environmental Protection Agency, EPA–815–R–05–001, which are incorporated by reference.

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 310 CMR 22.20G(5)(a). Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA and the Department for the methods listed in 310 CMR 22.20G(5)(a), up to a packed pellet volume of at least 2 mL.

2. Matrix spike (MS) samples, as required by the methods in 310 CMR 22.20G(5)(a), must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under 310 CMR 22.20G(6). If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

3. Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.

(b) *E. coli*. Systems must use methods for enumeration of *E. coli* in source water approved in accordance with 310 CMR 22.26(3)(c).

1. The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of 310 CMR 22.20G(5)(b)2.

2. 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 310 CMR 22.26(3)(c).

3. Systems must maintain samples between 0˚C and 10˚C during storage and transit to the laboratory.

(c) Turbidity. Systems must use methods for Turbidity measurement approved in 310 CMR 22.20A(5)(a)1.

22.20G: continued

(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 Department 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 310 CMR 22.20A(5) is approved for *E. coli* analysis under 310 CMR 22.20G when the laboratory uses the same technique for *E. coli* that the laboratory uses for 310 CMR 22.20A(5).

(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 310 CMR 22.20G(2) no later than ten days after the end of the first month following the month when the sample is collected.

(b) All systems serving at least 10,000 people must report the results from the initial source water monitoring required under 310 CMR 22.20G(2)(a) to EPA electronically at https://intranet.epa.gov/lt2/. 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 individuals must report results from the initial source water monitoring required under 310 CMR 22.20G(2)(a) to the Department.

(d) All systems must report results from the second round of source water monitoring required under 310 CMR 22.20G(2)(b) to the Department.

(e) Systems must report the applicable information in paragraphs 310 CMR 22.20G(7)(e)1. and 2. for the source water monitoring required under 310 CMR 22.20G(2).

1. Systems must report the following data elements for each *Cryptosporidium* analysis:
   a. PWS ID;
   b. Facility ID;
   c. Sample collection date;
   d. Sample type (field or matrix spike);
   e. Sample volume filtered (L), to nearest ¼ L;
   f. Was 100% of filtered volume examined; and
   g. Number of *oocysts* counted.
      i. For matrix spike samples, systems must also report the sample volume spiked and estimated number of *oocysts* spiked. These data are not required for field samples.
      ii. For samples in which less than 10 L is filtered or less than 100% of the sample volume is examined, systems must also report the number of filters used and the packed pellet volume.
      ii. For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.
2. Systems must report the following data elements for each *E. coli* analysis:
   a. PWS ID;
   b. Facility ID;
   c. Sample collection date;
   d. Analytical method number;
   e. Method type;
   f. Source type (flowing stream, Lake/Reservoir, GWUDI);
   g. *E. coli*/100 mL; and
   h. Turbidity.[1]

[1] Systems serving fewer than 10,000 individuals that are not required to monitor for Turbidity as specified in 310 CMR 22.20G(2) are not required to report Turbidity with their *E. coli* results.

22.20G: continued

(8) Grandfathering Previously Collected Data.

(a) 1. Systems may comply with the initial source water monitoring requirements of 310 CMR 22.20G(2)(a) by grandfathering sample results collected before the system is required to begin monitoring (*i.e.*, previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in 310 CMR 22.20G(8) and the Department must approve.

2. A filtered system may grandfather *Cryptosporidium* samples to meet the requirements of 310 CMR 22.20G(2)(a) when the system does not have corresponding *E. coli* and Turbidity samples. A system that grandfathers *Cryptosporidium* samples without *E. coli* and Turbidity samples is not required to collect *E. coli* and Turbidity samples when the system completes the requirements for *Cryptosporidium* monitoring under 310 CMR 22.20G(2)(a).

(b) *E. coli* Sample Analysis. The analysis of *E. coli* samples must meet the analytical method and approved laboratory requirements of 310 CMR 22.20G(5) through (6).

(c) *Cryptosporidium* Sample Analysis. The analysis of *Cryptosporidium* samples must meet the criteria in 310 CMR 22.20G(8)(c).

1. Laboratories analyzed *Cryptosporidium* samples using one of the analytical methods in 310 CMR 22.20G(8)(c)1.a. through f., which are incorporated by reference.

a. Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/ FA, 2005, United States Environmental Protection Agency, EPA–815–R–05–002.

b. Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA–815–R–05–001.

c. Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/ FA, 2001, United States Environmental Protection Agency, EPA–821–R–01–025.

d. Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, 2001, United States Environmental Protection Agency, EPA–821–-R–01–026.

e. Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/ FA, 1999, United States Environmental Protection Agency, EPA–82 1–R–99–006.

f. Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, 1999, United Departments 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 two filters that EPA and the Department approved for the methods listed in 310 CMR 22.20G(8)(c)1.

(d) Sampling Location. The sampling location must meet the conditions as specified in 310 CMR 22.20G(4).

(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 310 CMR 22.20G(3)(b)1. and 2. 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 310 CMR 22.20G(2)(a) are seasonally representative and unbiased.

2. Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems must follow the monthly averaging procedure in 310 CMR 22.20G(11)(b)5. or 310 CMR 22.20G(13)(a)3., as applicable, when calculating the bin classification for filtered systems or the mean *Cryptosporidium* concentration for unfiltered systems.

(f) Reporting Monitoring Results for Grandfathering. Systems that request to grandfather previously collected monitoring results must report the following information by the applicable dates listed in 310 CMR 22.20G(3).

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 310 CMR 22.20G(2)(a). Systems must report this information no later than the date required by the sampling schedule under 310 CMR 22.20G(3).

22.20G: continued

2. Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in 310 CMR 22.20G(8)(f)(2)a. through d., no later than two months after the applicable date listed in 310 CMR 22.20G(2)(c).

a. For each sample result, systems must report the applicable data elements in 310 CMR 22.20G(7).

b. 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 310 CMR 22.20G, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in 310 CMR 22.20G.

c. 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.

d. 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 310 CMR 22.20G(8)(c)1. 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 310 CMR 22.20G(11) or (13) 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 310 CMR 22.20G(2)(a) and some of the data are rejected due to not meeting the requirements of 310 CMR 22.20G(8), 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 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 310 CMR 22.20G(2)(a), a system that plans to make a significant change to its Disinfection practice, as defined in 310 CMR 22.20G(9)(b), must develop Disinfection Profiles and calculate Disinfection benchmarks for *Giardia lamblia* and Viruses as described in 310 CMR 22.20G(10). Prior to changing the Disinfection practice, the system must notify the Department and must include in this notice the information in 310 CMR 22.20G(9)(a)1. through 3.

1. A completed Disinfection Profile and Disinfection benchmark for *Giardia lamblia* and Viruses as described in 310 CMR 22.20G(10).
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.

22.20G: continued

(10) Developing the Disinfection Profile and Benchmark.

(a) Systems required to develop Disinfection Profiles under 310 CMR 22.20G(9) must follow the requirements of 310 CMR 22.20G(10). Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and Viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire plant, based on CT99.9 values in 310 CMR 22.20A(5)(b): *Tables 1.1* through *1.6, 2.1*, and *3.1* 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 Disinfectant Application prior to the entrance to the Distribution System must conduct the monitoring in 310 CMR 22.20G(10)(b)1. through 4. Systems with more than one Point of Disinfectant Application must conduct the monitoring in 310 CMR 22.20G(10)(b)1. through 4. for each Disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in 310 CMR 22.20A(5)(a).

1. For systems using a Disinfectant other than UV, the temperature of the disinfected water must be measured at each Residual Disinfectant Concentration Sampling Point during peak hourly flow or at an alternative location approved by the 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 310 CMR 22.20G(10)(b), systems may elect to meet the requirements of 310 CMR 22.20G(10)(c)1. or 2.

1. Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of 310 CMR 22.20G(10)(b) may use these data to develop Disinfection Profiles as specified in 310 CMR 22.20G(10) 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 310 CMR 22.20D(3) or (4) 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 310 CMR 22.20D(3) or 22.20F(4) 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 310 CMR 22.20G(10)(d)1. through 3.

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 310 CMR 22.2G(10)(d)1.a. or b.
   a. Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.
   b. Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the Point of Disinfectant Application and a point before or at the first customer during peak hourly flow. The system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine (Σ ($CTcalc/CT_{99.9}$)).
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 (($CTcalc/CT_{99.9}$)) must be calculated using the method in 310 CMR 22.20G(10)(d)1.b.

22.20G: continued

3. The system must determine the total logs of inactivation by multiplying the value calculated in 310 CMR 22.20G(10)(d)1. or 2. by 3.0.

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 310 CMR 22.20G(10)(e)1. and 2. to calculate a Disinfection benchmark.

1. For each year of profiling data collected and calculated under 310 CMR 22.20G(10)(a) through (d), 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 310 CMR 22.20G(2)(a), filtered systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results reported under 310 CMR 22.20G(2)(a) and must follow the procedures in 310 CMR 22.20G(11)(b)1. through 5.

(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 310 CMR 22.20G(2)(e) the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

5. If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in 310 CMR 22.20G(11)(b)1. through 4.

(c) Filtered systems must determine their initial bin classification from 310 CMR 22.20G: *Table 2* and using the *Cryptosporidium* bin concentration calculated under 310 CMR 22.20G(11)(a) and (b):

22.20G: continued

310 CMR 22.20G: *Table 2*
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 310 CMR 22.20G (2)	*Cryptosporidium* <0.075 *oocysts*/L	Bin 1
	0.075 *oocysts*/L<*Cryptosporidium* <1.0 *oocysts*/L	Bin 2
	1.0 *oocysts*/L< *Cryptosporidium* <3.0 *oocysts*/L	Bin 3
	Cryptosporidium ≥3.0 *oocysts*/L	Bin 4
Serving fewer than 10,000 people and NOT required to monitor for *Cryptosporidium* under 310 CMR 22.20G(2)(a)4.	N/A	Bin 1

[1] Based on calculations in 310 CMR 22.20G(11)(a) or (d), as applicable.

(d) Following completion of the second round of source water monitoring required under 310 CMR 22.20G(2)(b) filtered systems must recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported under 310 CMR 22.20G(7)(d) and following the procedures in 310 CMR 22.20G(11)(b)1. through 4. Systems must then redetermine their bin classification using this bin concentration and the table in 310 CMR 22.20G(11)(c).

(e) 1. Filtered systems must report their initial bin classification under 310 CMR 22.20G(11)(c) to the Department for approval no later than six months after the system is required to complete initial source water monitoring based on the schedule in 310 CMR 22.20G(2)(c).

2. Systems must report their bin classification under 310 CMR 22.20G(11)(d) to the Department for approval no later than six months after the system is required to complete the second round of source water monitoring based on the schedule in 310 CMR 22.20G(2)(c).

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 310 CMR 22.20G(11)(e) 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 310 CMR 22.20G(12)(a) based on their bin classification as determined under 310 CMR 22.20G(11) and according to the schedule in 310 CMR 22.20G(14).

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310 CMR 22.20G: *Table 3*
FILTERED SYSTEM ADDITIONAL *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS

If the system bin classification is …	And the system uses the following Filtration treatment in full compliance with 310 CMR 22.20A, 310 CMR 22.20D, and 310 CMR 22.20F (as applicable), then the additional *Cryptosporidium* treatment requirements are …			
	Conventional Filtration treatment (including softening)	Direct Filtration	Slow Sand or Diatomaceous Earth Filtration	Alternative Filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	[1]
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	[2]
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	[3]

[1] As determined by the 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 310 CMR 22.20G(18) to comply with the additional *Cryptosporidium* treatment required in 310 CMR 22.20G(12)(a).
2. Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under 310 CMR 22.20G(12)(a) using either one or a combination of the following: Bag Filters, Bank Filtration, Cartridge Filters, chlorine dioxide, membranes, ozone, or UV, in accordance with 310 CMR 22.20G(19) through (23).

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in 310 CMR 22.20G(19) through (23), that is at least equal to the level of treatment required in 310 CMR 22.20G(12)(a) 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 310 CMR 22.20G(2)(a) or (b), significant changes occurred in the system's Watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the Department to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options in accordance with 310 CMR 22.20G(18) through (23).

(13) Unfiltered System *Cryptosporidium* Treatment Requirements.

(a) Determination of Mean *Cryptosporidium* Level.

1. Following completion of the initial source water monitoring required under 310 CMR 22.20G(2)(a) unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under 310 CMR 22.20G(2)(a). Systems must report this value to the Department for approval no later than six months after the month the system is required to complete initial source water monitoring based on the schedule in 310 CMR 22.20G(2)(c).

2. Following completion of the second round of source water monitoring required under 310 CMR 22.20G(2)(b) unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under 310 CMR 22.20G(2)(b). Systems must report this value to the Department for approval no later than six months after the month the system is required to complete the second round of source water monitoring based on the schedule in 310 CMR 22.20G(2)(c).

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3. If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level in 310 CMR 22.20G(13)(a)1. or 2.

4. The report to the Department of the mean *Cryptosporidium* levels calculated under 310 CMR 22.20G(13)(a)1. and 2. must include a summary of the source water monitoring data used for the calculation.

5. Failure to comply with the conditions of 310 CMR 22.20G(13)(a) is a violation of the Treatment Technique requirement.

(b) *Cryptosporidium* Inactivation Requirements. Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in 310 CMR 22.20G(13)(b)1. and 2., based on their mean *Cryptosporidium* levels as determined under 310 CMR 22.20G(13)(a) and according to the schedule in 310 CMR 22.20G(14).

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; in accordance with 310 CMR 22.20G(23); in order to meet the *Cryptosporidium* inactivation requirements of 310 CMR 22.20G(13).

1. Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in 310 CMR 22.20G(13)(b) 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 310 CMR 22.20G(13)(b) by meeting the criteria in 310 CMR 22.20G(23)(b)1.d., are in violation of the Treatment Technique requirement.

(d) Use of Two Disinfectants. Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of 310 CMR 22.20G(13) and *Giardia lamblia* and Virus inactivation requirements of 310 CMR 22.20A(3)(a) using a minimum of two Disinfectants, and each of two Disinfectants must separately achieve the total inactivation required for *Cryptosporidium*, *Giardia lamblia*, or Viruses.

(14) Schedule for Compliance with *Cryptosporidium* Treatment Requirements.

(a) Following initial bin classification under 310 CMR 22.20G(11)(c), filtered systems must provide the level of treatment for *Cryptosporidium* required under 310 CMR 22.20G(12) according to the schedule in 310 CMR 22.20G(14)(c).

(b) Following initial determination of the mean *Cryptosporidium* level under 310 CMR 22.20G(13)(a)1., unfiltered systems must provide the level of treatment for *Cryptosporidium* required under 310 CMR 22.20G(13) according to the schedule in 310 CMR 22.20G(14)(c).

(c) *Cryptosporidium* Treatment Compliance Dates.

310 CMR 22.20G: *Table 4*
Cryptosporidium TREATMENT COMPLIANCE DATES TABLE

Systems that serve …	Must comply with *Cryptosporidium* treatment requirements no later than…*
(1) At least 100,000 individuals	April 1, 2012
(2) From 50,000 to 99,999 individuals	October 1, 2012
(3) From 10,000 to 49,999 individuals	October 1, 2013
(4) Fewer than 10,000 individuals	October 1, 2014

* 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 310 CMR 22.20G(11)(d), the system must provide the level of treatment for *Cryptosporidium* required under 310 CMR 22.20G(12) on a schedule the Department approves.

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(e) If the mean *Cryptosporidium* level for an unfiltered system changes following the second round of monitoring, as determined under 310 CMR 22.20G(13)(a)2. and if the system must provide a different level of *Cryptosporidium* treatment under 310 CMR 22.20G(13) 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 310 CMR 22.20G(15).

(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 310 CMR 22.20G(15)(c)1. or 2. 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 310 CMR 22.20G(15) is a violation of the Treatment Technique requirement.

(16) Reporting Requirements.

(a) Systems must report sampling schedules under 310 CMR 22.20G(3) and source water monitoring results under 310 CMR 22.20G(7) unless they notify the Department that they will not conduct source water monitoring due to meeting the criteria of 310 CMR 22.20G(2)(d).

(b) Systems must report the use of uncovered finished water storage facilities to the Department as described in 310 CMR 22.20G(15).

(c) Filtered systems must report their *Cryptosporidium* bin classification as described in 310 CMR 22.20G(11).

(d) Unfiltered systems must report their mean source water *Cryptosporidium* level as described in 310 CMR 22.20G(13).

(e) Systems must report Disinfection Profiles and benchmarks to the Department as described in 310 CMR 22.20G(9) through (10) 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 310 CMR 22.20G(12) or (13). 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.

310 CMR 22.20G: *Table 5*

MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox option	Systems must submit the following information	On the following schedule
(1) Watershed control program.	(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 310 CMR 22.20G(14).
	(ii) Watershed control plan…	No later than one year before the applicable treatment compliance date in 310 CMR 22.20G(14).
	(iii) Annual watershed control program status report……	Every 12 months, beginning one year after the applicable treatment compliance date in 310 CMR 22.20G(14).
	(iv) Watershed sanitary survey report……	For Community Water Systems, every three years beginning three years after the applicable treatment compliance date in 310 CMR 22.20G(14). For Noncommunity Water Systems, every five years beginning five years after the applicable treatment compliance date in 310 CMR 22.20G(14).

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Toolbox option	Systems must submit the following information	On the following schedule
(2) Alternative source/intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date in 310 CMR 22.20G(14).
(3) Pre-sediments	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100% of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent Turbidity or compliance with alternative Department approved performance criteria.	Monthly reporting within ten days following the month in which the monitoring was conducted beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(4) Two-stage Lime Softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to Filtration (ii) Both stages treated 100% of the plant flow.	Monthly reporting within ten days following the month in which the monitoring was conducted beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(5) Bank Filtration	(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit). (ii) If monthly average of daily max Turbidity is greater than one NTU then system must report result and submit an assessment of the cause.	No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(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% of the four hour CFE measurements taken each month.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(7) Individual filter performance	Monthly verification of the following: (i) Individual filter effluent (IFE) Turbidity levels less than or equal to 0.15 NTU in at least 95% of samples each month in each filter. (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(8) Demonstration of performance	(i) Results from testing following a Department-approved protocol. (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 310 CMR 22.20G(14). Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(9) Bag Filters and Cartridge Filters	(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge Filtration; (B) Removal efficiency established through challenge testing that meets criteria in 310 CMR 22.20G(22)(a). (ii) Monthly verification that 100% of plant flow was filtered.	No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(10) Membrane Filtration	(i) Results of verification testing demonstrating the following: (A) Removal efficiency established through challenge testing that meets criteria in 310 CMR 22.20G(22)(b). (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline. (ii) Monthly report summarizing the following:	No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).

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Toolbox option	Systems must submit the following information	On the following schedule
	(A) All direct integrity tests above the control limit; (B) If applicable, any Turbidity or alternative Department approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	
(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 ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(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 Surface Water Sources or Groundwater Under the Direct Influence of Surface Water.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(13) Chlorine dioxide	Summary of CT values for each day as described in 310 CMR 22.20G(23), as applicable.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(14) Ozone	Summary of CT values for each day as described in 310 CMR 22.20G(23), as applicable.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).
(15) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose. (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 310 CMR 22.20G(23), as applicable.	No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).

(17) Recordkeeping Requirements.

(a) Systems must keep results from the initial round of source water monitoring under 310 CMR 22.20G(2)(a) and the second round of source water monitoring under 310 CMR 22.20G(2)(b) until three years after bin classification under 310 CMR 22.20G(11) for filtered systems or determination of the mean *Cryptosporidium* level under 310 CMR 22.20G(11) 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 310 CMR 22.20G(2)(d) for three years.

(c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under 310 CMR 22.20G(18) through (23) and with uncovered finished water reservoirs under 310 CMR 22.20G(15), as applicable, for three years.

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(18) Microbial Toolbox Options for Meeting *Cryptosporidium* Treatment Requirements.

(a) A Public Water System may receive the *Cryptosporidium* treatment credits listed in 310 CMR22.20G(18)(b) *Table 6*, by meeting the conditions for microbial toolbox options described in 310 CMR 22.20G(19) through (23), provided however that unfiltered systems shall only be eligible for *Cryptosporidium* treatment credits for the microbial toolbox options described in 310 CMR 22.20G(23). A Supplier of Water may apply these *Cryptosporidium* treatment credits to meet the treatment requirements set forth in 310 CMR 22.20G(12) and (13), as applicable.

(b) The following table summarizes options in the microbial toolbox set forth in 310 CMR 22.20G(19) through (23). In the event of conflict between this table and the provisions of 310 CMR 22.20G(19) through (23), the latter shall control.

310 CMR 22.20G: *Table 6*

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA

Toolbox Option	**Log Credit**	***Cryptosporidium* treatment credit with design and implementation criteria**
SOURCE PROTECTION AND MANAGEMENT TOOLBOX OPTIONS		
1. Watershed control program	0.5-log	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 310 CMR 22.20G(19)(a).
2. Alternative source/intake management	No prescribed credit	Suppliers of Water may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in 310 CMR 22.20G(19)(b).
PRE FILTRATION TOOLBOX OPTIONS		
3. Pre-sedimentation basin with Coagulation	0.5-log credit	Credit is given during any month that pre-sedimentation 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 310 CMR 22.20G(20)(a).
4. Two-stage Lime Softening	0.5-log credit	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 310 CMR 22.20G(20)(b).

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Toolbox Option	**Log Credit**	***Cryptosporidium* treatment credit with design and implementation criteria**
5. Bank Filtration	0.5-log	For 25-foot setback[1]. Specific criteria are in 310 CMR 22.20G(20)(c).
	1.0-log	For 50-foot setback[1]. Specific criteria are in 310 CMR 22.20G(20)(c).
TREATMENT PERFORMANCE TOOLBOX OPTIONS		
6. Combined filter performance	0.5-log	Credit for combined filter effluent Turbidity less than or equal to 0.15 NTU in at least 95% of measurements each month. Specific criteria are in 310 CMR 22.20G(21)(a).
7. Individual filter performance	0.5-log	Credit is given in addition to 0.5-log combined filter performance credit. Credit is given if individual filter effluent Turbidity is less than or equal to 0.15 NTU in at least 95% 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 310 CMR 22.20G(21)(b).
8. Demonstration of performance	Credit awarded	Credit awarded to unit process or treatment train based on a demonstration to the Department with a Department-approved protocol. Specific criteria are in 310 CMR 22.20G(21)(c).
ADDITIONAL FILTRATION TOOLBOX OPTIONS		
9. Bag or Cartridge Filters (individual filters)	Up to 2-log	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 310 CMR 22.20G(22)(a).
10. Bag or Cartridge Filters (in series)	Up to 2.5-log	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 310 CMR 22.20G(22)(a).
11. Membrane Filtration	Log credit	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in 310 CMR 22.20G(22)(b).
12. Second stage Filtration	0.5-log	0.5-log credit for second separate granular media Filtration stage if treatment train includes Coagulation prior to first filter. Specific criteria are in 310 CMR 22.20G(22)(c).

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Toolbox Option	**Log Credit**	***Cryptosporidium* treatment credit with design and implementation criteria**
13. Slow sand filters	2.5-log	Credit as a secondary Filtration step[2]. Specific criteria are in 310 CMR 22.20G(22)(d).
	3.0-log	Credit as a primary Filtration process[2]. Specific criteria are in 310 CMR 22.20G(22)(d).
INACTIVATION TOOLBOX OPTIONS		
14. Chlorine dioxide	CT table	Log credit based on measured CT in relation to CT table. Specific criteria in 310 CMR 22.20G(23)(a).
15. Ozone	CT table	Log credit based on measured CT in relation to CT table. Specific criteria in 310 CMR 22.20G(23)(a).
16. UV	UV dose	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in 310 CMR 22.20G(23)(b).

[1] Aquifer must be unconsolidated sand containing at least 10% fines; average Turbidity in wells must be less than one NTU. Suppliers of Water 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.

[2] No prior chlorination for either option.

(19) Source Toolbox Components.

(a) Watershed Control Program. Suppliers of Water may apply for a 0.5-log *Cryptosporidium* treatment credit for implementing an approved watershed control program, in accordance with the following requirements:

1. provide advance written notice to the Department of the intent to apply for the watershed control program credit no later than two years prior to the treatment compliance date applicable to the Public Water System in 310 CMR 22.20G(14), Schedule for Compliance with *Cryptosporidium* Treatment requirements.

2. if no approved watershed control program is in place, then submit to the Department for approval a proposed, written watershed control plan no later than one year before the applicable treatment compliance date in 310 CMR 22.20G(14). The availability of the watershed control program treatment credit shall be contingent on Department approval of the watershed control plan based on the inclusion and adequacy of all of the following elements:

a. identification of an area outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment Plant Intake is not significant ("area of influence"). The area of influence shall be evaluated in future watershed surveys, as required in 310 CMR 22.20G(19)(a)5.b.

b. 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.

c. 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.

d. a statement of goals and specific actions the Supplier of Water will undertake to reduce source water *Cryptosporidium* levels, including:

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i. an explanation of how the actions are expected to contribute to specific goals;

ii. identification of Watershed resource requirements and commitments; and

iii. a schedule for implementing the watershed control plan, once approved, including deadlines for completing specific actions identified in the watershed control plan.

3. if an approved watershed control program is in place as of January 5, 2006, then submit to the Department for approval written documentation demonstrating that the existing watershed control plan complies with the following:

a. the existing watershed control plan must meet the above criteria listed in 310 CMR 22.20G(19)(a)2. in addition to any criteria met in the existing approval; and

b. the existing watershed control plan must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

4. Credit in the Absence of Department Response. If within 90 days of the Department's receipt of a watershed control plan submitted under 310 CMR 22.20G(19)(a), the Department does not respond to the Supplier of Water regarding approval of that watershed control plan, and the Supplier of Water otherwise meets the requirements of 310 CMR 22.20G(19)(a), the watershed control plan will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded, unless and until the Department subsequently withdraws such approval.

5. Maintaining the 0.5-log *Cryptosporidium* treatment credit for implementing an approved watershed control program. In order to maintain a 0.5-log *Cryptosporidium* treatment credit for implementing an approved watershed control program, the Supplier of Water shall satisfy the following requirements:

a. submit an annual watershed control program status report to the Department. The annual watershed control program status report shall describe the Supplier of Water's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the Supplier of Water is addressing any shortcomings in plan implementation, including those previously identified by the Department or as the result of the watershed survey conducted under 310 CMR 22.20G(19)(a)5.b. The Supplier of Water shall also describe any significant changes that have occurred in the Watershed since the last watershed sanitary survey. If a Supplier of Water, based upon implementation of an approved watershed control program, believes that a significant change to the approved watershed control program is necessary, the Supplier of Water shall notify the Department in writing of the changes it proposes to make to its approved watershed control plan. Any such change to an approved watershed control plan shall be subject to:

i. the Department's approval based upon the plan's continued inclusion of and adequacy of the elements in 310 CMR 22.20G(19)(a)2.; and

ii. if any change is likely to reduce the level of source water protection, the Supplier of Water's notification shall include a plan and strategy indicating how the proposed actions will mitigate this effect.

If within 60 days of the Department's receipt of a notification of a change to an approved watershed control plan, the Department does not respond to the Supplier of Water regarding approval of that change, and the Supplier of Water otherwise meets the requirements of 310 CMR 22.20G(19)(a)5.a.i. and ii., then the changes to the approved watershed control plan will be considered approved, unless and until the Department subsequently withdraws such approval, based upon failure to meet such requirements.

b. undergo a watershed sanitary survey every three years for Community Water Systems and every five years for Non-community Water Systems which:

i. encompasses the area of influence identified in the Department-approved watershed control plan;

ii. assesses the implementation of actions to reduce source water *Cryptosporidium* levels; and

iii. identifies any significant New Sources of *Cryptosporidium*;

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iv. unless performed by the Department, is performed by a qualified Person approved by the Department, based on demonstrated knowledge and experience in:

A. conducting watershed inspections and reviewing and assessing impacts to public water supplies from existing land use practices, stormwater discharges, aquatic and terrestrial invasive species, wildlife, public access and recreation, agriculture, local zoning and non zoning controls;

B. recommending source water protection measures to address impacts; and

C. assisting with multi-town coordination and public education for water supply protection.

Suppliers of Water shall submit the survey report to the Department, unless the survey is performed by the Department. If the Department determines that significant changes have occurred in the Watershed since the previous watershed sanitary survey, the Department may establish an earlier date than otherwise required in 310 CMR 22.20G(19)(a)5.b. by which Public Water Systems shall undergo another watershed sanitary survey.

c. The Supplier of Water shall make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public in electronic or printed form, upon request. These documents shall be in plain language and include criteria by which to evaluate the success of the program in achieving plan goals. A Supplier of Water may request in writing the Department's written approval to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations. Any such request must identify with specificity the security considerations relevant to each portion proposed to be withheld.

6. A Supplier of Water's watershed control program treatment credit shall be subject to withdrawal if the Department determines that the Supplier of Water is not performing the approved watershed control plan.

(b) Alternative Source.

1. A Supplier of Water 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). A Supplier of Water, subject to the Department's written approval, may determine its bin classification under 310 CMR 22.20G(11) based on the alternative source monitoring results.

2. If a Supplier of Water conducts alternative source monitoring under 310 CMR 22.20G(19)(b), the Supplier of Water shall also monitor its current Plant Intake concurrently, as described in 310 CMR 22.20G(2).

3. Alternative source monitoring under 310 CMR 22.20G (19)(b)1. shall meet the requirements for source monitoring to determine bin classification, as described in 310 CMR 22.20G(2) through (7). The Supplier of Water shall report the alternative source monitoring results in writing to the Department, along with supporting information documenting the operating conditions under which the samples were collected.

4. If a Supplier of Water determines its bin classification under 310 CMR 22.20G(11) 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 Supplier of Water shall relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in 310 CMR 22.20G(14)(c).

(20) Pre-filtration Treatment Toolbox Components.

(a) Pre-sedimentation. A Supplier of Water using Pre-sedimentation, subject to the Department's review and written approval, shall receive a 0.5-log *Cryptosporidium* treatment credit for any month the Public Water System meets the following criteria:

1. the Pre-sedimentation is in continuous operation and treats the entire plant flow taken from a Surface Water Source or a Groundwater under the Direct Influence of Surface Water source;

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2. the Supplier of Water continuously adds a coagulant to the Pre-sedimentation basin; and

3. the Pre-sedimentation basin achieves the following performance criteria:

a. demonstrates at least 0.5-log mean reduction of influent Turbidity. This reduction must be determined using daily Turbidity measurements in the Pre-sedimentation influent and effluent and must be calculated as follows: log10(monthly mean of daily influent Turbidity) - log10(monthly mean of daily effluent Turbidity); or

b. demonstrates at least 0.5-log mean removal of micron-sized particulate material through the Pre-sedimentation, in accordance with 310 CMR 22.20G(22)b.2.

(b) Two-stage Lime Softening. A Supplier of Water using Two-stage Lime Softening, subject to the Department's satisfactory review and written approval, shall receive a 0.5-log *Cryptosporidium* treatment credit, if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to Filtration, and both softening stages treat the entire plant flow taken from a Surface Water Source or a Groundwater under the Direct Influence of Surface Water Source.

(c) Bank Filtration. A Supplier of Water using Bank Filtration that serves as pretreatment to a Filtration plant, subject to the Department's satisfactory review and written approval of the Bank Filtration data, shall receive *Cryptosporidium* treatment credit, as set forth in 310 CMR 22.20G(2)(c)1. through 8., by meeting the following criteria:

1. Suppliers of Water shall receive either 0.5-log treatment credit for wells with a groundwater flow path of at least 25 feet or a 1.0-log treatment credit for wells with a groundwater flow path of at least 50 feet, whichever is less. The groundwater flow path shall be determined as specified in 310 CMR 22.20G(20)(c)4.;

2. the wells must be located in granular aquifers. Granular aquifers are comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A Supplier of Water must characterize the aquifer at the well site to determine aquifer properties. A Supplier of Water must extract a core from the aquifer and demonstrate that in at least 90% of the core length, grains less than 1.0 mm in diameter constitute at least 10% of the core material;

3. the wells must be horizontal or vertical;

4. for vertical wells, the groundwater 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 effective as of March 31, 2016) to the well screen. For horizontal wells, the groundwater flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen;

5. each wellhead must be monitored for Turbidity at least once every four hours while the Bank Filtration is in operation and shall be subject to the following requirements:

a. if monthly average Turbidity levels, based on daily maximum values in any of the wells being monitored, exceed one NTU, the Supplier of Water shall 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; and

b. the Supplier of Water's treatment credit shall be subject to revocation if the Department determines that microbial removal has been compromised, until such time as the Supplier of Water implements corrective actions, as approved by the Department, to remediate the problem;

6. Springs and Infiltration Galleries.

a. Springs and infiltration galleries shall not be eligible for a Bank Filtration treatment credit;

b. Springs and infiltration galleries shall be eligible for credit pursuant to 310 CMR 22.20G(21)(c);

7. Bank Filtration Demonstration of Performance. A Supplier of Water, subject to the Department's review and written approval, shall receive *Cryptosporidium* treatment credit for Bank Filtration based on submittal of a demonstration of performance study meeting the following criteria:

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a. 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; and

b. 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).

Treatment credit based on a performance study may be greater than 1.0-log and may be awarded for Bank Filtration that does not meet the criteria in 310 CMR 22.20G(20)(c)1. through 5.; and

8. Suppliers of Water using Bank Filtration when they begin source water monitoring under 310 CMR 22.20G(2)(a) shall collect samples as described in 310 CMR 22.20G(4)(d), but shall not be eligible for this credit.

(21) Treatment Performance Toolbox Components.

(a) Combined Filter Performance. A Supplier of Water using Conventional Filtration Treatment or Direct Filtration, subject to the Department's review and written approval, shall receive a 0.5 log *Cryptosporidium* treatment credit during any month the combined filter effluent (CFE) Turbidity is less than or equal to 0.15 NTU in at least 95% of the measurements. Turbidity must be measured as described in 310 CMR 22.20A(5)(a) and (c). Such credit shall be in addition to any other *Cryptosporidium* treatment credit granted to the Public Water System pursuant to 310 CMR 22.20G.

(b) Individual Filter Performance.

1. A Supplier of Water using conventional Filtration treatment or Direct Filtration treatment, subject to the Department's review and written approval, shall receive 0.5-log *Cryptosporidium* treatment credit during any month the Public Water System meets the following criteria:

a. the filtered water Turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95% of the measurements recorded each month; and

b. no individual filter has a measured Turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

2. A Public Water System that has received *Cryptosporidium* treatment credit for individual filter performance that fails to meet the requirements as specified in 310 CMR 22.20G(21)(b)1.a. or b. during any month shall not receive a Treatment Technique violation as a result of such failure, for the month in which the failure occurred, under 310 CMR 22.20G(12)(c), if the Supplier of Water demonstrates both of the following to the Department's satisfaction:

a. the failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation and maintenance; and

b. the Public Water System has experienced no more than two such failures in any calendar year.

3. Compliance with these criteria shall be based on individual filter Turbidity monitoring as described in 310 CMR 22.20A(5) or 22.20D, as applicable. Such credit shall be in addition to any other *Cryptosporidium* treatment credit granted to the Public Water System pursuant to 310 CMR 22.20G(21)(a).

(c) Demonstration of Performance.

1. A Supplier of Water, subject to the Department's review and written approval, may be granted *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the following criteria:

a. the demonstration of performance study must follow a Department-approved protocol and must demonstrate the level of reduction the treatment process will achieve under the full range of expected operating conditions for the Public Water System; and

b. the Supplier of Water must demonstrate and report on any monitoring and treatment performance criteria designated by the Department, where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

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2. The *Cryptosporidium* treatment credit may be greater than or less than the prescribed treatment credits in 310 CMR 22.20G(12) or (20) through (23) and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

3. A Public Water System that receives a *Cryptosporidium* treatment credit pursuant to 310 CMR 22.20G(21)(c) shall be subject to revocation if the Department determines that the Public Water System no longer satisfies the criteria set forth in 310 CMR 22.20G(21)(c)1.

4. A Public Water System that receives a *Cryptosporidium* treatment credit for a demonstration of performance study shall not receive a *Cryptosporidium* treatment credit for any toolbox option specified in 310 CMR 22.20G(20) through (23).

(22) Additional Filtration Toolbox Components.

(a) Bag Filters and Cartridge Filters. A Supplier of Water using Bag Filters or Cartridge Filters that treat the entire plant flow taken from a Surface Water Source, or Groundwater under the Direct Influence of Surface Water Source, subject to the Department's review and written approval, shall receive *Cryptosporidium* treatment credit, in accordance with the following:

1. Calculation of Credit. A *Cryptosporidium* treatment credit of up to 2.0-log for an individual Bag Filter or Cartridge Filter and up to a 2.5-log for Bag Filters or Cartridge Filters operated in series shall be granted based on the removal efficiency demonstrated during challenge testing conducted according to the criteria in 310 CMR 22.20G(22)(a)2.a. through i. A factor of safety equal to 1-log for individual Bag Filters or Cartridge Filters and 0.5-log for Bag Filters or Cartridge Filters in series shall be applied to challenge testing results to determine the *Cryptosporidium* treatment credit. Suppliers of Water may use results from challenge testing conducted prior to January 5, 2006, if the prior testing was consistent with the criteria specified in 310 CMR 22.20G(22)(a)2.a. through i.

2. Challenge Testing and Reporting Procedures.

a. challenge testing must be performed on full-scale Bag Filters 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 Filters or Cartridge Filters must be challenge tested in the same configuration that the Public Water System will use, either as individual filters or as a series configuration of filters;

b. 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;

c. the maximum feed water concentration that may 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);

d. challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer;

e. each filter evaluated must be tested for a duration sufficient to reach 100% of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used while remaining in compliance with the requirements of 310 CMR 22.20G(22)(a);

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f. removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$$LRV = \log^{10}(C_f) - \log^{10}(C_p),$$

Where:
LRV = log removal value demonstrated during challenge testing;
C_f = the feed concentration measured during the challenge test; and
C_p = the filtrate concentration measured during the challenge test.

In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p must be set equal to the detection limit;

g. 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% of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100% of the terminal pressure drop. An LRV shall be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV_{filter}) shall be assigned the value of the minimum LRV observed during the three challenge periods for that filter;

h. 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 tenth 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 tenth percentile may be calculated using linear interpolation; and

i. the results of challenge testing must be reported to the Department.

3. Retesting Requirement. 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 for a determination of whether such change will result in an adjustment to the overall *Cryptosporidium* treatment credit previously awarded.

(b) Membrane Filtration. A Supplier of Water using Membrane Filtration, subject to the Department's review and written approval, shall receive *Cryptosporidium* treatment credit, in accordance with the following:

1. Calculation of Credit. The level of *Cryptosporidium* treatment credit a Public Water System receives shall be equal to the lower of the values determined in 310 CMR 22.20G(22)(b)1.a. and b.

a. The removal efficiency demonstrated during challenge testing conducted under the conditions in 310 CMR 22.20G(22)(b)2.a.

b. The maximum removal efficiency that can be verified through direct integrity testing used with Membrane Filtration under the conditions in 310 CMR 22.20G(22)(b)2.b.

2. Testing and Reporting Procedures.

a. Challenge Testing. The membrane used by the Public Water System must undergo challenge testing to evaluate removal efficiency and the Supplier of Water must report the results of challenge testing to the Department. Suppliers of Water may use data from challenge testing conducted prior to January 5, 2006, if the prior testing was consistent with the criteria specified in 310 CMR 22.20G(22)(b)2.a.i. through viii. Challenge testing must be conducted in accordance with the following:

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 Public Water System's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. "Module" as used herein means the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure;

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ii. challenge testing must be conducted using *Cryptosporidium oocysts* or a surrogate that is removed no more efficiently than *Cryptosporidium oocysts*. The organism or surrogate used during challenge testing is referred to as the "challenge particulate". The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as Turbidity may not be used;

iii. the maximum feed water concentration that may be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation: Maximum Feed Concentration = 3.16×10^6 x (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" as used in 310 CMR 22.20G means the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. "Recovery" as used in 310 CMR 22.20G means 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:

$$LRV = \log^{10}(C_f) - \log^{10}(C_p),$$

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 must be 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 $LRV_{C\text{-}Test}$ must be equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then $LRV_{C\text{-}Test}$ is equal to the tenth 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 tenth 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 in the Public Water System's treatment facility 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 *Cryptosporidium* treatment credit demonstrated during the challenge test; and

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, 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 for a determination of whether such change will result in an adjustment to the previously awarded LRV, and an award of a new $LRV_{C\text{-}Test}$.

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b. Direct Integrity Testing. The membrane used by the Public Water System must undergo direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the *Cryptosporidium* treatment credit received pursuant to 310 CMR 22.20G(22)(b)2.a. A "direct integrity test" as used in 310 CMR 22.00G means 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). Direct integrity testing must be conducted in accordance with the following:

i. the direct integrity test must be independently applied to each membrane unit in service. A "membrane unit" as used herein means a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the Public Water System for the purpose of integrity testing or other maintenance;

ii. the direct integrity method must have a resolution of three micrometers or less, where "resolution" as used in 310 CMR 22.20G means the size of the smallest integrity breach that contributes to a response from the direct integrity test;

iii. the direct integrity test must have sensitivity sufficient to verify the *Cryptosporidium* treatment credit received pursuant to 310 CMR 22.20G(22)(b)2.a, where "sensitivity" as used in 310 CMR 22.20G means the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in 310 CMR 22.20G(22)(b)2.b.iii.A. or B., as applicable to the type of direct integrity test the system uses.

A. For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

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

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

B. For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity shall be calculated according to the following equation:

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

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

iv. Suppliers of Water 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 *Cryptosporidium* treatment credit awarded by the Department;

v. if the result of a direct integrity test exceeds the control limit established under 310 CMR 22.20G(22)(b)2.b.iv., the Supplier of Water must remove the membrane unit from service. The Supplier of Water 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; and

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vi. Suppliers of Water 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, unless otherwise approved by the Department, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.

c. Indirect Integrity Monitoring. Each membrane used by the Public Water System must undergo continuous indirect integrity monitoring according to the criteria specified in 310 CMR 22.20G(22)(b)2.c.i. through v. "Indirect integrity monitoring" as used in 310 CMR 22.20G means monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A Supplier of Water that implements continuous direct integrity testing of membrane units in accordance with the criteria in 310 CMR 22.20G(22)(b)2.b.i. through v. is not subject to the requirements for continuous indirect integrity monitoring. Monthly reports must be submitted to the Department summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case. Indirect integrity monitoring must be conducted in accordance with the following:

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 310 CMR 22.20G(22)(b)2.b.i. through v.; and

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 310 CMR 22.20G(22)(b)2.b.i. through v.

(c) Second stage Filtration. A Supplier of Water using second stage Filtration that consists of sand, dual media, GAC, or other fine grain media following granular media Filtration, subject to the Department's review and written approval based on an assessment of the design characteristics of the Filtration process, shall receive 0.5-log *Cryptosporidium* treatment credit, in accordance with the following:

1. the first stage of Filtration must be preceded by a Coagulation step;

2. both Filtration stages must treat the entire plant flow taken from a Surface Water Source or Groundwater under the Direct Influence of Surface Water Source; and

3. a cap, such as GAC, on a single stage of Filtration shall not be eligible for this *Cryptosporidium* treatment credit.

(d) Slow Sand Filtration (as Secondary Filter). A Supplier of Water using Slow Sand Filtration (as secondary filter) that follows a separate stage of Filtration, subject to the Department's review and written approval based on an assessment of the design characteristics of the Filtration process, shall receive 2.5-log *Cryptosporidium* treatment credit, in accordance with the following:

1. both Filtration stages must treat the entire plant flow taken from a Surface Water Source or Groundwater Under the Direct Influence of Surface Water Source;

2. no Disinfectant residual may be present in the influent water to the Slow Sand Filtration process; and

3. Slow Sand Filtration used as a primary Filtration process shall not be eligible for this *Cryptosporidium* treatment credit.

(23) Inactivation Toolbox Components.

(a) Inactivation by Chlorine Dioxide and Ozone. A Supplier of Water using chlorine dioxide or ozone, subject to the Department's review and written approval, shall receive *Cryptosporidium* treatment credit, in accordance with the following:

22.20G: continued

1. Calculation of Credit.
   a. A Public Water System meeting the chlorine dioxide CT value in 310 CMR 22.20G(23): *Table 7* for the applicable water temperature shall receive the corresponding *Cryptosporidium* treatment credit.

310 CMR 22.20G: *Table 7*

CT VALUES (MG ·MIN/L) FOR *Cryptosporidium* INACTIVATION BY CHLORINE DIOXIDE[1]

Log credit	**Water Temperature, °C**										
	≤0.5	1	2	3	5	7	10	15	20	25	30
0.25	159	153	140	128	107	90	69	45	29	19	12
0.5	319	305	279	256	214	180	138	89	58	38	24
1.0	637	610	558	511	429	360	277	179	116	75	49
1.5	956	915	838	767	643	539	415	268	174	113	73
2.0	1275	1220	1117	1023	858	719	553	357	232	150	98
2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122
3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

[1] A Supplier of Water may use this equation to determine log credit between the indicated values: log credit = (0.001506 x (1.09116)Temp) x CT.

   b. A Public Water System meeting the ozone CT value in 310 CMR 22.20G: *Table 8* for the applicable water temperature shall receive the corresponding *Cryptosporidium* treatment credit.

310 CMR 22.20G: *Table 8*

CT VALUES (MG MIN/L) FOR *Cryptosporidium* INACTIVATION BY OZONE[1]

Log credit	**Water Temperature, °C**										
	≤0.5	1	2	3	5	7	10	15	20	25	30
0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
2.0	48	46	42	38	32	26	20	12	7.8	4.9	3.1
2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

[1] A Supplier of Water may use this equation to determine log credit between the indicated values: log credit = (0.0397 x (1.09757)Temp) x CT.

   c. CT must be calculated at least once each day, with both C and T being measured during peak hourly flow as specified in 310 CMR 22.20A(5)(a) through (b).
   d. for a Public Water System which includes several Disinfection segments in sequence, CT must be calculated for each segment. "Disinfection segment" as used herein means a treatment unit process with a measurable Disinfectant residual level and a liquid volume.

22.20G: continued

2. Site-specific Study. A Supplier of Water may conduct a site-specific study, using a protocol pre-approved by Department, demonstrating a higher inactivation in support of a greater *Cryptosporidium* treatment credit than shown in 310 CMR 22.20G: *Table 7* or *Table 8*.

(b) Inactivation by Ultraviolet Light. A Supplier of Water using UV light, subject to the Department's review and written approval, shall receive *Cryptosporidium*, *Giardia lamblia*, and Virus treatment credits, in accordance with the following:

1. Calculation of credits.

a. achieve the UV dose values in 310 CMR 22.20G: *Table 9* to receive the corresponding *Cryptosporidium*, *Giardia lamblia*, and Virus treatment credits;

310 CMR 22.20G: *Table 9*

UV DOSE TABLE FOR *Cryptosporidium*, *Giardia lamblia*, and VIRUS INACTIVATION CREDIT

Log credit	Cryptospridium\UV dose (mJ/cm^2)	*Giardia lamblia* UV dose (mJ/cm^2)	Virus UV dose (mJ/cm^2)
0.5	1.6	1.5	39
1.0	2.5	2.1	58
1.5	3.9	3.0	79
2.0	5.8	5.2	100
2.5	8.5	7.7	121
3.0	12	11	143
3.5	15	15	163
4.0	22	22	186

b. the treatment credits listed in 310 CMR 22.20G: *Table 9* shall apply to 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, demonstrate an equivalent germicidal dose through reactor validation testing, as described in 310 CMR 22.20G(23)(b)4.;

c. the UV dose values in 310 CMR 22.20G: *Table 9* are applicable only to post-filter applications of UV in filtered Public Water Systems, and to unfiltered Public Water Systems; and

d. treat at least 95% 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 310 CMR 22.20G(23)(b)1.a. and 4.

2. Water Quality Monitoring. Prior to validation testing, a Supplier of Water shall satisfy the following requirements:

a. sample the water quality at a location that is immediately upstream from where the UV reactor is to be installed.

b. ensure monitoring:

i. represents storm events, reservoir turnover, seasonal changes, source blending and any variation in upstream treatment;

ii. is conducted up to the period of time specified in 310 CMR 22.20G: *Table 10*. The Department may approve a shorter period of monitoring if the Supplier of Water can demonstrate that the water quality is stable and does not change seasonally; and

22.20G: continued

iii. meets the water quality limits, specified in 310 CMR 22.20G: *Table 10*:

310 CMR 22.20G: *Table 10*
UV RAW WATER QUALITY CRITERIA

Parameter	Frequency[1]	Limits
pH (field measurement)	Monthly	NA
Temp. (field measurement)	Bi-weekly for one year	NA
Dissolved iron (mg/L)	Quarterly for one year	0.1
Dissolved manganese (mg/L)	Quarterly for one year	0.05
Turbidity (NTU)	Bi-weekly for one year	0.3
Color (color units)	Monthly	15
Total Hardness (mg/L as $CaCO_3$)	Quarterly for one year	120
Hydrogen Sulfide[2] (mg/L)	Quarterly for one year	0.2
Alkalinity (mg/L as $CaCO_3$)	Quarterly for one year	NA
Suspended Solids (mg/L)	Quarterly for one year	10.0
UV Transmittance at 254nm	Bi-weekly for one year	NA
Spectral Absorbance[3]	Bi-weekly for one year	NA
Algae Counts (cells/mL)[4]	Bi-weekly for one year	NA[5]

[1] The Department may allow the use of historical data collected at higher frequencies

[2] Groundwater only

[3] For the use of medium pressure reactors only. Absorbance to be measured at 200 - 300 nm

[4] Unfiltered supplies only

[5] At algae concentration > 70,000 cells/mL additional piloting may be required as part of the UV validation testing

3. Additional Raw Water Treatment. If a Public Water System fails to satisfy the requirements set forth in 310 CMR 22.20G(23)(b)2.b.iii., the Supplier of Water may propose and, subject to Department approval pursuant to 310 CMR 22.04, implement additional treatment for raw water in order to achieve the limits specified in 310 CMR 22.20G: *Table 10*.

4. Reactor Validation Testing. A Supplier of Water must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactors deliver the UV dose required in 310 CMR 22.20G(23)(b)1.a. for the applicable credit, subject to the following:

a. validation testing must include either full scale testing of a reactor that conforms uniformly to the UV reactors used by the Public Water System and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp, or an alternative approach in accordance with 310 CMR 22.20G(23)(b)4.b.; or

b. any alternative approach to UV validation using protocols established in:

i. *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse*, 3rd Edition, August 2012, published by National Water Research Institute in collaboration with AWWA Research Foundation, pp 1-78; or

ii. *Ultraviolet Microbiological Water Treatment Systems*, NSF/ANSI 55-2014, October 16, 2014, Appendix A and B, pp.1-36, published by NSF/ANSI; and

c. operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status; which 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.

22.20G: continued

5. Reactor Monitoring, Verification and Calibration.
   a. A Supplier of Water must monitor UV reactors to determine if the reactors are operating within validated conditions, as identified in 310 CMR 22.20G(23)(b)4.
   b. A Supplier of Water must submit monitoring results to the Department on a monthly basis on a form approved by the Department for review and evaluation in a format approved by the Department.
   c. A Supplier of Water must monitor UV intensity as measured by a UV sensor(s), flow rate, lamp status, UV transmittance, or "UVT", and other appropriate parameters based on UV reactor operation.
   d. A Supplier of Water must calibrate the UV reactor flow meters annually.
   e. A Supplier of Water must verify the calibration of the UV sensors monthly and recalibrate the sensors annually, each in accordance with manufacturer's specifications.
   f. A Supplier of Water must verify the calibration of UVT analyzers annually for UV reactors using the "Setpoint Approach". The Setpoint Approach, also called "Operational Setpoint", uses a specific value for a critical parameter, such as UV intensity, that is related to UV dose. Setpoints are established during validation testing. During operations, the PWS compares the measured parameter to the setpoint to confirm performance.
   g. A Supplier of Water must verify the calibration of UV transmittance analyzers weekly for UV reactors using the "Calculated Dose Approach". The Calculated Dose Approach uses a dose-monitoring equation to estimate the UV dose based on operating conditions (typically flow rate, UV intensity, and UVT).
   h. A Supplier of Water must verify the UVT reading of the reactor by comparing the UVT obtained from the on-line UVT transmitter against the UVT of a grab sample. The difference in reading between the on-line analyzer reading and the grab sample must be less than or equal to two percent of the UVT.

22.21: Groundwater Supply Protection

The following requirements shall apply to all persons to protect groundwater used as sources of public drinking water supply from contamination:

(1) Source Approval

(a) No public water supply well, wellfield, or spring shall be constructed, expanded or replaced, and no water supply well, wellfield, or spring shall be placed on-line in a public water system, without the prior written approval of the Department. Persons seeking such approval are directed to follow the procedures set forth in the Drinking Water Program's *Guidelines and Policies for Public Water Systems*.

All requests for source approval, or approval of Zone II and III delineations, shall be submitted to the Department's Regional Office serving the area where the proposed well, wellfield, or spring is located.

In determining whether to grant such approval, the Department shall apply the criteria set forth in 310 CMR 22.21 and the *Guidelines and Policies for Public Water Systems*. Copies of the *Guidelines and Policies for Public Water Systems* are available for a nominal fee from the State Bookstore, State House, Room 116, Boston, Massachusetts and 436 Dwight Street, Springfield, Massachusetts.

(b) No public water supply well or wellfield designed to withdraw, or spring which flows, less than 100,000 gallons per day shall be constructed, expanded or replaced, or placed on-line, unless the Department finds in writing:

1. that the proponent has satisfactorily complied with the Drinking Water Program's *Guidelines and Policies for Public Water Systems*;
2. that the source of water supply for the well, wellfield, or spring will achieve all applicable water quality standards set forth in the Massachusetts Drinking Water Regulations, 310 CMR 22.00;
3. that the proponent has properly determined the Zone I of the proposed well, wellfield, or spring;
4. that the Zone I of the proposed well, wellfield, or spring is owned or controlled by the supplier of water; and

22.21: continued

5. that current and/or future land uses within the Zone I are limited to those directly related to the provision of public drinking water or will have no significant adverse impact on water quality.

In addition, the Department may require the proponent to delineate Zones II and III, and submit a groundwater monitoring well program plan for approval if the Department finds that existing or proposed land uses within the Interim Wellhead Protection Area of the proposed well, wellfield, or spring, determined in accordance with 310 CMR 22.21(1)(i), may pose a threat to water quality.

(c) No public water supply well, wellfield or spring designed to withdraw, or spring which flows, 100,000 gallons per day or more shall be constructed, expanded or replaced unless the Department finds in writing:

1. that the proponent has met all the requirements set forth in 310 CMR 22.21(1)(b)1. through 5.;

2. that the proponent has properly delineated the Zones II and III of the proposed well, wellfield, or spring;

3. that the proponent has submitted a groundwater monitoring well program plan designed to evaluate the water quality impacts of land uses within the Zone II of the proposed well, wellfield, or spring; and

4. that the proponent has drafted wellhead protection zoning or nonzoning controls that prohibit siting within the Zone II the land uses set forth in 310 CMR 22.21(2)(a) and (b) unless designed in accordance with the performance standards specified in 310 CMR 22.00, and has complied with the nitrate management requirement of 310 CMR 22.21(2)(d).

(d) No public water supply well, wellfield or spring designed to withdraw, or spring which flows, 100,000 gallons per day or more shall be placed on-line unless:

1. a groundwater monitoring well program plan approved by the Department has been fully implemented (*i.e.* the monitoring wells are operational and the sampling frequency and parameters have been approved by the Department); and

2. the cities and towns in which any part of the Zone II of the proposed well, wellfield, or spring is located have wellhead protection zoning or nonzoning controls in effect that prohibit siting within the Zone II the land uses set forth in 310 CMR 22.21(2)(a) and (b) unless designed in accordance with the performance standards specified in 310 CMR 22.00. If the public water system is owned or controlled by an entity other than a municipality, the proponent must demonstrate to the Department's satisfaction that it has used its best efforts to have all cities and towns in which the Zone II is located establish such zoning or nonzoning controls.

(e) Notwithstanding 310 CMR 22.21(1)(d)2., no public water supply well, wellfield or spring designed to withdraw, or spring which flows, 100,000 gallons per day or more that will be used in a public water system owned or operated by a municipality, and is located within that municipality, shall be placed on-line unless the municipality has wellhead protection zoning or nonzoning controls in effect that prohibit siting within the Zone II the land uses set forth in 310 CMR 22.21(2)(a) and (b) unless designed in accordance with the performance standards specified therein. If the Zone ll of a municipal public water system extends into another municipality, the water supplier must also demonstrate to the Department's satisfaction that it has used its best efforts to have all cities and towns into which the Zone II extends establish such zoning or nonzoning controls within the Zone II.

(f) Notwithstanding any other regulatory provision to the contrary, the Department may waive the requirement that the proponent of a public water supply well, wellfield, or spring delineate the Zone II, provided:

1. the proponent has properly delineated the Zone III;

2. each city and town in which the Zone III of the proposed well, wellfield, or spring is located has wellhead protection zoning or nonzoning controls in effect that prohibit within the Zone III the land uses set forth in 310 CMR 22.21(2)(a) and (b) unless designed in accordance with the performance standards specified in 310 CMR 22.00;

3. the proponent has submitted a groundwater monitoring well program plan designed to evaluate the water quality impacts of land uses within the Zone III of the proposed well, wellfield, or spring; and

22.21: continued

4. the desired relief can be granted without substantial detriment to the public good.

In the event the Department waives the requirement that the proponent delineate the Zone II of a proposed public water supply well, wellfield, or spring, the supplier of water shall fully implement the groundwater monitoring well program plan approved by the Department before placing the well, wellfield, or spring on-line (*i.e.* the monitoring wells shall be operational and the sampling frequencies and parameters shall have been approved by the Department).

(g) In determining whether a proponent has properly determined the Zone I or delineated the Zones II or III of a well, wellfield, or spring, or adequately designed a groundwater monitoring well program plan, the Department shall apply the criteria set forth in the Drinking Water Program's *Guidelines and Policies for Public Water Systems*.

(h) Any person who receives Department approval for a public water supply well, wellfield or spring designed to withdraw, or spring which flows, 100,000 gallons per day or more that is not a replacement withdrawal point shall obtain a permit for any withdrawal, in accordance with the Water Management Act, M.G.L. c. 21G, and 310 CMR 36.00: *Massachusetts Water Resources Management Program*.

(i) If the Department has not approved the Zone II for a public water supply well, wellfield, or spring, the Department will utilize the Interim Wellhead Protection Area as defined in 310 CMR 22.02.

(j) The proponent may meet the requirements set forth in 310 CMR 22.21(1)(d)2. by demonstrating that existing rights in perpetuity or for a specific period of years stated in the form of a restriction, easement, covenant or condition in a deed or other instrument prohibit the siting of the land uses set forth in 310 CMR 22.21(2)(a) and (b) within the Zone II.

(k) The proponent may meet the requirements set forth in 310 CMR 22.21(1)(f)2. by demonstrating that existing rights in perpetuity or for a specific period of years stated in the form of a restriction, easement, covenant or condition in a deed or other instrument prohibit the siting of the land uses set forth in 310 CMR 22.21(2)(a) and (b) within the Zone III.

(l) No public water supply well, wellfield or spring designed to withdraw, or spring which flows, 100,000 gallons per day or more approved after the effective date of 310 CMR 22.21 shall remain on-line following the amendment or repeal of a wellhead protection zoning or nonzoning control pertinent to that well, wellfield, or spring, or the expiration of any such period of years stated in a deed or other instrument approved pursuant to 310 CMR 22.21(1)(j) or (k), unless the Department finds in writing that the supplier of water meets the requirements set forth in 310 CMR 22.21(1)(d) or (e), whichever is applicable, or grants a variance in accordance with 310 CMR 22.21(5). Any source of supply removed from service shall be maintained by the supplier of water as an emergency source of water supply unless the Department finds in writing that the source is not needed by the supplier of water for present or future water supply.

(m) Notwithstanding any other regulatory provision to the contrary, the Department may exempt a supplier of water from any of the requirements set forth in 310 CMR 22.21(1)(d) while a state of water emergency declared pursuant to M.G.L. c. 21G, § 15, is in effect. In the event that the Department grants such an exemption, the well, wellfield, or spring shall remain on-line only for the duration of the state of water emergency, as determined by the Department.

(2) Wellhead Protection Zoning and Nonzoning Controls

(a) Wellhead protection zoning and nonzoning controls submitted to the Department in accordance with 310 CMR 22.21(1), shall collectively prohibit the siting of the following land uses within the Zone II, or Zone III if the criteria of 310 CMR 22.21(1)(f) have been met, of the proposed well, wellfield, or spring, whichever is applicable:

1. landfills and open dumps, as defined in 310 CMR 19.006: *Definitions*;
2. landfills receiving only wastewater residuals and/or septage (wastewater residuals "monofills") approved by the Department pursuant to M.G.L. c. 21, § 26 through 53; M.G.L. c. 111, § 17; M.G.L. c. 83, §§ 6 and 7, and any regulations promulgated thereunder.
3. automobile graveyards and junkyard, as defined in M.G.L. c. 140B, § 1;
4. stockpiling and disposal of snow or ice removed from highways and streets located outside of Zone II that contains sodium chloride, chemically treated abrasives or other chemicals used for snow and ice removal;

22.21: continued

5. petroleum, fuel oil and heating oil bulk stations and terminals, including, but not limited to, those listed under Standard Industrial Classification (SIC) Codes 5171 (not including liquified petroleum gas) and 5983. SIC Codes are established by the U.S. Office of Management and Budget and may be determined by referring to the publication, *Standard Industrial Classification Manual*;

6. treatment or disposal works subject to 314 CMR 5.00: *Ground Water Discharge Permit Program* for wastewater other than sanitary sewage. This prohibition includes, but is not limited to, treatment or disposal works related to activities under the Standard Industrial Classification (SIC) Codes set forth in 310 CMR 15.004(6) (Title 5), except the following:

a. the replacement or repair of an existing system(s) that will not result in a design capacity greater than the design capacity of the existing system(s); and

b. treatment works approved by the Department designed for the treatment of contaminated ground or surface waters and operated in compliance with 314 CMR 5.05(3) or (13); and

c. publicly owned treatment works, or POTWs.

7. facilities that generate, treat, store or dispose of hazardous waste that are subject to M.G.L. c. 21C and 310 CMR 30.000: *Hazardous Waste*, except for the following:

a. very small quantity generators, as defined by 310 CMR 30.00: *Hazardous Waste*;

b. household hazardous waste collection centers or events operated pursuant to 310 CMR 30.390: *Special Provisions for Accumulation of Household Hazardous Waste And/or Hazardous Waste Generated by Very Small Quantity Generators*;

c. waste oil retention facilities required by M.G.L. c. 21, § 52A; and

d. treatment works approved by the Department designed in accordance with 314 CMR 5.00: *Ground Water Discharge Permit Program* for the treatment of contaminated ground or surface waters.

8. any floor drainage systems in existing facilities, in industrial or commercial hazardous material and/or hazardous waste process areas or storage areas, which discharge to the ground without a DEP permit or authorization. Any existing facility with such a drainage system shall be required to either seal the floor drain (in accordance with the state plumbing code, 248 CMR 10.00: *Uniform State Plumbing Code*), connect the drain to a municipal sewer system (with all appropriate permits and pre-treatment), or connect the drain to a holding tank meeting the requirements of all appropriate DEP regulations and policies.

(b) Wellhead protection zoning and nonzoning controls submitted to the Department in accordance with 310 CMR 22.21(1), shall collectively prohibit the siting of the following and uses within the Zone II, or Zone III if the criteria of 310 CMR 22.21(1)(f) have been met, of the proposed well, wellfield, or spring, whichever is applicable, unless designed in accordance with the performance standards specified below in 310 CMR 22.21(2)(b)1. through 7.:

1. storage of sludge and septage, as defined in 310 CMR 32.05: *Definitions*, unless such storage is in compliance with 310 CMR 32.30: *Requirements for Any Storage of Sludge or Septage* and 32.31: *Additional Requirements for Long-term Storage of Sludge or Septage*;

2. storage of sodium chloride, chemically treated abrasives or other chemicals used for the removal of ice and snow on roads, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate;

3. storage of commercial fertilizers, as defined in M.G.L. c. 128, § 64, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate;

4. storage of animal manures, unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff and leachate;

5. storage of liquid hazardous materials, as defined in M.G.L. c. 21E, and/or liquid petroleum products unless such storage is:

a. above ground level;

b. on an impervious surface; and

22.21: continued

c. either:
(i) in container(s) or above-ground tank(s) within a building; or
(ii) outdoors in covered container(s) or above-ground tank(s) in an area that has a containment system designed and operated to hold either 10% of the total possible storage capacity of all containers, or 110% of the largest container's storage capacity, whichever is greater;

however, these storage requirements shall not apply to the replacement of existing tanks or systems for the keeping, dispensing or storing of gasoline provided the replacement is performed in a manner consistent with state and local requirements.

6. the removal of soil, loam, sand, gravel or any other mineral substances within four feet of the historical high groundwater table elevation (as determined from monitoring wells and historical water table fluctuation data compiled by the United States Geological Survey), unless the substances removed are redeposited within 45 days of removal on site to achieve a final grading greater than four feet above the historical high water mark, and except for excavations for the construction of building foundations or the installation of utility works, or wetland restoration work conducted in accordance with a valid Order of Condition issued pursuant to M.G.L. c. 131, § 40;

7. and land uses that result in the rendering impervious of more than 15% or 2500 square feet of any lot or parcel, whichever is greater, unless a system for artificial recharge of precipitation is provided that will not result in the degradation of groundwater quality.

(c) The proponent shall give written notice to the Department of any and all local by-laws, ordinances, rules and regulations that allow for the grant of a variance, waiver or exemption from any of the wellhead protection zoning or nonzoning controls submitted to the Department for approval in accordance with 310 CMR 22.21 before placing the proposed well, wellfield, or spring on-line.

(d) The Department may require as part of the Source Approval process requirements of 310 CMR 22.21(1)(c), the completion of a nitrogen loading analysis for the new well, wellfield, or spring's Zone II. A nitrogen loading analysis shall be required when, in the Department's judgement, the type and level of land use within the Zone II or other information reasonably indicates that nitrate concentrations in the well, wellfield, or spring may or will exceed five mg/l nitrate.

Public water systems required by their Water Management Act M.G.L. c. 21G permits issued under 310 CMR 36.00: *Massachusetts Water Resources Management Program* to define Zone IIs and implement land use controls shall be required to conduct a nitrate loading analysis as part of the Zone II delineation for well, wellfield, or springs that have exceeded five mg/l nitrate.

Public water systems whose required nitrate loading analysis predicts >five mg/l nitrate or whose well, wellfield, or spring has exceeded five mg/l nitrate must prepare a nitrate management plan, subject to the Department's approval, which seeks to maintain nitrate levels below five mg/l for the subject well in the long-term.

(3) Requirements for all New and Existing Groundwater Sources

(a) Sources for Community Systems. Any person who obtains Department approval for a community public water system that relies entirely upon groundwater sources shall provide additional wells, wellfield, or springs and pumping equipment, or the equivalent, capable of producing the same volumes and quality of water as the system's primary well, wellfield, or spring at all times, or shall provide the storage capacity equivalent to the demand of at least two average days if approved by the Department, unless an interconnection with another public water system has been provided which can adequately provide the quantity and quality of water needed.

(b) Zone 1. All suppliers of water shall acquire ownership or control of sufficient land around wells, infiltration galleries, springs and similar sources of ground water used as sources for drinking water to protect the water from contamination. This requirement shall generally be deemed to have been met if all land within Zone I is under the ownership or control of the supplier of water. Current and future land uses within the Zone I shall be limited to those land uses directly related to the provision of the public water system or to other land uses which the public water system has demonstrated have no significant impact on water quality. The Department may require greater distances or permit lesser distances than the Zone I distances set forth at 310 CMR 22.02, if the Department deems such action necessary or sufficient to protect public health. No new underground storage tanks for petroleum products shall be located within Zone I.

22.21: continued

(4) Inspection and Enforcement

(a) Each supplier of water shall annually survey the land uses within Zones I, II and III, or within the Interim Wellhead Protection Area, for each well and wellfield under its control.

(b) A supplier of water shall submit to the Department an annual report that identifies for each well and wellfield under its ownership and control the presence of new land uses within the Zones I, II and III, or within the Interim Wellhead Protection Area, that could adversely impact water quality. The annual reports shall be submitted on Department approved forms by January 31st for the preceding calendar year. The annual reports shall be submitted to the Department's Office of Water Supply at the Regional Office that serves the area where the well, wellfield, or spring is located.

(c) A supplier of water shall notify the local board of health or health department within 48 hours of detection of any violation of a statutory or regulatory requirement that may adversely effect its water supply or distribution system, and shall notify the inspector of buildings, building commissioners or local inspector, or the person charged with enforcement of local zoning and nonzoning controls, within 48 hours of detecting any violation of applicable land use restrictions that may adversely effect its water supply or distribution system. Such notices should include the following information:

1. the name of the person in violation;
2. the location where the violation is occurring;
3. the date when the violation was observed;
4. a description of the violation;
5. the legal citation of the requirement or restriction violated; and
6. a description of the actions necessary to remove or remedy the violation and the deadlines for taking such actions.

In addition, the supplier of water shall notify the Department's Office of Water Supply at the appropriate Regional Office upon giving any notice required by 310 CMR 22.21(4)(c).

(d) A supplier of water shall take appropriate action to determine whether the violation has been removed or remedied and shall notify the Department's Office of Water Supply at the appropriate Regional Office upon finding that the violation has been removed or remedied.

(5) Variances

(a) The Department may grant a variance from the requirements of 310 CMR 22.21(1)(e) to a proponent that, despite its best efforts, is unable to adopt one or more of the requirements set forth in 310 CMR 22.21(2)(a) and (b) if the Department finds that strict compliance with such requirements would result in an undue hardship and would not serve to further the intent of 310 CMR 22.21.

(b) The Department shall consider the following factors in making the finding necessary to grant a variance pursuant to 310 CMR 22.21(5):

1. the reasonableness of available alternatives to the proposed well, wellfield, or spring;
2. the overall effectiveness of existing land use controls and other protective measures on the proposed well, wellfield, or spring and any other water supply sources used by the supplier of water;
3. the nature and extent of the risk of contamination to the proposed well, wellfield, or spring that would result from the granting of the variance; and
4. whether the variance is necessary to accommodate an overriding community, regional, state or national public interest.

These factors need not be weighed equally, nor must all of these factors be present for the Department to grant a variance. The presence of any single factor may be sufficient for the granting of a variance.

(c) A variance granted pursuant to 310 CMR 22.21(5) shall be conditioned on such monitoring or other requirements as the Department may prescribe.

(d) Requests for variances shall be made in writing and clearly state the provision or requirement from which the variance is sought and the reasons and facts that support the granting of a variance, and shall include an evaluation of the reasonableness of alternatives to the proposed well, wellfield, or spring.

(e) Within 14 days of filing a request for variance under 310 CMR 22.21(5)(a), the person filing the request shall notify persons served by the supplier of water by direct mail and by publication on not less than three consecutive days in a newspaper of general circulation in the service area of the supplier of water. The notice shall include:

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1. the provision or requirements from which the variance is being sought;
2. the identity of the proponent of the well, wellfield, or spring;
3. the identity of the person requesting the variance, the address where a copy of the request for variance will be available for public inspection, and the times it will be available; and
4. a statement that the Department will receive written comments concerning the request from the public for a 30 day period commencing on the last date of newspaper publication.

(f) Each person submitting a request for variance shall submit to the Department a copy of the public notice required by 310 CMR 22.21(5)(e) and affidavits attesting to the fact that the notices have been given. The Department will receive written comments concerning the request from the public for a 30 day period commencing on the last date of newspaper publication.

(g) Within 30 days of the close of the comment period, each person requesting a variance under 310 CMR 22.21(5)(a) shall respond in writing to all reasonable public comments received by the Department.

(h) The Department may schedule a public hearing on any request for variance submitted in accordance with 310 CMR 22.21(5) if it determines on the basis of the public comments received that such a hearing is in the public interest. In the event that the Department schedules a hearing, the person filing the request shall notify persons served by the supplier of water of the hearing by publication on not less than three consecutive days in a newspaper of general circulation in the service area of the supplier of water. In addition, the person filing the request shall notify each person who submitted written comment concerning the request to the Department by direct mail. The person filing the request shall submit to the Department a copy of the public notices required by 310 CMR 22.21(5)(h), and an affidavit attesting to the fact that the notices have been given, prior to the hearing. Persons filing a request for a variance under 310 CMR 22.21(5) shall pay the full the cost of all notifications and public hearing scheduled.

(i) Within 30 days of the grant of a variance under 310 CMR 22.21(5), any person that receives a variance shall notify persons served by the supplier of water of the granting of the variance, including any conditions imposed by the Department, by direct mail and by publication on not less than three consecutive days in a newspaper of general circulation in the service area of the supplier of water. The person that receives the variance shall submit to the Department a copy of the public notices and an affidavit attesting to the fact that the notices have been given upon completion of the public notification.

22.22: Cross Connections Distribution System Protection

(1) Purpose. The Department's purpose in establishing a comprehensive distribution protection program is to prevent the contamination of drinking water to the last free flowing outlets or consumer's tap. For this reason, the Department strongly advocates the elimination of all cross connections. The installation of backflow prevention devices does not eliminate a cross connection. The installation of backflow prevention devices is a protection solution when re-plumbing or re-piping is not feasible. All cross connection protection devices shall be approved and permited in accordance with 310 CMR 22.22.

(2) Maintenance of a Cross Connection

(a) No physical cross connection shall be maintained between the distribution system of a public water system, the water of which is being used for drinking, domestic, or culinary purposes, and the distribution system of any water source not approved by the Department, as being of safe sanitary quality, or any plumbing, fixture, or device whereby nonpotable water or other substances might flow into the potable water system, unless said connection has been protected by a backflow prevention device approved, in accordance with 310 CMR 22.22 or 248 CMR 10.00: *Uniform State Plumbing Code*; as applicable.

(b) Backflow prevention devices shall be installed, based on the degree of hazard involved, at all fixtures and equipment where backflow and/or back siphonage may occur and whenever a minimum air gap cannot be provided between the public water system outlets to the fixture or equipment and its flood level rim. All fixtures that have a threaded hose type connection shall, at a minimum, have the required air gap separation and be equipped with a vacuum breaker in accordance with 248 CMR 10.14: *Water Supply and the Water Distribution System*;

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(c) Where a water connection is not subject to back pressure, a non-pressure type vacuum breaker shall be installed on the discharge side of the last valve on the line serving the fixture or equipment,

(d) Cross connections maintained or created on fire protection system shall comply with 310 CMR 22.22(9)(d).

(e) All cross connection requiring the installation of a double check valve assembly or a reduced pressure backflow preventer shall be approved and registered by the public water system.

(f) Cross connections protected by a device other than a double check valve assembly or a reduced pressure backflow preventer, approved and permitted by the inspector of plumbing in accordance with 248 CMR 10.00: *Uniform State Plumbing Code* do not require the approval of the Department, its designee or the public water system.

(g) Except for the installation of backflow prevention devices on fire protection systems, no double check valve assembly or reduced pressure backflow preventors shall be installed on a cross connection until the application for a plumbing permit is accompanied by a letter of approval from the Department, its designee or public water system pursuant to 248 CMR 10.14: *Water Supply and the Water Distribution System*.

(h) Subject to applicable laws and regulations, public water systems shall have the authority to terminate any water service connection to any facility where cross connections are found to be in non-compliance with 310 CMR 22.22. The supplier shall deny water service to any premises where cross connections exist until corrective action is taken. If necessary, water service shall be disconnected for failure to test or maintain backflow prevention devices in a manner acceptable to the supplier. If it is found that the backflow prevention device has been removed or by-passed or otherwise rendered ineffective, water service shall be discontinued unless corrections are made immediately.

(i) The public water system shall establish a time for completion of necessary corrections or removal of actual or potential cross connections, taking into consideration the degree of hazard involved and the time required to obtain and to install the needed equipment. The public water system shall use every means at its disposal to obtain voluntary compliance. However, if proper protection has not been provided after a reasonable period of time (following legal notification and subject to applicable laws and regulations), the public water system shall physically separate the public water supply from the on-site piping system in such a manner that the two systems cannot again be connected by an unauthorized person.

(j) Cross connections between a public water system and a private well or individual water source serving residential dwellings used for potable or nonpotable purposes are prohibited.

(k) All backflow prevention devices shall be installed and repaired by a Massachusetts licensed plumber, except for backflow prevention devices installed on fire protection systems. A Massachusetts licensed fire sprinkler contractor is responsible for all work conducted on a fire protection system, including the installation, maintenance and repair of backflow prevention devices.

(l) An anti-siphon or back pressure device shall be installed on any apparatus that pumps any chemical into a potable water supply to prevent back siphonage.

(3) Public Water System Responsibilities. Every public water system shall be responsible for:

(a) Controlling cross connections to the last free flowing outlet of the consumer and for the safety of the public water system under its jurisdiction.

(b) Having a cross connection control distribution system protection program plan (the "cross connection program plan") approved by the Department as specified at 310 CMR 22.22(3)(b).

1. Every public water system is required to have its cross connection program plan approved by the Department by June 1, 1994.

2. Each plan must be prepared in accordance with departmental guidance and shall include, at a minimum, the following information: description of current program (*i.e.* staffing, tracking, surveying, testing, training and fee requirements) and evaluation of the current program, proposed changes and implementation plans. The plan shall also include an explanation of how the public water system will satisfy 310 CMR 22.22(3)(c) through (r).

22.22: continued

3. The plan shall be fully implemented and operational by January 1, 1999. A public water system may use a contractor, subcontractor, or consultant to assist in the program implementation except as specified at 310 CMR 22.22(3)(r). However, every public water system shall continue to be responsible for compliance with 310 CMR 22.22 and subject to enforcement by the Department.

4. The public water system shall obtain the Department's written approval prior to modifying its approved cross connection plan.

(c) Inspecting and surveying of all industrial, commercial, and institutional premises served by the public water system to determine if cross connections exist and that all cross connections are properly protected by an appropriate device or eliminated.

(d) Maintaining on the public water system premises in a readily accessible form the following documentation:

1. a schedule of all facilities inspected and surveyed;
2. records of all device locations;
3. related correspondence, including notices of violation; and
4. list of devices and inspections of approved backflow prevention devices.

(e) Ensuring that all backflow prevention device inspections are conducted by a Massachusetts Certified Backflow Prevention Device Tester and surveys for cross connections are conducted by a person who is certified by the Department as a Massachusetts Certified Cross Connection Surveyor.

(f) Establishing and maintaining a cross connection control program for residential users which shall include an educational component.

(g) Not allowing any cross connection at any point within its system unless said cross connection is approved pursuant to 310 CMR 22.22 or 248 CMR 10.00: *Uniform State Plumbing Code*.

(h) Ensuring that all double check valve assemblies and reduced pressure backflow preventer devices are inspected and tested in accordance with the public water system program plan as approved by the Department and as specified at 310 CMR 22.22(13). The public water system has the option of testing the devices itself, having the device tested by the device owner, or having the testing conducted by a contractor.

(i) Establishing a program for auditing for devices not tested by public water system staff.

(j) Submitting a report to the Department annually on a form or in a format specified by the Department that shall include the following minimum information:

1. a list of or information on all cross connections protected by an approved double check valve assembly or approved reduced pressure backflow preventer devices;
2. the numbers and types of facilities surveyed yearly; and
3. the number type and location of violations found.

(k) Assisting Department personnel in any cross connection related inspections and backflow device installations;

(l) Taking appropriate action to eliminate cross connections and hazardous conditions, strongly promote compliance, and take the appropriate enforcement action when necessary;

(m) Notifying the cross connection owner of any violations of 310 CMR 22.22 by sending a Notice of Violation to owner;

(n) Notifying all device owners of their responsibilities relative to cross connections control and 310 CMR 22.00.

(o) Annually notify consumers of water and local public officials of the requirements of the distribution system cross connection control program, including Mayors, Town Managers, city and town councilors or selectmen, water commissioners, fire chiefs, local boards of health, plumbing inspectors, building inspectors, local state representatives, unless waived in writing by the Department.

(p) Generating all necessary correspondence relative to the administration and operations of the cross connection control program. The public water system will be responsible for all correspondence to device owners. All correspondence relating to the cross connection control program must be signed by the public water system.

22.22: continued

(q) Reviewing and approving design data sheets and plans for proposed new installations of reduced pressure backflow preventers, and double check valve assemblies. All design data sheets and plans shall be reviewed by a Massachusetts Certified Cross Connection Surveyor, effective January 1, 1999 as specified at 310 CMR 22.22(7)(a)4. The public water system may not delegate, or subdelegate, contract, or subcontract this responsibility to any other entity, unless otherwise authorized in writing by the Department. The Department will require that all recommendations or findings made by the contracted certified surveyor, when reviewing and approving data sheets and plans, be submitted on the public water system letterhead and signed by an authorized person of the public water system.

(r) Ensuring, upon completion of installation that backflow prevention devices are installed according to the approved design data sheet and plans and tested for proper operation, effective January 1, 1999.

(4) Owners' Responsibilities. The owner of any cross connection protected by a double check valve assembly or reduced pressure backflow preventer shall:

(a) Notify the public water system of all cross connections protected by a double check valve assembly or reduced pressure backflow preventer and comply with all necessary approvals and permits from the public water system and/or the Department for the maintenance of cross connections, as specified at 310 CMR 22.22;

(b) Have suitable arrangements made so that inspections of backflow prevention devices and cross connection surveys can be made during regular business hours;

(c) Maintain a spare parts kit and any special tools required for the removal and reassembly of backflow prevention devices;

(d) Provide the necessary labor for inspection and testing by the Certified Backflow Prevention Device Testers or Certified Cross Connection Surveyor;

(e) Overhaul, repair, or replace within 14 days of the initial inspection date and retest pursuant to 310 CMR 22.22(13)(e), any device which fails a test or is found defective;

(f) Submit copies of the Inspection and Maintenance Report Form as required by the public water system.

(g) Maintain on the premises complete records on all devices for the life of said devices including as-built plans and design data sheets; maintain for seven years the Inspection and Maintenance Report Forms for tests conducted by the certified.

(h) Make certain that the cross connection protection device is tested as specified at 310 CMR 22.22(13) or as required by the public water system.

(5) Certified Backflow Prevention Device Tester's Responsibilities. Certified Backflow Prevention Device Testers have the following responsibilities relative to cross connections:

(a) Having a backflow preventer test kit that is maintained in proper working order and calibrated annually;

(b) Recording the test results for each inspection conducted;

(c) Submitting copies of inspection reports to the water supplier, and the owner within 30 days of the inspection; and

(d) Maintaining records of all test results for a minimum of seven years.

(6) Local Plumbing Inspector Responsibilities. Local Plumbing Inspectors, authorized by M.G.L. c. 142 to administer and to enforce 248 CMR 10.00: *Uniform State Plumbing Code*, have the following responsibilities relative to cross connections:

(a) As required by 248 CMR 10.14(6), the Inspector of Plumbing will ensure that potable water supply systems are designed, installed and maintained in a manner as to prevent contamination from non-potable liquids, solids or gases which may be introduced to a potable water supply system through cross connections;

(b) After reviewing the plans and specifications for plumbing work under 248 CMR 10.04(5), and before issuing a permit, the Plumbing Inspector, as required by 248 CMR 10.14, shall require the installation of appropriate devices in accordance with 310 CMR 22.00; and

(c) No plumbing permit shall be issued for cross connection installations requiring Reduced Pressure Zone Backflow Preventors or Double Check Valve Assemblies until the application for such permit is accompanied by a letter of approval from the Department, its Designee or public water system.

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(7) Installation Approval and Permit Requirements.

(a) Installation Approval.

1. No person shall install or remove or contract with another person for the installation or removal of any reduced pressure backflow preventer or double check valve assembly required by 310 CMR 22.22 unless a design data sheet with plans showing the method of protection of the public water distribution system has been approved by the Department, its Designee or the public water system for the installation of such device.

2. All persons shall obtain approval from the local plumbing inspector or the head of the local fire department, to the extent required by the State Plumbing Code, 248 CMR 10.04(3), or M.G.L. c. 148, § 27A, for the initial installation or retrofit for any change in the installation of any air gap separation with tank and pump arrangement, reduced pressure backflow preventer, or double check valve assembly.

3. Prior to the installation of any pressure or atmospheric vacuum breaker, backflow preventer with intermediate atmospheric vent, or barometric loop, the plans and specifications for the plumbing work must receive a permit issued pursuant to 248 CMR 10.04(3) by the local Plumbing Inspector. For these devices, a plumbing permit issued under 248 CMR 10.04(3) shall constitute installation approval pursuant to 310 CMR 22.22.

4. All design data sheets and plans for the installation of backflow prevention devices shall be reviewed by a certified cross connection surveyor as of December 31, 1998.

5. Design data sheets and plans for the installation of a backflow prevention device on fire protection systems shall not be approved by the public water system until a building permit has been issued by the Building Official who has jurisdiction over such system in accordance with 780 CMR 1.00: *Scope and Administration* and 9.00: *Fire Protection Systems* and approval by the head of the local fire department.

(b) Permit Requirement.

1. Any person owning or maintaining a cross connection protected by a double check valve assembly or a reduced pressure backflow prevention device that was approved by the Department, its designee or public water system shall register such protected cross connection device(s)with the public water system in accordance with 310 CMR 22.22(2). The Department will issue, upon request, one annual permit to the public water system covering only those registered cross connection devices identified by the public water system in its annual statistical report to the Department.

2. The Department reserves the right to revoke or suspend any conditional approval and/or permit for cause.

(c) The Department may revoke any approval or permit for any installation or change in installation of any backflow prevention device which is found to be in noncompliance with 310 CMR 22.22.

(8) Location of Devices.

(a) The location of each approved backflow prevention device, with respect to the plumbing on the premises and the service connection to the premises, shall be based upon the degree of existing or potentially existing health hazard, and shall conform to the following specific requirements:

1. Approved backflow prevention devices shall be located so that protection of all cross connections is achieved with a minimum number of devices;

2. Approved backflow prevention devices shall be located so as to provide in-plant protection;

3. The following types of facilities have been determined to present high health hazard conditions and in-plant protection shall be supplemented by installation of a reduced pressure backflow preventer or an air gap separation at the meter or property line unless an approved device is installed on a dedicated or process line, or if protection of the in-plant cross connection(s) is achieved to the satisfaction of the Department, its Designee or the public water system at:

a. Nuclear reactors or other facilities where radioactive materials are used;
b. Sewage treatment plants and sewage pumping stations;
c. Piers, docks, marinas, shipyards;
d. Chemical plants;
e. Metal plating industries;
f. Hospitals, mortuaries, medical clinics, dental offices and clinics;

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g. Laboratories, except when the Department or its Designee has made a specific determination that no health hazard exists on the premises;

h. Other types of facilities as determined in writing by the Department or its Designee.

(b) If, upon request by the owner of the premises or upon its own initiative, the Department or its Designee or the public water system determines that it is unreasonable to locate all cross connections within the premises, or the Department or its Designee determines that protection of all cross connections is unreasonable for economic reasons, then:

1. the public water supply distribution system shall be protected by installation of a reduced pressure backflow preventer or an air gap separation at the meter or property line; and

2. the owner of the premises shall provide a safe, alternative supply of potable water, well marked and labeled, to all domestic water fixtures on the premises.

(9) Types of Backflow Prevention Devices Required.

(a) Subject to the provisions of 310 CMR 22.22(10): *Table 22-1* shall serve as the guide for the type of protection required.

Table 22-1

AG - Air Gap
RPBP - Reduced Pressure Backflow Preventer
DCVA - Double Check Valve Assembly
AVB - Atmospheric Vacuum Breaker
PVB Pressure Vacuum Breaker
BPIAV - Backflow Preventer with Intermediate Atmospheric Vent

Types of Hazard on Premises	Acceptable Types of Backflow Preventers						Comments*
	AG	RPBP	DCVA	AVB	PVB	BPIAV	
1. Sewage Treatment Plant	X	X					
2. Sewage Pumping Station	X	X					
3. Food Processing	X	X	X*				*If no health hazard exists
4. Laboratories	X	X	X*				*If no health hazard exists
5. Fixtures with hose threads on inlets	X	X	X	X			In addition to an air gap separation, all fixtures that have a threaded hose type connection shall at a minimum, be equipped with a AVB in accordance with 248 CMR 10.14
6. Hospitals, Mortuaries, Clinics	X	X					
7. Plating Facilities	X	X					
8. Irrigation Systems	X	X		X*	X**		Each case should be evaluated individually. *An AVB can be used if no back pressure is possible and no health hazard exists **Pressure Vacuum Breakers can be installed if back pressure is not possible
9. Systems or Equipment Using Radioactive Material	X	X					
10. Submerged Inlets	X	X		X*			*If no health hazard exists and no back pressure is possible
11. Dockside Facilities	X	X					
12. Valved outlets or fixtures with hose attachments	X	X		X*			Each case should be evaluated individually *If no health hazard exists and no back pressure is possible
13. Commercial Laundries and Dry Cleaners	X	X					
14. Commercial Dishwashing Machines	X	X		X*			*If no health hazard exists
15. High and Low Pressure Boilers	X	X*					*If chemicals are added
16. Low Pressure Heating Boilers						X	Residential and small commercial, having no chemicals added

22.22: continued

Types of Hazard on Premises	Acceptable Types of Backflow Preventers						Comments*
	AG	RPBP	DCVA	AVB	PVB	BPIAV	
17. Photo Processing Equipment	X	X					
18. Reservoirs -Cooling Tower Recirculating Systems	X	X					
19. Fire Protection Systems: For cross connection control, fire protection systems may be classified on the basis of water source and arrangement of supplies as follows: (a) Class 1: Direct connection from public water system mains only; no pumps, tanks, or reservoirs; no physical connection from other water supplies; no antifreeze or other additives of any kind; all sprinkler drains discharge to atmosphere, dry wells, or other safe outlets. These systems may or may not have fire department connections. Refer to 310 CMR 22.22(9)(d)1.	X	X	X				A backflow prevention assembly does not have to be installed on existing fire protection systems installed prior to March 21, 1997, provided that the fire protection system is registered with the public water system, equipped with a UL listed alarm check valve that is properly maintained in accordance with NFPA 25 and has not undergone substantial modification defined within 310 CMR 22.22(9)(d)3. Alarm check maintenance records must be available for inspection by the Department, its designee or the public water system
b. Class 2: Same as Class 1 except that booster pumps may be installed in the connections from the street mains .These systems may or may not have fire department connections. Refer to 310 CMR 22.22(9)(a).	X	X	X				A backflow prevention assembly does not have to be installed on existing fire protection system installed prior to March 21, 1997, provided that the fire protection system is registered with the public water system and equipped with a UL listed alarm check valve that is properly maintained in accordance with NFPA 25. Alarm check maintenance records must be available for inspection by the Department, its designee or the public water system
c. Class 3: Direct connection from public water system mains, plus one or more of the following: elevated storage tanks; fire pumps taking suction from aboveground covered reservoirs, or tanks; and pressure tanks.	X	X*	X*				*RPBP or DCVA contingent on evaluation of auxiliary supply and on-site system in accordance with 310 CMR 22.22(9)(d)1.
d. Class 4: Directly supplied from public water system mains, similar to Class 1 and Class 2 with an auxiliary water supply dedicated to fire department use and available to the premises, such as an nonpotable water source located within 1700 feet of the fire department connection, (FDC).	X	X*					*RPBP on evaluation of auxiliary supply and on-site system in accordance with 310 CMR 22.22(9)(d)1.
e. Class 5: Directly supplied from public water system mains, and interconnected with auxiliary supplies, such as pumps taking suction from reservoirs exposed to contamination, or rivers and ponds; driven wells; mills or other industrial water systems; or where antifreeze or other additives are used.	X*	X*					*RPBP or air gap contingent on evaluation of auxiliary supply and on-site system. Refer to 310 CMR 22.22(9)(d)1.
f. Class 6: Combined industrial and fire protection systems supplied from the public water mains only, with or without gravity storage or pump suction tanks.	X	X*			X	X	*RPBP contingent on evaluation of on-site water system. Refer to 310 CMR22.22 (9)(d)1.
g. Residential fire protection systems for one and two family detached dwellings and manufactured homes only. Fire protection systems in three family dwellings meeting NFPA 13D requirements as provided in 780 CMR, Chapter 9, are included in this section.	X	X	X				Non testable devices and flow through systems should be used whenever possible. Systems are typically designed and installed in accordance with NFPA 13D: "Installation of Sprinkler systems in One and Two Family Dwellings and manufactured homes". These systems are authorized to use food grade antifreeze with no additional requirements when potable piping (PB, CPVC, and copper tube) is employed. If non-grade antifreeze is utilized, the system may be classified as a class 5. If a fire department connection is used, the requirements for a class 1 or 2 apply.

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Types of Hazard on Premises	Acceptable Types of Backflow Preventers						Comments*
	AG	RPBP	DCVA	AVB	PVB	BPIAV	
h. Residential fire protection systems for other than those described in Table 22-1-19.g.	X	X	X				Fire protection system in this category shall comply with the requirements set forth in class 1 through 4 as appropriate.
20. Solar Energy Systems	X	X				X*	Residential and small commercial having no chemicals or only USP Glycenne added to water
21. Single Jacketed Heat Exchangers	X	X					Each case should be evaluated individually

(b) Subject to the authority of the Department, its Designee, or public water system to issue the final determination of what type of device is required and the location of the device for each cross connection in individual cases, depending upon the degree of health hazard and type of backflow involved, the acceptable devices for backflow prevention include air gap separation, reduced pressure backflow preventers, double check valves assemblies, atmospheric or pressure vacuum breakers, backflow preventers with intermediate atmospheric vents, and barometric loops.

(c) There shall be no by-pass around any approved backflow prevention device unless the same type of approved backflow prevention device is installed on the by-pass.

(d) Fire Protection Systems.

1. Any new, existing or substantially modified fire protection system, including residential fire protection systems, shall be evaluated by the Department, its Designee or public water system to determine if a cross connection exists. If it is determined that a cross connection does exist, 310 CMR 22.22(9)(a): *Table 22-1* shall serve as a guide in determining the type of protection device required. In evaluating the type of protection device required, the degree of hazard associated with the fire protection system, and the potability of the water pumped into the fire department connection, shall be considered, and the head of the local fire department shall be consulted.

2. All existing cross connections between public water systems and fire protection systems, as described in 310 CMR 22.22: *Table 22-1*, (9)(a)19.a. and b., and installed prior to March 21, 1997, shall be equipped with a UL listed alarm check valve with the standard alarm pressure switch trim package. The device shall comply with the applicable requirements stated in 310 CMR 22.22(9)(d)6.: Fire protection systems installed on or after March 21, 1997, shall be equipped with a protection device specified in 310 CMR 22.22(9)(d)1. When backflow prevention devices are to be retroactively installed on exiting fire protection system, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary system modification to accommodate the additional friction loss, shall be completed as part of the installation in accordance with NFPA-13. The installation of a backflow prevention device only does not constitute a substantial modification of an existing fire protection system.

3. The owner of a cross connection subject to 310 CMR 22.22(9)(d)2. shall register the connection(s) with the public water system, a copy of which shall be retained by the public water system as specified at 310 CMR 22.22.

22.22: continued

4. Any owner of existing cross connection(s) who decides to install a protection device specified at 310 CMR 22.22(9)(a): *Table 22-1*, when the Department has not determined that such a protection device is necessary, shall obtain the prior written approval of the Department or its Designee of the design data sheets for the proposed protection device as specified at 310 CMR 22.22(9)(d)6.

5. Notwithstanding the provisions of 310 CMR 22.22(9)(d)3. and 4., by providing written notification to the owner of a cross connection between a public water system and a fire protection system, the Department or its Designee may, whenever the Department or its designee determines that the cross connection constitutes a threat to the public health, at any time require the installation of a protection device, modify or revoke the approval of a cross connection, or require water quality monitoring.

6. In addition to the requirements set forth in 310 CMR 22.22, the installation and testing of a backflow protection device on a fire protection system may be subject to the requirements of the following:

a. 780 CMR: *Massachusetts State Building Code* - Fire Protection Systems, Design, Installation, Testing and Maintenance Requirements;

b. 527 CMR: *Massachusetts Fire Prevention Regulations*, Installation Permits;

c. 250 CMR: *Board of Registration of Professional Engineers and Land Surveyors*, Practice of Engineering and Preparation of Plans and Specifications;

d. 528 CMR: *Bureau of Pipe fitters, Refrigeration, and Sprinkler Fitters*, Qualification and Licensing of Installers;

e. M.G.L. c. 148, § 27A, Shutting off Existing Fire Protection systems and Permitting;

f. 248 CMR: *State Plumbing and Fuel Gas Code*, Permits and Installation.

(10) Approval of Devices for Use in Massachusetts.

(a) Types and models of atmospheric breakers, pressure vacuum breakers/anti-siphon vacuum breakers, backflow preventers with intermediate atmospheric vent, dual check valve preventers, and hose connection vacuum breakers may be used in Massachusetts for certain low hazard applications referred to in 248 CMR 10.00: *Uniform State Plumbing Code* shall be those meeting the requirements of, and approved by, the Board of State Examiners of Plumbers and Gas Fitters.

(b) All reduced pressure backflow preventers, double check valve assemblies, and double check detector assemblies used in Massachusetts for the protection of a cross connection in accordance with 310 CMR 22.00 shall meet the standards established by at least one of the following organizations: American Society of Sanitary Engineering (ASSE), American Water Works Association or University of Southern California (U.S.C.) Specifications;

(c) Devices and valves installed on fire protection systems including dual check backflow preventer for residential fire sprinkler systems shall be listed by Underwriters Laboratory (UL) or approved by Factory Mutual Research in accordance with 780 CMR *Massachusetts State Building Code* unless otherwise approved by the head of the local fire department.

(d) The Department reserves the right to prohibit the use of any cross connection protection devices in Massachusetts if the Department determines that such device is found, after subsequent review, to be defective or to have performed inadequately in the field.

(11) Installation Requirements.

(a) Reduced Pressure Backflow Preventers: Reduced pressure backflow preventers may be used to protect against backflow caused by back pressure or back siphonage and to protect a public water supply system from substances which are hazardous to health only when they are installed in the following manner:

1. For devices installed as in-plant protection, the reduced pressure backflow preventer shall be installed on the owner's side of the water meter on the potable water supply line.

2. Before installing a reduced pressure backflow preventer, all pipelines shall be thoroughly flushed to remove foreign material.

3. Drinking and domestic water lines, lines for safety showers, and lines for eye wash units must be taken off the upstream side of reduced pressure backflow preventers for devices installed as in-plant protection.

4. The reduced pressure backflow preventer shall be located so as to permit easy access and provide adequate and convenient space for maintenance, inspection, and testing.

22.22: continued

5. The owner of the device shall be able to shut down water lines after reasonable notice during normal business hours to permit necessary testing and maintenance of the device, provided that if it is not possible to meet this requirement a by-pass line equipped with an approved type reduced pressure backflow preventer shall be installed.

6. The reduced pressure backflow preventer and shut-off valves must be installed in a horizontal alignment between three and four feet from the floor to the bottom of the device and a minimum of 12 inches from any wall. Vertical installation of devices shall be determined by the public water system.

7. Tightly closing valves must be installed at each end of the device and be immediately accessible unless otherwise approved by the Department or its Designee or public water system.

8. The device must be protected from freezing, flooding, and mechanical damage.

9. If the device is to be installed on a hot water line, a device approved for use at the elevated temperature must be used.

10. If a drain is to be provided for the relief valve port, there must be an approved air gap separation between the port and drain line. To be approved, the air gap must be at least twice the internal diameter of the discharge line.

11. Pit installation shall be approved only as provided in 310 CMR 22.22(11)(f).

12. All water lines shall be color coded according to 248 CMR 10.00: *Uniform State Plumbing Code*, except that water filtration plants, pumping stations, sewage treatment plants and sewage pumping stations shall label all water lines in *lieu* of color coding.

(b) Double Check Valve Assemblies. Double check valve assemblies may be used to protect against backflow caused by back pressure or back siphonage and to protect a public water supply system from substances which may be objectionable, but not hazardous to health, only if they are installed in the following manner:

1. Drinking and domestic water lines, lines for safety showers, and lines for eye wash units must be taken off the upstream side of the double check valve assembly for devices installed as in-plant protection.

2. The double check valve assembly shall be installed with adequate space to facilitate maintenance, inspection, and testing.

3. The double check valve must be installed horizontally and the top of the double check valve assembly must be between 12 inches and 48 inches from the floor and a minimum of 12 inches from any wall. Vertical installation of devices shall be determined by the public water system.

4. If a water meter is not provided on the upstream side of an approved swing-type double check valve assembly, a three to five foot spacer must be installed between the check valves.

5. Tightly closing valves must be installed at each end of the device and be immediately accessible unless otherwise approved by the Department or its Designee.

6. Double check valve assemblies must be readily accessible for testing and service and provided with suitable connections and appurtenances for testing.

7. The device must be protected against flooding, freezing and mechanical damage.

8. Pit installation will be approved only as provided in 310 CMR 22.22(11)(f).

(c) Vacuum Breakers. Vacuum breakers shall not be used to protect against backflow due to back pressure and shall not be installed as protection for high hazard conditions as determined by the Department, its Designee or public water system. Vacuum breakers may be used for low health hazards only if they are installed in the following manner:

1. Vacuum breakers must be installed at least six inches above the flood level rim of the fixture they serve.

2. Atmospheric vacuum breakers must be installed downstream of the last shut off servicing the fixture or equipment.

3. Vacuum breakers must not be installed in locations where the device is subject to corrosive fumes, dust or grit.

4. Vacuum breakers must be protected against flooding, freezing and mechanical damage.

5. Atmospheric vacuum breakers shall not be used under conditions of static line pressure. Pressure vacuum breakers may be used under conditions of static line pressure.

6. Vacuum breakers shall be installed on all fixtures that have a threaded hose type connection as required in 248 CMR 10.14: *Water Supply and the Water Distribution System*, in addition to an air gap separation.

22.22: continued

(d) Barometric Loops. Barometric Loops may be used only to protect against back siphonage, shall be approved for use only when no health hazard exists and when back pressure is not possible.

(e) Air Gap Separation. Air gap separation may be used to protect against backflow caused by back pressure or back siphonage and to protect a public water supply system from substances which are hazardous to health and shall be approved for use only when installed in accordance with 248 CMR 10.00: *Uniform State Plumbing Code*.

(f) Pit Installation. No devices shall be installed in pits except as specifically approved by the Department, its Designee or public water system in cases of unique circumstances, and must comply with 29 CFR 1910.196, OSHA regulations where applicable for work in confined spaces then only as follows:

1. the pit interior shall be a minimum of ten feet long, six feet wide, and must have a clear height 6½ feet high;
2. the pit must be watertight;
3. the pit opening and manhole cover must be at least 30 inches in diameter;
4. The foothold inserts must be of steel, aluminum, or other material approved by the Department, must be a maximum of 12 inches apart, and must be installed so that the top foothold is within 12 inches of the manhole cover and the bottom foothold is within 12 inches of the pit floor;
5. An adequate drain must be installed and the drain line shall not be connected to a sewer;
6. The pit floor shall be pitched to the drain;
7. If built in a roadway, the top of the pit must be adequately reinforced.

(12) Cross Connection Certification

(a) Cross Connection Backflow Prevention Device Tester. Any person seeking Department certifications as a Backflow Prevention Device Tester in the Commonwealth of Massachusetts shall meet all of the following requirements:

1. pass a written and practical certification examination which is approved by the Department for "Backflow Prevention Device Tester".
2. apply to the Department for certification on the form provided by the Department. This submittal must include payment of the certification fee established by the Department.
3. Application for certification must be submitted to the Department no later than 12 moths after the date the applicant received notice of passing a Department approved examination.

(b) Cross Connection Control Surveyor. Any person seeking Department certification as a Cross Connection Surveyor in the Commonwealth of Massachusetts shall meet all of the following requirements:

1. Pass a written examination approved by the Department for Cross Connection Control Surveyor".
2. Apply to the Department for certification on the form provided by the Department. This submittal must include payment of the certification fee established by the Department.
3. Application for certification must be submitted to the Department no later than 12 months after the date the applicant received notice of passing a Department approved examination.

(c) Any person, upon satisfying the requirements of 310 CMR 22.22(13)(a), shall receive from the Department a certificate which indicates that he or she is a:

1. Certified Backflow Prevention Device Tester; or
2. Certified Cross Connection Surveyor; or
3. Combination Certified Backflow Prevention Device Tester/Certified Cross Connection Surveyor.

(d) All certificates will remain valid for three years from the date of issuance.

(e) Renewal of Certification. Any Certified Backflow Prevention Device Tester, Cross Connection Surveyor or person holding a valid Combination Certificate who desires to renew his or her certification must submit a renewal application including any renewal fee and prerequisites, no later than one month prior to the expiration date of his or her certificate.

22.22: continued

1. Backflow Prevention Device Testers. Persons applying for renewal shall complete at least 24 inspections/tests of backflow prevention devices and obtain a least three training contact hours (TCH) in the past three years. Proof of inspections and TCH shall accompany the application.

2. Cross Connection Surveyor. Persons applying for renewal shall complete at least three cross connection surveys and obtain a least three training contact hours (TCH) in the past three years. Proof of surveys and TCH shall accompany the application.

(f) Persons failing to meet the certification renewal requirements at 310 CMR 22.22(13)(e)1. and/or 2. within three years from the date that the certification expired must retake an examination approved by the Department for renewal.

(g) Recertifcation Requirements. Persons failing to renew their certification within three years from the date that the certificate expired, must retake an examination approved by the Department for recertification.

(h) Persons holding both a valid Backflow Prevention Device Testers certificate and a valid Cross Connection Surveyor certificate shall be issued a Combination Certificate.

(i) Persons holding a combination certification shall satisfy all the renewal requirements stated at 310 CMR 22.22(12)(e), except for the TCH requirements. Only three TCH will be required for a combination certificate.

(13) Inspection Surveying, Testing and Overhauling of Devices.

(a) All cross connection surveys shall be conducted by a person who is a Massachusetts Certified Cross Connection Surveyor. All backflow prevention device tests shall be conducted by a certified Backflow Prevention Device Tester in accordance with 310 CMR 22.22. A person holding a Combination Certification may conduct a cross connection survey and/or backflow prevention test.

(b) Within 14 calendar days after the installation of devices in accordance with plans reviewed and approved by the reviewing authority, the owner or owner's agent shall notify the public water system to arrange for the inspection of the installation.

(c) Reduced pressure backflow preventers, double check valve assemblies, may be inspected and tested by the Department, its designee or the public water system at any time.

(d) The public water system is responsible to ensure that each reduced pressure backflow preventer will be inspected semiannually in accordance with the public water system's approved cross connection program plan, as provided for in 310 CMR 22.22(3)(b). If the supply is used less than six months of the year, these devices shall be inspected and tested once each year. Each double check valve assembly shall be tested annually. Pressure type vacuum breakers should be tested at least annually by the owner of the device. Each test shall be conducted by a Certified Backflow Prevention Device Tester.

(e) Devices which fail the test or are found to be defective shall be overhauled, repaired, or replaced and retested within 14 calendar days of the failure or from the discovery of the defect. The repair work must be done by a plumber licensed by the Commonwealth of Massachusetts to the extent required by 248 CMR 10.00: *Uniform State Plumbing Code*. No person shall overhaul, repair, replace a device on a fire system without approval from the head of the local fire department pursuant to M.G.L. c.148, § 27A.

(f) No two routine tests for reduced pressure backflow preventers required by 310 CMR 22.22 shall be conducted within five months of each other without the written approval of the Department, its designee or the public water system.

(g) The owner or owner's agent must maintain on the premises a spare parts kit and any special tools required for removal and reassembly of devices which are to be tested. The presence of these materials must be recorded on the Inspection and Maintenance Report Form.

(h) The owner or owner's agent must provide labor on the premises as necessary to allow inspection and testing of devices by the Department, the supplier of water, or Certified Backflow Prevention Device Testers.

(i) The owner or owner's agent shall notify the public water system in writing, no later than 30 days prior to the removal from service of any permitted device and such notification shall include the reason for removal and must indicate if the cross connection has been eliminated.

(j) The owner or owner's agent shall notify the public water system in writing no later than 30 days prior to a change in ownership. Notification must include, at a minimum, the name and address of the new owner as well as documentation with proof of change in ownership.

22.22: continued

(k) If the public water system deems necessary, it may test a device more frequently to ensure proper cross connection control.

(14) Right of Entry. All owners or operators of commercial, industrial or institutional premises served by a public water supply system shall authorize agents and employees of the Commonwealth, upon presentation of their credentials, to enter their premises without a warrant for the purpose of inspecting and surveying their water systems for cross connections and assuring compliance with 310 CMR 22.22, whether or not the Commonwealth has evidence that the system is in violation of an applicable legal requirement.

(15) Fees.

(a) The certification fees for Backflow Prevention Device Testers and Cross Connection Control Surveyors are established by the Department as stated in 310 CMR 4.00: *Timely Action Schedule and Fee Provisions*.

(b) A person holding either a Testers or Surveyors certificate will not be charged an additional fee for a combination certification provided that all the requirement of 310 CMR 22.22(12) have been met.

(c) Permit fees as specified at 310 CMR 22.22(7)(b) are established by the Department in accordance with 310 CMR 4.00: *Timely Action Schedule and Fee Provisions*.

(16) Enforcement.

(a) Whoever maintains a cross connection in violation of M.G.L. c. 111, § 160A, shall be:

1. punished by a fine of not more than $25,000 for each day such violation occurs or continues, or by imprisonment for not more than one year, or both such fine and imprisonment, or

2. subject to a civil penalty not to exceed $25,000 per day for each day that such violation occurs or continues.

(b) Any violation of 310 CMR 22.22 shall be subject to the administrative penalty provisions of 310 CMR 5.00: *Administrative Penalty*.

(c) Upon due notice to the person maintaining the connection the Department may revoke any permit whenever, in the opinion of the Department, the cross connection or the maintenance thereof no longer complies with 310 CMR 22.00.

(d) After notice and opportunity for a hearing, the Department may suspend or revoke the certification of any Backflow Prevention Device Tester or Cross Connection Control Surveyor for cause. A certified backflow prevention device tester or certified cross connection control surveyor whose certification has been suspended or revoked by the Department may not test devices or conduct any surveys pending the outcome of the hearing, if any.

(e) Audit: The Department may perform audits of a Public Water System's distribution system protection cross connection control program to ascertain whether the PWS is in compliance with 310 CMR 22.22, and to ascertain the fitness and purity of the water for domestic use and to secure the sanitary protection of such waters, pursuant to MGL c. 111, § 160. The Department may issue a written order, pursuant to M.G.L. c. 111, § 160A, requiring a supplier of public water to perform any action necessary to assure the delivery of fit and pure water through its distribution system, including the actions required under 310 CMR 22.22(13).

(f) In order to ensure the delivery of a fit and pure water supply, the Department may issue a written order, pursuant to M.G.L. c. 111, § 160, requiring a supplier of public water to cease supplying water to any premises if one or more cross connections are maintained in violation of the requirements of 310 CMR 22.22, or requiring any person to take such actions as are reasonable and necessary to prevent or to eliminate cross connections.

22.23: Use of Non-centralized Treatment Devices and Bottled Water

(1) Public Water Systems shall not use bottled water to achieve compliance with an MCL, MRDL, Action Level or Treatment Technique established in 310 CMR 22.00 or any standards specific to an individual Public Water System established pursuant to a health assessment as provided in 310 CMR 22.03(8). Bottled water may be approved by the Department for use on a temporary basis to avoid any unreasonable risk to health.

22.23: continued

(2) Public Water Systems using bottled water as a condition of obtaining an exemption from the requirements of 310 CMR 22.06(16), 22.07A and 22.07B(1), and must meet the requirements in 310 CMR 22.14(25)

(3) Public Water Systems that use point-of-use or point-of-entry devices as a condition of receiving an exemption must meet the requirements in 310 CMR 22.14(27).

(4) A Supplier of Water meeting the following minimum requirements, subject to the Department's review and written approval in accordance with 310 CMR 22.04, may use Point of Use (POU) and/or Point of Entry (POE) devices to comply with an MCL set forth in 310 CMR 22.00 or to achieve a contaminant level identified in accordance with 310 CMR 22.03(8):

(a) the POU or POE device must be owned, controlled, operated and maintained by the Supplier of Water in accordance with 310 CMR 22.00;

(b) the POU or POE device must be equipped with mechanical warnings device to ensure that customers are automatically notified of operational problems;

(c) the POU or POE device must be included in the Department's approved list of technologies for small systems and approved in accordance with 310 CMR 22.04(8);

(d) the POU or POE device must be installed in conformance with 248 CMR 10.00: *Uniform State Plumbing Code*;

(e) a monitoring plan that ensures that the devices provide health protection equivalent to that provided by central water treatment must be submitted;

(f) effective technology under a Department-approved plan must be applied. The microbiological safety of the water must be maintained at all times;

(g) the Supplier of Water must ensure that buildings connected to the system have sufficient POU or POE devices that are properly installed, maintained, and monitored such that all consumers will be protected;

(h) the POU or POE device must have an adequate certification of performance including field testing or the device has undergone a rigorous engineering design review;

(i) the design and application of the POU and/or POE devices must consider the potential for increasing concentrations of heterotrophic bacteria 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;

(j) each building connected to the system must have a POU or POE device that is properly installed, maintained, and monitored. Each building is subject to treatment and monitoring, and the rights and responsibilities of the Public Water System customer convey with title upon sale of property;

(k) the Supplier of Water must document that all customers are required to or have agreed to participate in the POU and or POE water treatment program. Documentation may include, without limitation, the following:

1. an ordinance that requires the customers to participate in the program; or
2. copies of signed agreements from all customers explicitly agreeing to provide the Supplier of Water with access to their homes or buildings for the purpose of conducting necessary maintenance and sampling activity;

(l) the Supplier of Water must notify and provide an opportunity for public comment to its customers of the proposed POU and POE treatment program at a public meeting, or an equivalent approved opportunity for public comment;

(m) the Supplier of Water must submit a continuing education and awareness plan, including all supporting educational materials;

(n) the Supplier of Water must provide educational materials pursuant to the approved continuing education and awareness plan described in 310 CMR 22.23(4)(m) to new and existing customers summarizing potential health effects of contaminants of concern and the benefits of POU/POE devices, subject to the following:

1. if the water system is a Community Water System educational materials may be provided in their Consumer Confidence Report; and
2. new residents shall be given educational materials within 15 days of beginning water service to such residents;

(o) the POU device must not be used for the following contaminants: microbiological contaminants, nitrate, volatile organic compounds and radon; and

22.23: continued

(p) the POE device must not be used for the following contaminants: microbiological contaminants and nitrate.

(5) With prior written approval of the Department in accordance with 310 CMR 22.04(1), a POE or POU device may be installed in a facility to meet an Action Level, Treatment Technique in *lieu* of an MCL, or other requirements of 310 CMR 22.00. The facility, upon the installation of the POE or POU device, shall constitute a consecutive Public Water System as defined in 310 CMR 22.02, provided the facility meets the definition of a Public Water System as defined in 310 CMR 22.02. A consecutive system that installed a POU or POE device in accordance with 310 CMR 22.23(5) is subject to all of the requirements of 310 CMR 22.00 unless said system complies with 310 CMR 22.23(6)(a) through (i) and demonstrates to the Department's satisfaction that it meets the criteria in 310 CMR 22.03(3)(b) through (e).

(6) If a POE device is installed in a facility solely to enhance the aesthetic quality of the drinking water and, because of the installation of such a device the facility meets the definition of a Public Water System in 310 CMR 22.02, it shall constitute a consecutive Public Water System subject to all of the requirements of 310 CMR 22.00, unless the system complies with the following minimum requirements:

(a) the facility shall advise the Department and the supplying Public Water System in writing of the intended installation of the device;

(b) the facility shall be responsible for the operation and maintenance of the device, subject to adequate oversight by the supplying Public Water System;

(c) the facility shall comply with the requirements of the supplying Public Water System;

(d) the facility shall provide a detailed written notification of the installation of the POE device to the local health authority having jurisdiction over the facility;

(e) the facility shall only use POE devices that have been certified by the National Sanitation Foundation (NSF), Underwriters Laboratory (UL) or equivalent third party certifying organization accredited by American National Standards Institute (ANSI);

(f) the facility shall install the POE device in accordance with 248 CMR 10.00: *Uniform State Plumbing Code*;

(g) the facility shall monitor the quality of water as specified by the supplying Public Water System, the Department or the local health authority;

(h) the facility shall ensure that any wastewater discharge complies with all applicable federal, state and local regulations; and

(i) the facility shall maintain the microbiological quality standards of the water at all times as specified at 310 CMR 22.05.

(7) The Department may require any facility or other entity meeting the requirements of 310 CMR 22.23(5) and (6) to comply with any or all other requirement of 310 CMR 22.00, if the Department determines that such action is necessary to protect the health of the consumers of water.

22.24: Sale, Transfer of Property Interest, or Change in Use of Water Supply Land

(1) No supplier of water may sell, lease, assign, or otherwise dispose of, or change the use of, any lands used for water supply purposes without the prior written approval of the Department. The Department will not approve any such disposition or change in use unless the supplier of water demonstrates to the Department's satisfaction that such action will have no significant adverse impact upon the supplier of water's present and future ability to provide continuous adequate service to consumers under routine and emergency operating conditions, including emergencies concerning the contamination of sources of supply, failure of the distribution system and shortage of supply.

(2) Land Transfers Any sale, transfer of property interest or change in use of land acquired for water supply purposes may also require approval by a ⅔ vote of the Legislature, in addition to Department approval. (Massachusetts Constitution Amend. Art. XCVII, Section 243)

22.23: continued

(3) Easements The Department will not approve any grant of easement for pipelines, or other conduit, carrying liquid petroleum products within the Zone I of a PWS. For other public utility easements within Zone I, the Department may require as a condition of any grant of such easement an express perpetual prohibition on the use of fertilizers, pesticides, herbicides, and other non-mechanical means of vegetation control within the area subject to the easement.

(4) The owner/operator of any public water system shall notify the Department in writing at least 30 days in advance of any:

(a) proposed sale, change of system ownership, or transfer of the system; and/or

(b) changes that impact the classification of the system. Changes in system classification are subject to Department review and approval. For non-community systems, changes that impact the classification include changes in the type of facilities, service connections, population served or operating hours that may result in a change of transient use to non-transient use, or non-community use to community use according to the definition of a public water system pursuant to 310 CMR 22.02 and the *Guidelines and Policies for Public Water Systems*.

22.25: Abandonment of Water Supply Sources

(1) No supplier of water may remove a public water system source from service or abandon a public water system source without the prior written approval of the Department. The Department will not approve any such action unless the supplier of water demonstrates to the Department's satisfaction that such action will have no significant adverse impact upon the supplier of water's present and future ability to provide continuous adequate service to consumers under routine and emergency operating conditions, including emergencies concerning the contamination of sources of supply, failure of the distribution system and shortage of supply.

(2) The supplier of water shall maintain each public water system source removed from service as an emergency source unless the Department approves its disposition in accordance with 310 CMR 22.24 or its abandonment in accordance with 310 CMR 22.25. All public water system groundwater sources approved for abandonment or permanent closure may continue to be used as non-public water system sources. The Department may require closure of certain groundwater sources in a manner that minimizes the potential for groundwater contamination and public health risk, by permanently preventing vertical movement of water within the borehole and annular space and eliminating all physical hazards at the ground surface associated with the well's construction or location. Proposals for permanent closure shall describe the closure method and materials to be used and shall be submitted to the Department for review and approval.

22.26 Ground Water Rule

(1) General Requirements and Applicability.

(a) Applicability. 310 CMR 22.26 applies to all Public Water Systems that use groundwater except that it does not apply to Public Water Systems that combine all of their groundwater with Surface Water or with Groundwater under the Direct Influence of Surface Water prior to treatment. For the purposes of 310 CMR 22.26, "groundwater system" is defined as any Public Water System meeting this applicability statement, including consecutive systems receiving finished groundwater.

(b) General Requirements. Systems subject to 310 CMR 22.26 must comply with the following requirements:

1. Sanitary survey information requirements for all groundwater systems as described in 310 CMR 22.26(2).

2. Microbial source water monitoring requirements for groundwater systems that do not treat all of their groundwater to at least 99.99% (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 310 CMR 22.26(3).

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3. Treatment Technique requirements, described in 310 CMR 22.26(4), that apply to groundwater systems that have fecally contaminated source waters, as determined by source water monitoring conducted under 310 CMR 22.26(3), or that have significant deficiencies that are identified by the Department. A groundwater system with fecally contaminated source water or with significant deficiencies subject to the Treatment Technique requirements of 310 CMR 22.26 must implement one or more of the following corrective action options:

a. correct all significant deficiencies;

b. provide an alternate source of water;

c. eliminate the source of contamination; or

d. 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. Groundwater 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 310 CMR 22.26(4)(b).

(c) Compliance Date. Groundwater systems must comply, unless otherwise noted, with the requirements of 310 CMR 22.26 beginning December 1, 2009.

(2) Sanitary Surveys for Groundwater Systems.

(a) Groundwater systems must provide the Department or its agents, at the Department's request, any existing information that will enable the Department to conduct a Sanitary Survey.

(b) For the purposes of 310 CMR 22.26, a Sanitary Survey, as conducted by the Department or its agents, 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.

(c) The Sanitary Survey must include a written evaluation of the applicable components listed in 310 CMR 22.26(2)(c)1. through 8.:

1. Source;
2. Treatment;
3. Distribution System;
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) Groundwater Source Microbial Monitoring and Analytical Methods.

(a) Triggered Source Water Monitoring.

1. General Requirements. A groundwater system must conduct triggered source water monitoring if the conditions identified in 310 CMR 22.26(3)(a)1.a. and b. exist.

a. 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 groundwater source; and

b. The system is notified that a sample collected under 310 CMR 22.05(1)(a) is total coliform-positive and the sample is not invalidated under 310 CMR 22.05(3).

2. Sampling Requirements. A groundwater system must collect, within 24 hours of notification of the total coliform-positive sample, at least one groundwater source sample from each groundwater source in use at the time the total coliform-positive sample was collected, except as provided in 310 CMR 22.26(3)(a)2.b.

a. The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the groundwater source water sample within 24 hours due to circumstances beyond its control. The system must contact the Department for pre-approval of the delay of sampling. In the case of an extension, the Department will specify in writing how much time the system has to collect the sample.

22.26: continued

b. If approved by the Department, systems with more than one groundwater source may meet the requirements of 310 CMR 22.26(3)(a)2. by sampling a representative groundwater source or sources. Systems must submit for Department approval a triggered source water monitoring plan that identifies one or more groundwater sources that are representative of each monitoring site in the system's sample siting plan under 310 CMR 22.05(1) and that the system intends to use for representative sampling under 310 CMR 22.26(3). After December 1, 2009, a system that has not received written Department approval of their triggered source water monitoring plan, must collect triggered source water samples as required by 310 CMR 22.26(3)(a)2. until written approval is received.

c. A groundwater system serving 1,000 people or fewer may use a repeat sample collected from a groundwater source to meet both the requirements of 310 CMR 22.05(2) and to satisfy the monitoring requirements of 310 CMR 22.26(3)(a)2. for that groundwater source:

i. if *E. coli* is used as a fecal indicator for source water monitoring pursuant to 310 CMR 22.26(3)(a)3.; and

ii. if the Department, pursuant to 310 CMR 22.05(1)(a)3.d.ii., has approved the use of a single sample for meeting both the triggered source water monitoring requirements in 310 CMR 22.26(3)(a) and the repeat monitoring requirements in 310 CMR 22.05(2).

If the repeat sample collected for the groundwater source is *E. coli* positive, the system shall comply with 310 CMR 22.26(3)(a)4.

d. A groundwater system may use a Raw Water sample collected to meet the requirements of 310 CMR 22.05(1) to satisfy the monitoring requirements of 310 CMR 22.26(3)(a)2. for that groundwater source only if: the Raw Water sample was collected on the same day as the distribution sample that tested total coliform-positive under 310 CMR 22.05(1) and triggered the requirements of 310 CMR 22.26(3)(a)2.; and the Raw Water sample was analyzed in accordance with 310 CMR 22.05(3)(b)1. and the analytical methods in 310 CMR 22.26(3)(c). If the Raw Water sample is total coliform-negative, no additional testing is required under 310 CMR 22.26 unless otherwise determined by the Department.

3. Fecal Indicator Requirement.

a. All Non-transient Non-community Water Systems, all Transient Non-community Water Systems and each Community Water System serving 3,300 or fewer people shall use *E. coli* as the fecal indicator to comply with 310 CMR 22.26(3)(a).

b. For Community Water Systems serving greater than 3,300 people:

i. If *E. coli* is detected in samples collected under 310 CMR 22.05(1), the Community Water System shall use *E. coli* as the fecal indicator to comply with 310 CMR 22.26(3)(a).

ii. If total coliform is detected in samples collected under 310 CMR 22.05(1) without the confirmation of *E. coli*, the Community Water System shall use *enterococci* as the fecal indicator to comply with 310 CMR 22.26(3)(a).

c. Testing for additional fecal indicators may be required to further evaluate contamination at a groundwater source.

4. Additional Requirements. If the Department does not require corrective action under 310 CMR 22.26(4)(a)2. for a fecal indicator-positive source water sample collected under 310 CMR 22.26(3)(a)2. that is not invalidated under 310 CMR 22.26(3)(d), 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.

5. Consecutive and Wholesale Systems.

a. In addition to the other requirements of 310 CMR 22.26(3)(a), a consecutive groundwater system that has a total coliform-positive sample collected under 310 CMR 22.05(1) must notify the Wholesale System(s) within 24 hours of being notified of the total coliform-positive sample.

b. In addition to the other requirements of 310 CMR 22.26(3)(a), a wholesale groundwater system must comply with 310 CMR 22.26(3)(a)5.b.i. and ii.

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i. A wholesale groundwater system that receives notice from a consecutive system it serves that a sample collected under 310 CMR 22.05(1) is total coliform-positive must, within 24 hours of being notified, collect a sample from its groundwater source(s) under 310 CMR 22.26(3)(a)2. and analyze it for a fecal indicator under 310 CMR 22.26(3)(c).

ii. If the sample collected under 310 CMR 22.26(3)(a)5.b.i. is fecal indicator-positive, the wholesale groundwater system must notify all consecutive systems served by that groundwater source of the fecal indicator source water positive within 24 hours of being notified of the groundwater source water sample monitoring result and must meet the requirements of 310 CMR 22.26(3)(a)4.

6. Exceptions to the Triggered Source Water Monitoring Requirements. A groundwater system is not required to comply with the source water monitoring requirements of 310 CMR 22.26(3)(a) if either of the following conditions exists:

a. The Department determines, and documents in writing, that the total coliform-positive sample collected under 310 CMR 22.05(1) is caused by a Distribution System deficiency; or

b. The total coliform-positive sample collected under 310 CMR 22.05(1)(a) is collected at a location that meets Department criteria for Distribution System conditions that will cause total coliform- positive samples.

(b) Other Source Water Monitoring.

1. A groundwater system meeting the applicability requirements of 310 CMR 22.26(1)(a) that does not treat their groundwater to at least 99.99% (4-log) treatment of Viruses and conducts any type of source water monitoring under 310 CMR 22.00 or otherwise that includes analysis of total coliform, *E. coli*, enterococci, or coliphage is subject to the requirements of 310 CMR 22.26 if the source water sample analysis yields a positive result. The requirements of 310 CMR 22.26 apply only to the groundwater sources with positive source water sample results. A positive sample shall satisfy the monitoring requirements of 310 CMR 22.26(3)(a)2. If the source water sample is tested for total coliform, and the sample is total coliform-positive, the system must analyze that total coliform-positive culture medium for *E. coli*. *E. coli* shall serve as the fecal indicator under this condition.

2. The Department reserves the right to require additional source water monitoring for fecal indicators using analytical methods as defined under 310 CMR 22.26(3)(c) if circumstances warrant additional testing to determine system vulnerability.

(c) Analytical Methods.

1. A groundwater system subject to the source water monitoring requirements of 310 CMR 22.26(3)(a) must collect a Standard Sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical methods used.

2. A groundwater system must analyze all groundwater source samples collected under 310 CMR 22.26(3)(a) and (b) using methods listed in the following table in 310 CMR 22.26(3)(c)2. for the presence of *E. coli* or enterococci as specified in 310 CMR 22.26(3)(a)3. The Department reserves the right to require coliphage analysis.

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Analytical Methods for Source Water Monitoring

Fecal Indicator [1]	Methodology	Method Citation
E.coli	Colilert®[3] Colisure®[3] Colilert-18® Membrane Filter Method with MI Agar E*Colite Test[5] NA-MUG	SM 9223 B[2] SM 9223 B[2] SM 9223 B EPA Method 1604[4] SM 9222 G[2]
Enterococci	Membrane Filter Technique Membrane Filter Technique Enterolert™ [7]	SM 9230C[2] EPA Method 1600[6]
Coliphage	Two-step Enrichment Presence-absence Procedure Single Agar Layer Procedure	EPA Method 1601[8] EPA Method 1602[9]

Analyses must be conducted in accordance with the documents 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.

[1] The time from sample collection to initiation of analysis may not exceed 30 hours. The groundwater system is encouraged but is not required to hold samples below 10ºC during transit.

[2] Methods are described in *Standard Methods for the Examination of Water and Wastewater* 20th 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, Westbrook, 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/nerlcwww/1604sp02.pdf or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460.

[5] 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.

[6] EPA Method 1600: *Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-[beta]-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 from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460. The holding time and temperature for groundwater samples are specified in footnote [1], rather than as specified in Section 8 of EPA Method 1600.

[7] DEXX 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.

[8] EPA Method 1601: *Male-specific (F+) and Somatic Coliphage in Water by Two-step Enrichment Procedure*; April 2001, EPA 821-R-01-030. Method is available at http://www.epa.gov/nerlcwww/1601ap01.pdf or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

[9] EPA Method 1602: *Male-specific (F+) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure*; April 2001, EPA 821-R-01-029. Method is available at http://www.epa.gov/nerlcwww/1602ap01.pdf or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

(d) Invalidation of a Fecal Indicator-positive Groundwater Source Sample.

1. A groundwater system may obtain Department invalidation of a fecal indicator-positive groundwater source sample collected under 310 CMR 22.26(3)(a) only under the conditions specified in 310 CMR 22.26(3)(d)1.a. and b.

a. The system provides the Department with written notice from the laboratory that improper sample analysis occurred; or

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b. The Department determines and documents in writing that there is substantial evidence that a fecal indicator-positive groundwater source sample is not related to source water quality.

2. If the Department invalidates a fecal indicator-positive groundwater source sample, the groundwater system must collect another source water sample under 310 CMR 22.26(3)(a) 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 310 CMR 22.26(3)(c). 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 circumstances beyond its control. In the case of an extension, the Department will specify how much time the system has to collect the sample.

(e) Sampling Location.

1. Any groundwater source sample required under 310 CMR 22.26(3)(a) must be collected at a location prior to any treatment of the groundwater source. All systems are required to maintain a Raw Water source water sample tap in accordance with 310 CMR 22.05(1)(a)1.

2. If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a Department-approved location to meet the requirements of 310 CMR 22.26(3)(a) if the sample is representative of the water quality of that well. Approval must be received in writing.

(f) New Sources. A groundwater system that plans to place a new groundwater source into service after November 30, 2009, must conduct source water monitoring in accordance with Chapter 4 of the *Massachusetts Guidelines for Public Water Systems* and may have to meet the requirements of 310 CMR 22.26(3)(b) if the Department determines additional testing is required.

(g) Public Notification. A groundwater system with a groundwater source sample collected under 310 CMR 22.26(3)(a) or (b) that is fecal indicator-positive and that is not invalidated under 310 CMR 22.26(3)(d), including consecutive systems served by the groundwater source, must conduct public notification under 310 CMR 22.16.

(h) Monitoring Violations. Failure to meet the requirements of 310 CMR 22.26(3)(a) through (f) is a monitoring violation and requires the groundwater system to report each failure to the Department pursuant to 310 CMR 22.15(1), and provide public notification under 310 CMR 22.16.

(i) Department Notification. The Supplier of Water shall notify the Department by the end of the day that it is notified of a fecal indicator-positive source water test result. If the Supplier of Water receives such notification outside of the Department's regular business hours, then it shall provide notification to the Department by calling the Department's Emergency notification telephone number and using any other electronic reporting tool designated by the Department, or other Department designated telephone numbers.

(4) Treatment Technique Requirements for Groundwater Systems.

(a) Groundwater systems with significant deficiencies or source water fecal contamination.

1. The Treatment Technique requirements of 310 CMR 22.26(4) must be met by groundwater systems when a Significant Deficiency is identified or when a groundwater source sample collected under 310 CMR 22.26(3)(a)4. is fecal indicator-positive.

2. If directed by the Department, a groundwater system with a groundwater source sample collected under 310 CMR 22.26(3)(a)2., 5., or (b) that is fecal indicator positive must comply with the Treatment Technique requirements of 310 CMR 22.26(4).

3. When a Significant Deficiency is identified at a surface or Groundwater Under the Direct Influence of Surface Water Public Water System that uses both Groundwater and Surface Water or Groundwater under the Direct Influence of Surface Water, the system must comply with provisions of 310 CMR 22.26(4) 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 Groundwater under the Direct Influence of Surface Water.

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4. Unless the Department directs the groundwater system to implement a specific corrective action, the groundwater 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 groundwater source sample collected under 310 CMR 22.26(3)(a)4. was found to be fecal-indicator-positive, or direction from the Department that a fecal indicator-positive sample collected under 310 CMR 22.26(3)(a)2., 5., or (b) requires corrective action. For the purposes of 310 CMR 22.26, 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 potential for 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 groundwater source sample collected under 310 CMR 22.26(3)(a)4. was found to be fecal indicator-positive, or direction from the Department that a fecal indicator-positive sample collected under 310 CMR 22.26(3)(a)2., 5., or (b) requires corrective action, the groundwater system must either:

a. 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

b. Be in compliance with a Department-approved corrective action plan and schedule subject to the conditions specified in 310 CMR 22.26(4)(a)5.b.i. and ii.

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.

iii. Corrective action plans submitted under 310 CMR 22.05(4) or 22.26(4) may be considered for purposes of 310 CMR 22.26(4)(a)5., as appropriate.

6. Corrective Action Alternatives. Groundwater systems that meet the conditions of 310 CMR 22.26(4)(a)1. or 2. must implement one or more of the following corrective action alternatives:

a. Correct all significant deficiencies;

b. Provide an alternate source of water;

c. Eliminate the source of contamination; or

d. 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 groundwater source.

(b) Compliance Monitoring.

1. Existing Groundwater Sources. A groundwater system that is not required to meet the source water monitoring requirements of 310 CMR 22.26 for any groundwater 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 groundwater 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 groundwater source and begin compliance monitoring in accordance with 310 CMR 22.26(4)(b)3. by December 1, 2009. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission. If the system subsequently discontinues 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 groundwater source, the system must conduct groundwater source monitoring as required 310 CMR 22.26(3).

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2. New Groundwater Sources. A groundwater system that places a groundwater source in service after November 30, 2009, that is not required to meet the source water monitoring requirements of 310 CMR 22.26 because the system 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 groundwater source must comply with the requirements of 310 CMR 22.26(4)(b)2.a. through c.

a. 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 groundwater source. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission.

b. The system must conduct compliance monitoring as required under 310 CMR 22.26(4)(b)3. within 30 days of placing the source in service.

c. The system must conduct groundwater source monitoring under 310 CMR 22.26(3) if the system subsequently discontinues 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 groundwater source.

3. Monitoring Requirements. A groundwater system subject to the requirements of 310 CMR 22.26(4)(a) or (b)1. or 2. must monitor the effectiveness and reliability of treatment for that groundwater source before or at the first customer as follows:

a. Chemical Disinfection.

i. Groundwater Systems Serving Greater than 3,300 People. A groundwater system that serves greater than 3,300 people must continuously monitor the Residual Disinfectant Concentration using analytical methods specified in 310 CMR 22.20A(5)(a)2. at a location approved by the Department and must record the lowest Residual Disinfectant Concentration each day that water from the groundwater source is served to the public. The groundwater system must maintain the Department-determined Residual Disinfectant Concentration every day the groundwater system serves water from the groundwater source to the public. If there is a failure in the continuous monitoring equipment, the groundwater 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. Groundwater Systems Serving 3,300 or Fewer People. A groundwater system that serves 3,300 or fewer people must monitor the Residual Disinfectant Concentration using analytical methods specified in 310 CMR 22.20A(5)(a)2. at a location approved by the Department and record the residual Disinfection concentration each day that water from the groundwater source is served to the public. The groundwater system must maintain the Department-determined Residual Disinfectant Concentration every day the groundwater system serves water from the groundwater source to the public. The groundwater 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 groundwater system must take follow-up samples every four hours until the Residual Disinfectant Concentration is restored to the Department-determined level. Alternatively, a groundwater system that serves 3,300 or fewer people may monitor continuously and meet the requirements of 310 CMR 22.26(4)(b)3.a.i.

b. Membrane Filtration. A groundwater system that uses Membrane Filtration to meet the requirements of 310 CMR 22.26 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 groundwater system that uses Membrane Filtration is in compliance with the requirement to achieve at least 4-log removal of Viruses when:

i. The membrane has an absolute molecular weight cut-off (MWCO), or an alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of Viruses;

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ii. The membrane process is operated in accordance with Department-specified compliance requirements; and

iii. The integrity of the membrane is intact.

c. Alternative Treatment. A groundwater system that uses a Department-approved alternative treatment to meet the requirements of 310 CMR 22.26 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.

(c) Discontinuing Treatment. A groundwater system may discontinue 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 groundwater source if the Department determines and documents in writing that 4-log treatment of Viruses is no longer necessary for that groundwater source. A system that discontinues 4-log treatment of Viruses is subject to the source water monitoring and analytical methods requirements of 310 CMR 22.26(3).

(d) Failure to meet the monitoring requirements of 310 CMR 22.26(4)(b) is a monitoring violation and requires the groundwater system to provide public notification under 310 CMR 22.16(4).

(5) Treatment Technique Violations for Groundwater Systems.

(a) A groundwater 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 the 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 groundwater source sample under 310 CMR 22.26(3)(d), a groundwater 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 310 CMR 22.26(4)(a)1. or 2., 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 groundwater system subject to the requirements of 310 CMR 22.26(4)(b)3. 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 groundwater source is in violation of the Treatment Technique 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) Groundwater system must give public notification under 310 CMR 22.16 for the Treatment Technique violations specified in 310 CMR 22.26(5)(a) through (c).

(6) Reporting and Recordkeeping for Groundwater Systems.

(a) Reporting. In addition to the requirements of 310 CMR 22.15, a groundwater system regulated under 310 CMR 22.26 must provide the following information to the Department:

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1. A groundwater system conducting compliance monitoring under 310 CMR 22.26(4)(b) 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 membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The groundwater 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 310 CMR 22.26(4)(a), a groundwater system must notify the Department within 30 days of completion of the corrective action.

3. If a groundwater system subject to the requirements of 310 CMR 22.26(3)(a) does not conduct source water monitoring under 310 CMR 22.26(3)(a)6.b., the system must provide documentation to the Department within 30 days of the total coliform-positive sample that it met the Department criteria.

(b) Recordkeeping. In addition to the requirements of 310 CMR 22.17, a groundwater system regulated under 310 CMR 22.26 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 310 CMR 22.16A(8). Documentation shall be kept for a period of not less than three years.

3. Records of decisions under 310 CMR 22.26(3)(a)6.b. and records of invalidation of fecal indicator-positive groundwater source samples under 310 CMR 22.26(3)(d). 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 310 CMR 22.05(3). 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 310 CMR 22.26(4)(b):

a. Records of the Department-specified minimum Disinfectant residual. Documentation shall be kept for a period of not less than ten years.

b. 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.

c. 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.

22.27: Severability

If any provision of 310 CMR 22.00 or its application to any unit of government is held invalid, such invalidity shall not affect other provisions or applications of 310 CMR 22.00 which can be given effect without the invalid provision or application and to this end the provisions of 310 CMR 22.00 are declared to be severable.

REGULATORY AUTHORITY

310 CMR 22.00: M.G.L. c. 111, § 160A.

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