

310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION

310 CMR 22.00: DRINKING WATER

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22.01: Purpose and Authority

(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 is promulgated to set 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, 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.

- (a) 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.
- (b) 310 CMR 22.22 is promulgated pursuant to the authority conferred by M.G.L. c. 111, §§160 and 160A.

(3) Effective Dates.

- (a) Except as provided in 310 CMR 22.01(2), 310 CMR 22.00 shall take effect on June 24, 1977. Rules and Regulations For the Purpose of Preventing The Pollution And Securing The Sanitary Protection of Certain Waters Used As Sources of Public Water Supply, approved and adopted by the Department of Public Health on October 11, 1960 and filed with the Secretary of the Commonwealth on June 1, 1961, are repealed as of the effective date of 310 CMR 22.00.
- (b) Except for 310 CMR 22.06(2)(c), the effective date for 310 CMR 22.06, 22.07, 22.07A is January 1, 1993.
- (c) The effective date for 310 CMR 22.07B(1)(a)(1) through (a)(8) is January 9, 1989.
- (d) The effective date for 310 CMR 22.07B(1)(a)(9) through (a)(18) and of 310 CMR 22.07A(1)(a)(1) through (c)(18) is July 30, 1992.
- (e) The effective date for 310 CMR 22.06(2)(a) is October 2, 1987 and for 310 CMR 22.06 (2)(b) and 310 CMR 22.06(2)(d) through 310 CMR 22.06(2)(k) is July 30, 1992.
- (f) 310 CMR 22.05 became effective January 1, 1991.
- (g) The effective date for 310 CMR 22.06(2)(l) through (p), 22.07A(1)(t) through (hh) and 22.07B(1)(s) through (v) is January 17, 1994
- (h) The effective date for 310 CMR 22.11B is July 1, 1995.
- (i) The effective date for 310 CMR 22.16A is the date of promulgation.
- (j) The effective date for 310 CMR 22.07C is the date of promulgation.
- (k) The effective date for 310 CMR 22.07E and 310 CMR 22.20D is January 1, 2002.
- (l) The effective date for 310 CMR 22.20E is the date of promulgation.
- (m) The effective date for 310 CMR 22.20F is January 1, 2005.
- (n) The effective date of 310 CMR 22.09A is December 8, 2003.
- (o) The arsenic maximum contaminant level (MCL) listed in 310 CMR 22.06(2)(c) is effective for the purpose of compliance on January 23, 2006. Requirements relating to arsenic set forth in 310 CMR 22.06(2), 310 CMR 22.06(4), 310 CMR 22.06(15), 310 CMR 22.06(16), and 310 CMR 22.06(17), are effective for the purpose of compliance on January 23, 2006. The Consumer Confidence Rule reporting requirements relating to arsenic listed in 310 CMR 22.16A(10) are effective for the purpose of compliance on March 23, 2001.
- (p) The effective date for 310 CMR 22.06 (9) is January 1, 2007.
- (q) The effective date for 310 CMR 22.07F is the date of promulgation.
- (r) The effective date for 310 CMR 22.20G is the date of promulgation.

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) can not 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.

Agency means the United States Environmental Protection Agency.

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 1 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 ground water 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 1 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.

Certified Operator means an operator who has received a certified of competency issued by the Board of Certification of Operators of Drinking Water Supply Facilities in accordance with 236 CMR 2.00, 3.00, 4.00, and 5.00 and currently maintains a valid license.

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 obtains all of its water from another public water system, but is not owned or operated by, a public water system, which is subject to 310 CMR 22.00, 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.

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 CT_{calc} 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.

$$\frac{CT_{calc}}{CT_{99.9}}$$

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

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

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.

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 Filtration means a process resulting in substantial particulate removal in which (1) a precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum), and (2) while the water is filtered by passing through the cake on the septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake.

Direct Filtration means a series of processes including coagulation and filtration but excluding sedimentation resulting in substantial particulate removal.

Direct Responsible Charge means accountability for and performance of active, daily on-site operation of the facility or system, or a major segment of the facility or 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 the facility or 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. For the purpose of 310 CMR 22.00, the distribution system may include the source booster pumping stations, storage tanks and reservoirs, and chlorination and/or disinfection facilities.

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.

Emergency means any situation or event, natural or man-made, which causes or threatens to cause damage to a water supply system such that there will be a disruption of normal water supply functions. The effects can be on a portion or all of the system and may require an immediate action in order 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.

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, for the purpose of demonstrating public water system capacity under 310 CMR 22.04, 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 regulations to 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 22.07F(5)(b)(2) 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.

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.

Ground Water Under the Direct Influence of Surface Water means any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.

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. This definition 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.

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 = $(32 \times \text{pumping rate in gallons per minute}) + 400$. A default IWPA radius or an IWPA radius otherwise computed and determined by the Department shall be applied to transient non-community (TNC) and non-transient non-community (NTNC) wells when there is no metered rate of withdrawal or no approved pumping rate.

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 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.

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: for the purpose of 310 CMR 22.16A(4)(C)1. 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 nonenforceable 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 1 micrometer is rejected by an engineered barrier, primarily through a size- exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

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.

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.

Presedimentation 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 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 the Massachusetts Drinking Water Regulations, 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.

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. Such term 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 herein 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 persons 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

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 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.

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 the Massachusetts Surface Water Quality Standards, 314 CMR 4.00. Protected Zones A, B, and C, as defined herein, do not apply to river sources designated as Class B under 314 CMR 4.00.

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

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.

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.

Secondary Maximum Contaminant Level (SMCL) means standards which apply to public water systems and which in the judgement of the Administrator or the Department, are requisite to protect the public welfare. The SMCL is the maximum permissible level of a containment 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 qualify, are excluded from this definition. The Department may require a public water system to comply with secondary maximum contaminant levels to protect public health and to discourage persons served by the public water system from discontinuing their use of drinking water from public water systems.

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 1.00 through 5.00.

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.

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 3,300 persons or fewer.

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.

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. This definition does not apply to substantial modifications as that term is used in 310 CMR 22.22.

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 the Massachusetts Surface Water Quality Standards, 314 CMR 4.00.

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 Technique (TT) means, as defined in 310 CMR 22.16A(4)(e)1., a required process 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).

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.

Uncovered Finished Water Storage Facility means 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.

Variations 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.

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.

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.

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. The wells can either be suction lifted or individually pumped. Pump intake depths shall be no greater than 28 feet below ground level (bgl). A maximum distance of 50 feet shall be permitted between wells.

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.

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

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); 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), 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).

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. Tubular wellfields require a 250-foot protective radius. Protective radii for all other public water system wells are determined by the following equation: Zone I radius in feet = $(150 \times \log \text{ of pumping rate in gpd}) - 350$. 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 (TNC) and non-transient non-community (NTNC) wells when there is no metered rate of withdrawal or no approved pumping rate.

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.

(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 Prevention Device Tester](#) means an individual who is certified by the Department as a [Massachusetts Backflow Prevention Device Tester](#).

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.

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.

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 an individual 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.

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 and
 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.

22.04: Construction, Operation and Maintenance of 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/National Sanitation Foundation (ANSI/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); and

2. was approved by the ~~Environmental Protection Agency (EPA)~~ prior to April 1990 and conforms to the standards of the American Water Works Association (AWWA).

(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.

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. The technology received a favorable review from ETV, UL, ANSI/NSF or AWWA.

Add 310 CMR 22.04 (13)

13) Emergencies.

(a) Each water supplier 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 the Department's Office of Research and Standards' as set forth in the Standards and Guidelines for Contaminants in Massachusetts Drinking Waters. (available on-line at <http://www.mass.gov/dep/water/laws/regulati.htm#chems>);
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 this section 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;
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 310CMR 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.

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

(6) Analytical Methodology.

(a) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml. Sample should be tested within two hours of receipt in the laboratory. However, the time from sample collection to initiation of analysis shall not exceed 30 hours. Samples should be kept below 10°C during transport or shipping to the laboratory.

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

(c) Public water systems must conduct total coliform analyses in accordance with one of the following analytical methods set forth in 310 CMR 22.05(6)(c)1. through 310 CMR 22.05(6)(c)10. These methods are contained in the 18th edition (1992), 19th edition (1995) or 20th edition (1998) of Standard Methods for the Examination of Water And Wastewater, 1992, American Public Health Association, 1015 Fifteenth Street NW., Washington, DC 20005. The cited methods in any of these editions may be used. In addition, the following online versions may also be used: 9221 A, B, D-99, 9222 A, B, C-97, and 9223 B-97. Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that may be used.

1. Total Coliform Fermentation Technique (9221A, B). Lactose broth, as commercially available, may be used in lieu of laurel tryptose broth, if the system conducts at least 25 parallel tests between this medium and laurel tryptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate for total coliform, using lactose broth, is less than 10%. If inverted tubes are used to detect gas production, the media should cover these tubes at least ½ to _ after the sample is added. No requirement exists to run the completed phase on 10% of all total coliform-positive confirmed tubes.

2. Total Coliform Membrane Filter (MF) Technique (9222 A, B, C).

3. Presence-Absence (P-A) Coliform Test (9221D). No requirement exists to run the completed phase on 10% of all total coliform-positive confirmed tubes. Six-times formulation strength may be used if the medium is filter-sterilized rather than autoclaved.
 4. ONPG-MUG Test (9223). The ONPG-MUG Test is also known as the Autoanalysis Collect System.
 5. Colisure Test. The Colisure Test must be incubated for 28 hours before examining the results. If an examination of the results at 28 hours is not convenient, then results may be examined at any time between 28 hours and 48 hours. A description of the Colisure Test 8th edition February 28, 1999 may be obtained from IDEXX Laboratories Inc., One IDEXX Drive, Westbrook, Maine 04092. The Colisure Test may be read after an incubation time of 24 hours.
 6. E*Colite® Test. A description of the E*Colite® Test “Presence/Absence for Coliforms and E-Coli in Water.” December 21, 1997, is available from Charm Science Inc. 36 Franklin Street, Malden, MA 02148.
 7. M-ColiBlue 24® Test. A description of the m-ColiBlue 24® Test, August 17, 1999, is available from the Hach Company 100 Dayton Avenue, Ames, IA 50010.
 8. Readycult® Coliforms 100 Presence/Absence Test. The Readycult® Coliforms 100 Presence/Absence Test is described in the document, “Readycult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters”. November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGaA, Darmstadt Germany).
 9. Membrane Filter Technique using Chromocult® Coliform Agar. A description of Membrane Filter Technique using Chromocult® Coliform Agar is in the document, “Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia Coli* in Finished Waters”, November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGaA, Darmstadt Germany).
 10. Colitag® Test for the determination of the presence/absence of total coliforms and E. Coli is described in “Colitag® Product as a test for Detection and identification of Coliforms and E.Coli Bacteria in Drinking Water and Source Water as Required in National Primary Drinking Water Regulations,” August 2001, available from CPI International, Inc.
- (d) In lieu of the 10-tube MTF Technique specified in 310 CMR 22.05(6)(c)1., a public water system may use the MTF Technique using either five tubes (20-ml sample portions) or a single culture bottle containing the culture medium for the MTF Technique i.e., laurel tryptose broth (formulated as described in *Standard Methods for the Examination of Water and Wastewater*, 1985, American Public Health Association et al., 16th Edition, Method 908A - pp. 872), as long as a 100-ml water sample is used in the analysis.
- (e) Each supplier of water must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique or Presence-Absence (P-A) Coliform Test is used to test for total coliform, shake the lactose-positive presumptive tube or P-A bottle vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator

stick into brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliform, respectively. For EPA-approved analytical methods which use a membrane filter, transfer the total coliform-positive culture by one of the following methods: remove the membrane containing the total coliform colonies from the substrate with a sterile forceps and carefully curl and insert the membrane into a tube of EC medium. (the laboratory may first remove a small portion of selected colonies for verification), swab the entire membrane filter surface with a sterile cotton swab and transfer the inoculum to EC medium (do not leave the cotton swab in the EC medium), or inoculate individual total coliform-positive colonies into EC Medium. Gently shake the inoculated EC tubes to insure adequate mixing and incubate in a water bath at $44.5 \pm 0.2^\circ\text{C}$ for 24 ± 2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test. The preparation of EC medium is described in Method 9221E (paragraph 1a) in *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), and 20th edition (1998); the cited method in any of these editions may be used. Public Water systems need only determine the presence or absence of fecal coliform; a determination of fecal coliform density is not required.

(f) Copies of the analytical methods cited in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association; 1015 Fifteenth Street, NW.; Washington, DC 20005. Copies of the methods set forth in *Microbiological Methods for Monitoring the Environment, Water and Wastes* may be obtained from ORD Publications, U.S. EPA, 26 W. Martin Luther King Drive, Cincinnati, Ohio 45268. Copies of the MMO-MUG Test as set forth in the article "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliform and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method" (Edberg et al.) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235.

1. EC medium supplemented with 50 $\mu\text{g}/\text{mL}$ of 4-methylumbelliferyl-beta-Dglucuronide (MUG) (final concentration), as described in Method 9222G in *Standard Methods for the Examination of Water and Wastewater*, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 mL of EC medium, as described in 310 CMR 22.05(6)(e), is supplemented with 50 $\mu\text{g}/\text{mL}$ of MUG before autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in 310 CMR 22.05(6)(e) for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at $44.5^\circ\text{C} \pm 0.2^\circ\text{C}$ for $24 \pm$ hours, and then observe fluorescence with an ultraviolet light (366 nm) in the dark. If fluorescence is visible, *E. coli* are present.

2. Nutrient agar supplemented with 100 $\mu\text{g}/\text{mL}$ of 4-methylumbelliferyl-beta-Dglucuronide (MUG) (final concentration), as described in Method 9222G in *Standard Methods for the Examination of Water and Wastewater*, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition

(1992) may be used if the membrane filter containing a total coliform-positive colony(ies) is transferred to nutrient agar, as described in Method 9221B (paragraph 3) of Standard Methods (18th edition), supplemented with 100 µg/mL of MUG. If the 18th edition is used, incubate the agar plate at 35°C for four hours and then observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, E. coli are present.

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

(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 (hereafter called a 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 22.06(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 (hereafter called a 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 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. Compositing of source with previous detects is not allowed, unless otherwise authorized by the Department

1. If the concentration in the composite sample is greater than or equal to one-fifth 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 one-fifth of the MCL in the composite sample. Detection limits for each analytical method and MCL are the following:

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DETECTION LIMITS FOR INORGANIC CONTAMINANTS

<u>Contaminant</u>	<u>MCL(mg/l)</u>	<u>Methodology</u>	<u>Detection Limit (mg/l)</u>
Antimony	0.006	Atomic Absorption; furnace	0.003
			0.0008 ⁵
Arsenic	0.010 ⁶	ICP-Mass Spectrometry	0.0004
		Hydride-Atomic absorption	0.001
		Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform- Stabilized Temperature	0.0005 ⁷
		Atomic Absorption; Gaseous Hydride	0.001
Asbestos	7 MFL ¹	ICP- Mass Spectrometry	0.0014 ⁸
		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
Beryllium	0.004		(0.001)
		Atomic Absorption; furnace	0.0002
		Atomic Absorption; platform Inductively Coupled Plasma ²	0.00002 ⁵
		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
Cyanide	0.2		(0.001)
		Distillation, Spectrophotometric ³	0.02
		Distillation, Automated, Spectrophotometric ³	0.005
		Distillation, Selective Electrode ³	0.05
		Distillation, Amenable, Spectrophotometric ⁴	0.02
		UV, Distillation, Spectrophotometric ¹¹	0.0005
		<u>Micro</u> Distillation, <u>Flow Injection</u> , Spectrophotometric ³	0.0006
		<u>Ligand Exchange with Amperometry</u> ⁴	<u>0.0005</u>
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

Nitrite	1 (as N)	<u>Capillary Ion Electrophoresis</u>	<u>0.076</u>
		Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
Perchlorate	0.0020	<u>Capillary Ion Electrophoresis</u>	<u>0.103</u>
		Ion Chromatography ⁹	0.0010 ¹⁰
		LC/MS or LC/MS/MS	0.0010
Selenium	0.05	IC/MS or IC/MS/MS	0.0010
		Atomic Absorption; furnace	0.002
Sodium	0.002	Atomic Absorption; gaseous hydride	0.002
		<i>See 310 CMR 22.06A</i>	
Thallium	0.002	Atomic Absorption; furnace	0.001
		Atomic Absorption; platform	0.0007 ⁵
		ICP-Mass Spectrometry	0.0003

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-digester is used, and "free" cyanides when UV-digester is bypassed.

(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

Contaminant	Reference (Method Number)		ASTM ³	SM ⁴	SM Online ²³	Other
	Methodology	EPA				
Antimony	Atomic Absorption: Furnace			3113B	<u>3113 B-99</u>	
	Atomic Absorption: platform	² 200.9				
	ICP-Mass Spectrometry	² 200.8				

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Hydride-Atomic Absorption		D-3697-92	
Arsenic ⁴⁴¹² Atomic Absorption; Hydride	Atomic Absorption: Furnace	D2972-97C	3113B
	Inductively Coupled Plasma ⁴⁵¹³	D-2972-97B	3114B
	ICP-Mass Spectrometry		⁵ <u>3120B 3120 B-99</u>
	Atomic Absorption; Platform		
	<u>Differential Pulse Anodic Stripping Voltametry</u>		<u>Method 1001¹⁶</u>
Asbestos	Transmission Electron Microscopy	⁹ 100.1	--
	Transmission Electron Microscopy	¹⁰ 100.2	--
Barium	Atomic Absorption; Furnace	--	<u>3113B 3113B-99</u> --
	Atomic Absorption; Direct	--	3111D <u>3111D-99</u> --
	Inductively Coupled Plasma	² 200.7	3120B <u>3120B-99</u> --
	ICP-Mass Spectrometry	² 200.8	
Beryllium	Atomic Absorption; Furnace	D-3645-93B <u>D3645-97,03B</u>	3113B <u>3113B-99</u>
	Atomic Absorption; Platform	² 200.9	
	Inductively Coupled Plasma	² 200.7	3120B <u>3120B-99</u>
	ICP-Mass Spectrometry	² 200.8	
Cadmium	Atomic absorption; Furnace	--	3113B <u>3113B-99</u> --
	Inductively-coupled Plasma	² 200.7	-- --
	ICP-Mass Spectrometry	² 200.8	
	Atomic Absorption; Platform	² 200.9	
Chromium	Atomic absorption; Furnace	--	3113B <u>3113B-99</u> --
	Inductively Coupled Plasma	² 200.7	3120B <u>3120B-99</u> --
	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	D2036-96B	4500-CN-G <u>4500-CN G-99</u>
	Manual Distillation followed by: Spectrophotometric, Manual	D2036-98A	4500-CN <u>4500- I-3300-85⁶</u> <u>-E CN E-99</u>
	Semi-automated	⁶ 335.4	

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	Selective Electrode			4500-CN-F	<u>4500-CN</u> <u>F-99</u>	
	<u>UV, Distillation,</u> <u>Spectrophotometric</u> <u>Micro Distillation, Flow</u> <u>Injection</u> <u>Spectrophotometric</u>					<u>Kelada-01</u> ¹⁹
	<u>Ligand Exchange and</u> <u>Amperometry</u> ²²	<u>D6888-04</u>				<u>QuikChem10</u> <u>-204-00-1-X</u> ¹⁸ <u>OIA-1677</u> <u>DW</u> ²¹
Mercury	Manual cold vapor	² 245.1	D3223-97	<u>02</u>	3112B	<u>3112B-99</u> --
	Automated cold vapor	¹ 245.2	--		--	--
	ICP-Mass Spectrometry	² 200.8				
Nickel	Atomic Absorption: Furnace				3113B	<u>3113B-99</u>
	Atomic Absorption: Platform	² 200.9				
	Atomic Absorption Direct				3111B	<u>3113B-99</u>
	Inductively Coupled Plasma	² 200.7			3120B	<u>3120-99</u>
	ICP-Mass Spectrometry	² 200.8				
Nitrate	Manual cadmium reduction		D3867-90B		4500- 4500-	NO ₃ -E <u>NO₃E-00</u> --
	Automated cadmium reduction	⁶ 353.2	D3867-90A		4500- 4500-	NO ₃ -F <u>NO₃F-00</u> --
	Ion selective electrode	--	--		4500- 4500-	NO ₃ -D <u>NO₃D-00</u> 601 ⁷
	Ion chromatography	⁶ 300.0 <u>300.1</u> ²⁰	D4327-97	<u>03</u>	4110B	<u>4110B-00</u> B-1011 ⁸
	<u>Capillary Ion Electrophoresis</u>					<u>D6508,</u> <u>Rev.2</u> ²⁴
Nitrite	Spectrophotometric		--		4500- 4500-NO ₂ -	NO ₂ -B <u>B-00</u>
	Automated cadmium reduction	⁶ 353.2	D3867-90A		4500- 4500-NO ₃ -	NO ₃ -F <u>F-00</u> --
	Manual cadmium reduction		D3867-90B		4500- 4500-NO ₃ -	NO ₃ -E <u>E-00</u> --
	Ion chromatography	⁶ 300.0 <u>300.1</u> ²⁰	D4327-97	<u>03</u>	4110B	<u>4110B-00</u> B-1011 ⁸
	<u>Capillary Ion Electrophoresis</u>					<u>D6508,</u> <u>Rev.2</u> ²⁴
Perchlorate	Ion chromatography	⁺⁶¹⁴ 314.0				

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		⁺⁷¹⁵ 314.1	
	LC/MS or LC/MS/MS	⁺⁸¹⁶ 331.0	
	IC/MS or IC/MS/MS	⁺⁹¹⁷ 332.0	
Selenium	Hydride-Atomic absorption;		D3859-98, <u>03A</u> ,3114B, <u>3114B-97</u>
	Atomic Absorption: Furnace		D3859-98, <u>03B</u> ,3113B, <u>3113B-99</u>
	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	

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 – 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 – Industrial Method No. 129-71W, "Fluoride in Water and Wastewater", December 1972, and Method No. 380-75WE, "Fluoride in Water and Wastewater", February 1976, Technicon Industrial Systems. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.~~

~~¹² – Unfiltered, no digestion or hydrolysis.~~

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 in-furnace depositions are made.

¹² – If ultrasonic nebulization is used in the determination of arsenic by Methods 200.7, 200.8, or SM 3120 B, the arsenic must be in the pentavalent state to provide uniform signal response. For methods 200.7 and 3120B, both samples and standards must be diluted in the same mixed acid matrix concentration of nitric and hydrochloric acid with the addition of 100 µL of 30% hydrogen peroxide per 100 ml of sodium hypochlorite. For direct analysis of arsenic with the Method 200.8 using ultrasonic nebulization, samples must contain 1 mg/L of sodium hypochlorite.

¹³ – After January 23, 2006 analytical methods using the ICP-AES technology, may not be used because the detection limits for these methods are 0.008 mg/L or higher. This restriction means that the two ICP-AES methods (EPA Method 200.7 and SM 3120 B) approved for use for the MCL of 0.05 mg/L may not be used for compliance determinations for the revised MCL of 0.01 mg/L. However, prior to January 23, 2006 systems may have compliance samples analyzed with these less sensitive methods.

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."

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:

<u>Methodology</u>	<u>Reference (Method Number)</u>				
	<u>EPA</u>	<u>ASTM¹</u>	<u>SM²</u>	<u>SM Online⁸</u>	<u>Other</u>
<u>Ion Chromatography</u>	<u>300.0⁵</u>	<u>D4327</u>	<u>4110B</u>	<u>4110-B-00</u>	
	<u>300.1⁶</u>	<u>-97</u>			
<u>Manual Distillation;</u>			<u>4500F-B,D</u>	<u>4500-F-B,</u>	
<u>Colorimetric SPADNS</u>				<u>D-97</u>	--
<u>Manual Electrode</u>		<u>D1179-93</u>	<u>B</u>	<u>4500F-C</u>	<u>4500-F-</u>
		<u>99 B</u>		<u>C-97</u>	
<u>Automated Alizarin fluorine blue - lanthanum;</u>			<u>4500F-E</u>		<u>129-71W³</u>
<u>with distillation (complexone)</u>					<u>380-75WE⁴</u>
<u>Automated ion selective electrode</u>	--	--	--		
<u>Capillary Ion Electrophoresis.</u>					<u>D6508,</u>
					<u>Rev. 2⁷</u>

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, ~~Tarrytown, New York, 10591~~. 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, ~~Tarrytown, New York, 10591.~~ 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.

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, 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:

<u>Contaminant</u>	<u>Preservative</u> ¹	<u>Container</u> ²	<u>Time</u> 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 ₂ SO ₄ to pH<2	P or G	28 days
Non-chlorinated	Cool 4°C	P or G	48 <u>dayshours</u>
Non-chlorinated	Con H ₂ SO ₄ to pH<2	P or G	28 days
Nitrite	Cool, 4°C	P or G	48 hours
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.

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

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

<u>Contaminant</u>	<u>SODIUM ANALYTICAL METHODS</u>			
	<u>Methodology</u> ⁴³	<u>EPA</u> ¹	<u>SM</u> ²	<u>SM Online</u> ⁴ <u>ASTM</u>
Sodium	Inductively-coupled Plasma	200.7	--	
	Atomic absorption; direct aspiration		3111B	<u>3111 B-99</u>
	<u>Ion Chromatography</u>			<u>D6919-03</u>

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

(10) Analytical Methods.

(a) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica, and temperature shall be conducted using the following methods:

ANALYTICAL METHODS

Reference (Method Number)

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<u>Contaminant</u>	<u>Methodology</u> ⁹	<u>EPA</u> ¹	<u>ASTM</u> ²	<u>SM</u> ³	<u>SM Online</u> ¹¹	<u>USGS</u> ⁴	<u>Other</u>
Lead	Atomic absorption; furnace technique	----	D3559- 96D <u>96, 03D</u>	3113B	<u>3113B-99</u>		
	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- 95C 95, <u>02C</u>	3113B	<u>3113B-99</u>		
	Atomic absorption; direct aspiration	----	D1688- 95A <u>95, 02A</u>	3111B	<u>3113B-99</u>		
	Inductively-coupled plasma	200.7 ⁵		3120B	<u>3120B-99</u>		
	Inductively-coupled plasma; mass spectrometry	200.8 ⁶					
	Atomic absorption; platform furnace	200.9 ⁷					
<u>Magnesium</u>	<u>Atomic absorption; furnace</u>		<u>D 511- -93 03B</u>	<u>3111B</u>	<u>311B-99</u>		
	<u>ICP</u>	<u>200.7</u>		<u>3120B</u>	<u>3120B-99</u>		
	<u>Complexation Titrimetric Methods</u>		<u>D 511- 93, 03A</u>	<u>3500-Mg E</u>	<u>3500 MB-97</u>		
				<u>3500 Mg B</u>			
	<u>Ion Chromatography</u>		<u>D6919-03</u>				
pH	Electrometric	150.1	D1293- 95, <u>99</u>	4500- H ⁺ B	<u>4500- H⁺B-00</u>		
		150.2					
Conductivity	Conductance	----	D1125- A 95(<u>Re- approved</u> 1999) <u>A</u>	2510B	<u>2510B-97</u>		
Calcium	EDTA titrimetric	----	D511- 93A , 3500-		<u>3500-</u>		

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-			<u>03 A</u>	Ca-D	<u>Ca B-</u>	
			-	Ca B	<u>97</u>	
	Atomic absorption; direct aspiration		D511-93B	3111B	<u>3111 B-</u>	
			<u>03 B</u>		<u>99</u>	
	Inductively-coupled plasma	200.7		3120B	<u>3120 B-</u>	
					<u>99</u>	
Alkalinity	Titrimetric	----	D1067-92B	2320B	<u>2320 B-</u>	
			<u>02 B</u>		<u>97</u>	
	Electrometric titration					I-1030-85
Ortho-phosphate, unfiltered, no digestion or hydrolysis	Colorimetric, automated, ascorbic acid	365.1 ⁸		4500-P-F		
	Colorimetric, ascorbic acid, two reagent	----				
	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	300.0 ⁸ 300.1	D4327-97, <u>03</u>	4110B	<u>4110 B-00</u>	
	<u>Capillary Ion Electro- Phoresis</u>					<u>D6508, Rev. 2</u>
Silica	Colorimetric, molybdate blue; automated-segmented flow					I-1700-85
	Colorimetric Molybdosilicate	----	D859- 94 <u>95</u> <u>00</u>	4500-Si -D(18 th <u>19th</u>) 4500-SiO ₂ C(<u>20th ed.</u>)	4500- <u>SiO₂</u> <u>C-97</u>	I-2700 -85
	Heteropoly blue		-	4500-Si -E(18 th , 19 th) 4500 -SiO ₂ D (20 th ed.)	<u>4500-</u> <u>SiO₂</u> <u>D-97</u>	
	Automated method for					

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molybdate-reactive silica		4500-Si- <u>F(18th, 19th)</u>	<u>4500- SiO₂ E-97</u>
Inductively-coupled plasma	200.7 ⁵	4500-SiO ₂ <u>E(20th ed.)</u> 3120B	<u>3120 B-99</u>
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, CERL, EPA, Cincinnati, OH 45268. Copies may be inspected at the United States 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.

²The 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 States 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 States 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.

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.

⁹For analyzing lead and copper, the technique applicable to total metals shall be used and samples cannot be filtered. Samples that contain less than 1 NTU (nephelometric turbidity unit) and are properly preserved (conc HNO³ 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.

¹⁰The 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](http://www.standardmethods.org) 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.

22.07A: Synthetic Organic Chemicals (SOC) Sampling and Analytical Requirements

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. ~~These 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-821-B-94-005, October 1994; 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 and Method 1613, EPA/600/R-92/129, August 1992 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. Methods 504.1, 508.1 and 525.2 are available from U.S. EPA EMSL, Cincinnati, OH 45268. 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). American Public Health Association, 1015 Fifteenth Street NW, Wash., D.C. 20005; 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 Chromatography 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.html>.~~

~~(a) Method 504.1, "1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (1,2,3-TCP) in Water by Microextraction and Gas~~

~~Chromatography." Method 504.1 can be used to measure dibromochloropropane (DBCP) and ethylene dibromide (EDB). Method 504.1 Rev 1.0 is effective until July 1, 2001.~~

~~(b) Method 505, "Analysis of Organohalide Pesticides and Commercial Polychlorinated Biphenyl (PCB) Products in Water by Microextraction and Gas Chromatography." Method 505 can be used to measure alachlor, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, toxaphene and simazine. Method 505 can be used as a screen for PCBs (as Aroclors). Method 505, Rev 2.0 is effective until June 1, 2001.~~

~~(c) Method 506, "Determination of Phthalate and Adipate Esters in Drinking Water by Liquid-Liquid Extraction or Liquid-Solid Extraction and Gas Chromatography with Photoionization Detection." Method 506 can be used to measure di(2-ethylhexyl) phthalate and di(2-ethylhexyl) adipate. Method 506 is effective until June 1, 2001.~~

~~(d) Method 507, "Determination of Nitrogen and Phosphorus-Containing Pesticides in Ground Water by Gas Chromatography with a Nitrogen-Phosphorus Detector." Method 507 can be used to measure alachlor, atrazine and simazine. Method 507, Rev 2.0 is effective until June 1, 2001.~~

~~(e) Method 508, "Determination of Chlorinated Pesticides in Water by Gas Chromatography with an Electron Capture Detector." Method 508 can be used to measure chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor and toxaphene. Method 508 can be used as a screen for PCBs (as Aroclors). Method 508, Rev 2.0 is effective until June 1, 2001.~~

~~(f) Method 508.1, Revision 1.0, "Determination of Chlorinated Pesticides, Herbicides, and Organohalides by Liquid Solid Extraction and Electron Capture Gas Chromatography." Method 508.1 can be used to measure alachlor, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, simazine and toxaphene, method 508.1 can be used as a screen for PCBs (as Aroclors Method 508.1 Rev 1.0 is effective until June 1, 2001.~~

~~(g) Method 508A, "Screening for Polychlorinated Biphenyls by Perchlorination and Gas Chromatography." Method 508A is used to quantify PCBs as decachlorobiphenyl if detected in Methods 505, 508, 508.1 or 508.2.~~

~~(h) Method 515.1, "Determination of Chlorinated Acids in Water by Gas Chromatography with an Electron Capture Detector." Method 515.1 can be used to measure 2,4-D, dalapon, dinoseb, pentachlorophenol, picloram and 2,4,5-TP (Silvex). Method 515.1 Rev 1.0 is effective until June 1, 2001.~~

~~(i) Method 515.2, "Determination of Chlorinated Acids in Water using Liquid-Solid Extraction and Gas Chromatography with an Electron Capture Detector." Method 515.2 can be used to measure 2,4-D, dinoseb, pentachlorophenol, picloram and 2,4,5-TP (Silvex). Method 515.2 Rev 1.0 is effective until June 1, 2001.~~

~~NON-TEXT PAGE~~

|

~~22.07A: continued~~

- ~~(j) Method 515.3 can be used to measure 2,4-D dalapon, dinoseb, penachlorophenol, and picloram.~~
- ~~(k) Method 525.2, Revision 1.0, "Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry." Method 525.2 can be used to measure alachlor, atrazine, benzo(a)pyrene, chlordane, di(2-ethylhexyl)adipate, di(2-ethylhexyl)phthalate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, pentachlorophenol, simazine and toxaphene. Method 525.2 Rev 1.0 is effective until July 1, 2001.~~
- ~~(l) Method 531.1, "Measurement of N-Methyl Carbamoyloximes and N-Methyl Carbamates in Water by Direct Aqueous Injection HPLC with Post-Column Derivatization." Method 531.1 can be used to measure carbofuran and oxyamyl. Method 531.1 Rev 3.0 is effective until June 1, 2001.~~
- ~~(m) Method 547, "Determination of Glyphosate in Drinking Water by Direct Aqueous Injection HPLC with Post-Column Derivatization, and Fluorescence Detection." Method 547 can be used to measure glyphosate.~~
- ~~(n) Method 548.1, "Determination of Endothall in Drinking Water by Ion-Exchange Extraction, Acidic Methanol Methylation and gas Chromatography/Mass Spectrometry." Method 548.1 can be used to measure endothall.~~
- ~~(o) Method 549.2, "Determination of Diquat and Paraquat in Drinking Water by Liquid-Solid Extraction and High Performance Liquid Chromatography with Ultraviolet Detection." Method 549.2 can be used to measure diquat.~~
- ~~(p) Method 550, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Liquid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550 can be used to measure benzo(a)pyrene.~~
- ~~(q) Method 550.1, "Determination of Polycyclic Aromatic hydrocarbons in Drinking Water by Liquid-Solid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550.1 can be used to measure benzo(a)pyrene.~~
- ~~(r) Method 551, "Determination of Chlorination Disinfection Byproducts and Chlorinated Solvents in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography with Electron-Capture Detection." Method 551 can be used to measure ethylene dibromide (EDB), dibromochloropropane (DBCP), alachlor, atrazine, endrin, heptachlor, epoxide, lindane, methoxychlor, simazine, hexachlorobenzene, and hexachlorocyclopentadiene. Method 551 is effective until June 1, 2001.~~
- ~~(s) Method 552.2, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Ion-Exchange Liquid-Solid Extraction and Gas Chromatography with an Electron Capture Detector." Method 552.2 can be used to measure dalapon.~~
- ~~(t) Method 555, "Determination of Chlorinated Acids in Water by High Performance Liquid Chromatography with a Photodiode Array Ultraviolet Detector." Method 555 can be used to measure 2,4-D, 2,4,5-TP (Silvex), dinoseb, pentachlorophenol and picloram.~~
- ~~(u) Method 1613, "Tetra through Octa-Chlorinated Dioxins and Furans by Isotope Dilution." Method 1613 can be used to measure 2,3,7,8-TCDD (dioxin).~~
- ~~(v) Method 6610, "Carbamate Pesticides." Method 6610 can be used to measure~~

~~carbofuran and oxamyl. Method 6610 shall be followed 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.~~

~~(w) Method 6651, "Glyphosate Herbicide (Proposed) ^{*}." Method 6651 can be used to measure glyphosate. Method 6651 shall be followed 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.~~

~~(x) Method ASTM D5317-93 can be used to measure 2,4D: 2,4, TP (silvex), picloram, pentachlorophenol. ASTM Method D5317-93 is available in the *Annual Book of ASTM Standards*, 1999, Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.~~

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Add table

<u>Contaminant</u>	<u>EPA Method</u>	<u>SM</u>	<u>ASTM</u>	<u>Other</u>
<u>2,3,7,8-TCDD(dioxin)</u>	<u>1613</u>			
<u>2,4-D³ (as acid, salts and esters)</u>	<u>515.2,555,515.1, 515.3, 515.4</u>		<u>D5317-93,98 (Reapproved 2003).</u>	
<u>2,4,5-TP³ (Silvex)</u>	<u>515.2, 555, 515.1, 515.3, 515.4</u>		<u>D5317-93, 98 (Reapproved 2003).</u>	
<u>Alachor¹</u>	<u>505, 507, 525.2, 508.1, 551.1</u>			
<u>Atrazine¹</u>	<u>505, 507, 525.2, 508.1, 551.1</u>			<u>Syngenta AG-625⁴</u>
<u>Benzo(a)pyrene</u>	<u>525.2, 550, 550.1</u>			
<u>Carbofuran</u>	<u>531.1, 531.2</u>	<u>6610</u>		
<u>Chlordane</u>	<u>505, 508, 525.2, 508.1</u>			
<u>Dalapon</u>	<u>552.1, 515.1, 515.3, 552.2, 515.4</u>			
<u>Di(2-ethylhexyl)adipate</u>	<u>506, 525.2</u>			
<u>Di(2-ethylhexyl)phthalate</u>	<u>506, 525.2</u>			
<u>Dibromochloropropane (DBCP)</u>	<u>504.1, 551.1</u>			
<u>Dinoseb³</u>	<u>515.2, 555, 515.1, 515.3, 515.4</u>			
<u>Diquat</u>	<u>549.2</u>			
<u>Endothall</u>	<u>548.1</u>			
<u>Endrin</u>	<u>505, 508, 525.2, 508.1, 551.1</u>			
<u>Ethylene dibromide (EDB)</u>	<u>504.1, 551.1</u>	<u>6651</u>		
<u>Glyphosate</u>	<u>547</u>			
<u>Heptachlor</u>	<u>505, 508, 525.2, 508.1, 551.1</u>			
<u>Heptachlor Epoxide</u>	<u>505, 508, 525.2</u>			

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<u>Contaminant</u>	<u>EPA Method</u>	<u>SM</u>	<u>ASTM</u>	<u>Other</u>
	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).	
Picloram³	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003).	
Simazine¹	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.](#)

² [PCBs are qualitatively identified as Aroclors and measured for compliance purposes as decachlorobiphenyl. Users of Method 505 may have more difficulty in achieving the required detection limits than users of Methods 508.1, 525.2, or 508.](#)

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 one-half 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.

22.07B: Maximum Contaminant Levels (MCLs) for Volatile Organic Compounds (VOC)

8) VOC Analytical Methods: Analysis for the contaminants listed in 22.07B(1) shall be conducted using the following EPA methods or their equivalent as approved by EPA

Contaminant	EPA Method
<u>Benzene</u>	<u>502.2, 524.2</u>
<u>Carbon tetrachloride</u>	<u>502.2, 524.2, 551.1</u>
<u>Chlorobenzene</u>	<u>502.2, 524.2</u>
<u>1,2-Dichlorobenzene</u>	<u>502.2, 524.2</u>
<u>1,4- Dichlorobenzene</u>	<u>502.2, 524.2</u>
<u>1,2- Dichloroethane</u>	<u>502.2, 524.2</u>
<u>cis-Dichloroethylene</u>	<u>502.2, 524.2</u>
<u>trans- Dichloroethylene</u>	<u>502.2, 524.2</u>
<u>Dichloromethane</u>	<u>502.2, 524.2</u>
<u>1,2-Dichloropropane</u>	<u>502.2, 524.2</u>
<u>Ethylbenzene</u>	<u>502.2, 524.2</u>
<u>Styrene</u>	<u>502.2, 524.2</u>
<u>Tetrachloroethylene</u>	<u>502.2, 524.2, 551.1</u>
<u>1,1,1-Trichlorobenzene</u>	<u>502.2, 524.2, 551.1</u>
<u>Trichloroethylene</u>	<u>502.2, 524.2, 551.1</u>
<u>Toluene</u>	<u>502.2, 524.2</u>
<u>1,2,4-Trichlorobenzene</u>	<u>502.2, 524.2</u>
<u>1,1-Dichloroethylene</u>	<u>502.2, 524.2</u>
<u>1,1,2-Trichloroethane</u>	<u>502.2, 524.2,</u>
<u>Vinyl chloride</u>	<u>502.2, 524.2</u>
<u>Xylenes(total)</u>	<u>502.2, 524.2</u>

(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.-

Method 502.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series." Method 502.2 Rev 2.0 is effective until July 1, 2000.

(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 Method 524.2, "Measurement of Purgeable Organic Compounds in Water by "Capillary Column Gas Chromatography/Mass Spectrometry."

(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.

22.07D: Secondary Chemical Standards

(1) Secondary Contaminants. The following contaminant levels apply to every public water systems:

<u>Contaminant</u>	<u>Secondary MCL</u>
(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) <u>Corrosivity</u>	<u>Non-corrosive</u>
(f) <u>Fluoride</u>	<u>2.0 mg/l</u>
<u>Reserved</u>	
(g) (g) Foaming Agents	0.5 mg/l
(g) (h) Iron	0.3 mg/l
(h) (i) Manganese	0.05 mg/l
(g) (j) Odor	3 Threshold Unit Number
(h) (k) pH	6.5 – 8.5
(i) (l) Silver	0.10 mg/l
(j) (m) Sulfate	250 mg/l
(k) (n) Total Dissolved Solids	500 mg/l
(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. 67, No. 205/October 23, 2002~~/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:

<u>Disinfection Byproduct</u>	<u>MCL (mg/l)</u>
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).

- (a) Compliance dates for CWSs and NTNCWSs. Surface water and ground water 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 ground water under the direct influence of surface water systems serving fewer than 10,000 persons and systems using only ground water 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.
 - 1. Compliance dates.
Surface water and ground water under the direct influence of surface water systems serving 10,000 or more persons must comply with 310 CMR 22.07E(1)(b)1.a. beginning January 1, 2002. Surface water systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with 310 CMR 22.07E(1)(b) 1. 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.
 - 1. 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:

<u>Disinfectant Residual</u>	<u>MRDL (mg/l)</u>
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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 ground water 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 ground water source under the direct influence of surface water that serves fewer than 10,000 persons and each supplier of water who uses only a ground water 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.

(4) Disinfection Byproducts BATs.

(a) The EPA Administrator, pursuant to Section 1412 of the federal Safe Drinking Water Act,

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):

<u>Disinfection Byproduct</u>	<u>Best Available Technology</u>
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 section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in 310 CMR 22.07E(1)(c) for all systems that disinfect their source water:

<u>Disinfection byproduct</u>	<u>Best available technology</u>
<u>Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5).</u>	<u>Enhanced coagulation or enhanced softening, plus GAC10; or nanofiltration with a molecular weight cutoff <1000 Daltons; or GAC20</u>

(c) The EPA Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in 310 CMR 22.07E(1) (c) for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

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

←

(5) Disinfectant Residuals BATs. The EPA Administrator, pursuant to Section 1412 of the federal Safe Drinking Water Act, 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 310 CMR 22.07F, to demonstrate compliance with the requirements of 310 CMR 22.07E and 310 CMR 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.

(b) The methods described in 310 CMR 22.07E(6) 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-~~120821~~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 300.1 is titled USEPA Method 300.1, Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision 1.0, USEPA, 1997, EPA/600/R-98/118 (available through the NTIS, PB98-169196); also available from: Chemical Exposure Research Branch, Microbiological & Chemical Exposure Assessment Research Division, National Exposure Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268, Fax Number: 513-569-7757, Phone number: 513-569-7586. 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 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/nerlewww/ordmeth.htm. Standard Methods 4500-CI D, 4500-CI E, 4500-CI F, 4500-CI G, 4500-CI H, 4500-CI I, 4500-CIO2 D, 4500-CIO2 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-CI D-00, 4500-CI E-00, 4500-CI F-00, 4500-CI G-00, 4500-CI H-00, 4500-CI I-00, 4500-CIO2 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.

~~Except where noted, all methods refer to *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. The cited methods published in any of these three editions may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005. ASTM Method D 1253-86 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 1996 edition; copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.~~

(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:

Delete Table

~~Approved Methods for Disinfection Byproduct Compliance Monitoring~~

Methodology ²	EPA Method	Standard Method	TTHM	Byproduct Measured ¹		
				HAAS	Chlorite ⁴	Bromate
P&T/GC/EICD & PID	502.2		X			
P&T/GC/MS	524.2		X			
LLE/GC/ECD	551.1		X			
LLE/GC/ECD		6251-B		X		
SPE/GC/ECD	552.1			X		
LLE/GC/ECD	552.2			X		
Amperometric Titration		4500-ClO ₂ -E			X	
IC	300				X	
IC	300.1				X	X

Add Table

APPROVED METHODS FOR DISINFECTION BYPRODUCT COMPLIANCE MONITORING

<u>Contaminant and methodology¹</u>	<u>EPA method</u>	<u>Standard Method²</u>	<u>SM online³</u>	<u>ASTM method³</u>
<u>TTHM</u> <u>P&T/GC/EICD& PID</u> <u>P&T/GC/MS</u> <u>LLE(GC/ECD)</u>	<u>502.2⁴</u> <u>524.2</u> <u>551.1</u>			
<u>HAA5</u> <u>LLE(diazomethane)/GC/ECD</u> <u>SPE(acidicmethanol)/GC/ECD</u> <u>LLE(acidicmethanol)/GC/ECD</u>	<u>552.1⁵</u> <u>552.2,552.3</u>	<u>6251 B⁵</u>	<u>6251 B-94</u>	
<u>Bromate</u> <u>Ion chromatography</u> <u>Ion chromatography & post column reaction</u> <u>IC/ICP-MS</u>	<u>300.1</u> <u>317.0 Rev. 2.0⁶</u> <u>326.0⁶</u> <u>321.867</u>			<u>D 6581-00</u>
<u>Chlorite</u> <u>Amperometric titration</u> <u>Spectrophotometry</u> <u>Ion chromatography</u>	<u>327.0 Rev 1.1⁸</u> <u>300.0, 300.1,</u> <u>317.0 Rev 2.0,</u> <u>326.0</u>	<u>4500-ClO₂ E⁸</u>	<u>4500-ClO₂ E-008</u>	<u>D 6581-00</u>

¹ P&T = purge and trap; GC = gas chromatography; EICD = electrolytic conductivity detector; PID= photoionization detector; MS = mass spectrometer; LLE = liquid/liquid extraction; ECD = electron capture detector; SPE = solid phase extractor; IC = ion chromatography, ICP-MS=inductively coupled plasma/mass spectrometer.

²If TTHMs are the only analytes being measured in the sample, then a PID is not required.

³ 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.

⁴19th 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.

⁵ Annual Book of ASTM Standards, 2001 or any year containing the cited version of the method, Vol 11.01.

⁶The samples must be extracted within 14 days of sample collection.

⁷ 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.

⁸ Samples must be preserved at the time of sampling with 50 mg ethylenediamine (EDA)/L of sample and must be analyzed within 28 days.

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>.

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:

Approved Methods for Disinfectant Residual Compliance Monitoring

Methodology	Standard Method(19 th or 20 th edition)	SM Online²	EPA method	ASTM Method	Residual Measured ¹			
					Free Chlorine	Combined Chlorine	Total Chlorine	Chlorine Dioxide
Amperometric Titration	4500-C1 D	4500-C1 D-00		D 1253-86 (96) 03	X	X	X	
Low Level Amperometric Titration	4500-C1 E	4500-C1 E-00					X	
DPD Ferrous Titrimetric	4500-C1 F	4500-C1 F-00			X	X	X	
DPD Colorimetric	4500-C1 G	4500-C1 G-00			X	X	X	
Syringaldazine (FACTS)	4500-C1 H	4500-C1 H-00			X			
Iodometric Electrode	4500-C1 I	4500-C1 I-00					X	
DPD	4500-C1 O ₂ D							X
Amperometric Method II	4500-C1 O ₂ E	4500-C1 O₂ E-00						X
Lissamine Green Spectrophotometric			327.0 Rev 1.1					<u>X</u>

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>.](#)

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 3300 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 outlined 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.
1. Alkalinity. All methods allowed in 310 CMR 22.06B(10) for measuring alkalinity.
 2. Bromide. EPA Method 300.0 or EPA Method 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 1.1 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 by minimal addition of the acid specified in the method or by the instrument manufacturer, phosphoric or sulfuric acid as soon as practical after sampling, not to exceed 24 hours. Acidified TOC samples shall be analyzed within 28 days.
 4. Specific Ultraviolet Absorbance (SUVA). SUVA is equal to the UV absorption at 254nm (UV_{254}) (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 UV_{254} 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 UV_{254} . SUVA shall be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV_{254} 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. Prior to analysis, DOC samples shall be filtered through a 0.45 µm pore-diameter filter. 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. DOC samples shall be filtered through the 0.45 µm pore-diameter filter prior to acidification. DOC samples shall either be analyzed or shall be acidified to achieve pH less than 2.0 by minimal addition of phosphoric or sulfuric acid as soon as practical after sampling, not to exceed 48 hours. Acidified DOC samples shall be analyzed within 28 days of sample collection.

b. Ultraviolet Absorption at 254 nm (UV₂₅₄). Method 5910 B or 5910 B-00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1. 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.

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.

(b) Monitoring Requirements for Disinfection Byproducts.

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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 ground water 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 ground water 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 ground water 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 ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	One water sample per quarter per treatment plant ²	Locations representing maximum residence time ¹
Systems using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than	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

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10,000 persons.		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.
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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 ground water 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 ground water 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 ground water 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 ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	TTHM annual average ≤ 0.040 mg/l and HAA5 annual average ≤ 0.030 mg/l.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during August.
System using only ground water not under	TTHM annual average ≤ 0.040	One sample per treatment plant

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<p>direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.</p>	<p>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.</p>	<p>per three year monitoring cycle at distribution system location reflecting maximum residence time during August, with the three-year cycle beginning on January 1 following the quarter in which system qualifies for reduced monitoring.</p>
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c. Monitoring requirements for source water TOC. In order to qualify for reduced monitoring for TTHM and HAA5 under 310 CMR 22.07E(b)1.b, surface water and ground water 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.

e. 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 ground water not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHM annual average is > 0.080 mg/l or the HAA5 annual average is > 0.060 mg/l, the system shall go to increased monitoring identified in 310CMR 22.07E(7)(b)1a (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.

de. 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.

ef. 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 nontransient noncommunity 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(7)(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.
3. Bromate.
 - a. Routine Monitoring. Community and non-transient non-community 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, ~~e~~Each supplier of water who is required to analyze for bromate may reduce monitoring from monthly to quarterly ~~once per quarter~~, if the system's 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 ~~or equal to~~ 0.05 mg/l based upon representative monthly measurements. If the running annual average source water bromide concentration is > 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 317.0 Revision 2.0, 326.0 or 321.8. 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 317.0 Revision 2.0, 326.0, or 321.8. 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 nontransient noncommunity 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 ground water 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, nontransient noncommunity, and transient noncommunity 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.

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 ground water 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 ground water 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 ground water source under the direct influence of surface water that serves more than 3300 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.
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 310 CMR 22.07E(7)(b)2.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).

(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).

(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 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

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	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.

(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	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

enhanced softening requirements in 310 CMR 22.07E(10)(b)2. or (b)3.

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.

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.

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 CaCO₃, 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 ground water 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 (a)3.

2. Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems. Each supplier of water who uses a surface water source or ground water 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 (a)2.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.

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 CaCO₃), 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 (a)3.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 CaCO₃), 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 CaCO₃), 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.

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 ground water 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 (b)4.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.

Insert new section – 22.07F

22.07F Stage 2 Disinfection Byproducts Requirements (DBPR)

(1) Initial Distribution System Evaluations.

(a) General Requirements. The requirements of 310 CMR 22.07F(1) – (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 22.07E, to identify and select compliance monitoring locations under 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 – 22.07F
INITIAL DISTRIBUTION SYSTEM EVALUATION SCHEDULE**

<u>If you serve this population</u>	<u>Supplier of water must submit their standard monitoring plan or system specific study plan¹ or 40/30 certification² to the Department by or receive very small system waiver from the Department</u>	<u>Supplier of water must complete their standard monitoring or system specific study by</u>	<u>Supplier of water must submit their IDSE report to the Department by³</u>

Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system

<u>a. >=100,000</u>	<u>October 1, 2006</u>	<u>September 30, 2008</u>	<u>January 1, 2009</u>
<u>b. 50,000-99,999</u>	<u>April 1, 2007</u>	<u>March 31, 2009</u>	<u>July 1, 2009</u>
<u>c. 10,000-49,999</u>	<u>October 1, 2007</u>	<u>September 30, 2009</u>	<u>January 1, 2010</u>
<u>d. < 10,000 (CWS Only)</u>	<u>April 1, 2008</u>	<u>March 31, 2010</u>	<u>July 1, 2010</u>

Other systems that are part of a combined distribution system

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<u>e. Wholesale system or consecutive system</u>	<u>--at the same time as the system with the earliest compliance date in the combined distribution system</u>	<u>--at the same time as the system with the earliest compliance date in the combined distribution system.</u>	<u>--at the same time as the system with the earliest compliance date in the combined distribution system.</u>
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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. ²The 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.iii, 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 they must implement the recommended monitoring in 310 CMR 22.07F as required.

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 310 CMR 22.07E(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 (a) 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 (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 ground water under the direct influence of surface water or ground water).

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 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.

TABLE 2 – 310 CMR 22.07F STANDARD MONITORING

<u>Source water type</u>	<u>Population size category</u>	<u>Monitoring periods and frequency of sampling</u>	<u>Distribution system monitoring locations¹</u>				
			<u>Total per monitoring period</u>	<u>Near entry points</u>	<u>Average residence time</u>	<u>High TTHM locations</u>	<u>High HAA5 locations</u>
<u>Surface water</u>	<u><500 consecutive systems</u>	<u>One (during peak historical month)²</u>	<u>2</u>	<u>1</u>	<u>.....</u>	<u>1</u>	
	<u><500 non-consecutive systems</u>	<u>.....</u>	<u>2</u>	<u>.....</u>	<u>.....</u>	<u>1</u>	<u>1</u>
	<u>500-3,300 consecutive systems</u>	<u>Four (every 90 days)</u>	<u>2</u>	<u>1</u>	<u>.....</u>	<u>1</u>	
	<u>500-3,300 non-</u>	<u>.....</u>	<u>2</u>	<u>.....</u>	<u>.....</u>	<u>1</u>	<u>1</u>

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	<u>consecutive systems</u>							
	<u>3,301-9,999</u>	<u>.....</u>	<u>4</u>	<u>.....</u>	<u>1</u>	<u>2</u>	<u>1</u>	
	<u>10,000-49,999</u>	<u>Six (every 60 days)</u>	<u>8</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>2</u>	
	<u>50,000-249,999</u>	<u>.....</u>	<u>16</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>4</u>	
	<u>250,000-999,999</u>	<u>.....</u>	<u>24</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>6</u>	
	<u>1,000,000-4,999,999</u>	<u>.....</u>	<u>32</u>	<u>6</u>	<u>8</u>	<u>10</u>	<u>8</u>	
	<u>>5,000,000</u>	<u>.....</u>	<u>40</u>	<u>8</u>	<u>10</u>	<u>12</u>	<u>10</u>	
<u>Ground water</u>	<u><500 consecutive systems</u>	<u>One (during peak historical month)²</u>	<u>2</u>	<u>1</u>	<u>.....</u>	<u>1</u>		
	<u><500 non-consecutive systems</u>	<u>.....</u>	<u>2</u>	<u>.....</u>	<u>.....</u>	<u>1</u>	<u>1</u>	
	<u>500-9,999</u>	<u>Four (every 90 days)</u>	<u>2</u>	<u>.....</u>	<u>.....</u>	<u>1</u>	<u>1</u>	
	<u>10,000-99,999</u>	<u>.....</u>	<u>6</u>	<u>1</u>		<u>2</u>	<u>2</u>	
	<u>100,000-499,999</u>	<u>.....</u>	<u>8</u>	<u>1</u>		<u>3</u>	<u>3</u>	
	<u>>500,000</u>	<u>.....</u>	<u>12</u>	<u>2</u>		<u>4</u>	<u>4</u>	

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 22.20F (2)(b) may not be reduced under the provisions of Sec.141.29 and the Department may not reduce the supplier of water's monitoring using the provisions of Sec. 142.16(m).

(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).

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 ground water under the direct influence of surface water or ground water).
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 10 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 10 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 (a)1.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 (a)1.b. 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.

TABLE 3 – 310 CMR 22.07F
EXISTING MONITORING RESULTS REQUIRED

<u>System Type</u>	<u>Population size category</u>	<u>Number of monitoring locations</u>	<u>Number of samples</u>	
			<u>TTHM</u>	<u>HAA5</u>
<u>Surface and Ground Water Under the Influence of Surface Water</u>	<u><500</u>	<u>3</u>	<u>3</u>	<u>3</u>
	<u>500-3,300</u>	<u>3</u>	<u>9</u>	<u>9</u>
	<u>3,301-9,999</u>	<u>6</u>	<u>36</u>	<u>36</u>
	<u>10,000 – 49,999</u>	<u>12</u>	<u>72</u>	<u>72</u>
	<u>50,000-249,999</u>	<u>24</u>	<u>144</u>	<u>144</u>
	<u>250,000-999,999</u>	<u>36</u>	<u>216</u>	<u>216</u>
	<u>1,000,000-4,999,999</u>	<u>48</u>	<u>288</u>	<u>288</u>
	<u>>5,000,000</u>	<u>60</u>	<u>360</u>	<u>360</u>
<u>Ground Water</u>	<u><500</u>	<u>3</u>	<u>3</u>	<u>3</u>
	<u>500-9,999</u>	<u>3</u>	<u>9</u>	<u>9</u>
	<u>10,000-99,999</u>	<u>12</u>	<u>48</u>	<u>48</u>
	<u>100,000-499,999</u>	<u>18</u>	<u>72</u>	<u>72</u>
	<u>>500,000</u>	<u>24</u>	<u>96</u>	<u>96</u>

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 ground water under the direct influence of surface water or ground water).
- 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 22.07(3)(b)5.

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;

(D) All 12-inch diameter and larger pipes;

(E) All 8-inch and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps, and control valves, or are known or expected to be significant conveyors of water;

(F) All 6-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 ground water under the direct influence of surface water or ground water).

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 (b)6. The supplier of water must submit their IDSE report according to the schedule in 310 CMR 22.07F(1)(c).

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 ground water under the direct influence of surface water or ground water).

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.a. of this section, 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 10 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 10 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**

<u>If your 40/30 certification is due</u>	<u>Then your eligibility for 40/30 certification is based on eight consecutive calendar quarters of compliance monitoring results under 310 CMR22.07E beginning no earlier than¹</u>
<u>1. October 1, 2006</u>	<u>January 2004</u>
<u>2. April 1, 2007</u>	<u>January 2004</u>
<u>3. October 1, 2007</u>	<u>January 2005</u>
<u>4. April 1, 2008</u>	<u>January 2005</u>

¹Unless 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.

(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 10 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 they have taken TTHM and HAA5 samples under 310 CMR 22.07E, they are not required to comply with 310 CMR 22.07G(5) unless the Department notifies them that they 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 they must comply with 310- CMR 22.07F, they 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.

TABLE 5 – 310 CMR 22.07F
DISTRIBUTION SYSTEM MONITORING LOCATIONS

<u>Source water type</u>	<u>Population size category</u>	<u>Monitoring frequency¹</u>	<u>Distribution system monitoring location</u>			
			<u>Total per monitoring period²</u>	<u>Highest TTHM locations</u>	<u>Highest HAA5 locations</u>	<u>Existing compliance locations under 310 CMR 22.07E</u>
<u>Surface or ground water under the influence of surface water</u>	<u><500</u>	<u>Per year</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>.....</u>
	<u>500-3,300</u>	<u>Per quarter</u>	<u>2</u>	<u>1</u>	<u>1</u>	
	<u>3,301-9,999</u>	<u>Per quarter</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>.....</u>
	<u>10,000-49,999</u>	<u>Per quarter</u>	<u>4</u>	<u>2</u>	<u>1</u>	<u>1</u>
	<u>50,000-249,999</u>	<u>Per quarter</u>	<u>8</u>	<u>3</u>	<u>3</u>	<u>2</u>
	<u>250,000-999,999</u>	<u>Per quarter</u>	<u>12</u>	<u>5</u>	<u>4</u>	<u>3</u>
	<u>1,000,000-4,999,999</u>	<u>Per quarter</u>	<u>16</u>	<u>6</u>	<u>6</u>	<u>4</u>
	<u>>5,000,000</u>	<u>Per quarter</u>	<u>20</u>	<u>8</u>	<u>7</u>	<u>5</u>
<u>Ground water</u>						
	<u><500</u>	<u>Per year</u>	<u>2</u>	<u>1</u>	<u>1</u>	
	<u>500-9,999</u>	<u>Per year</u>	<u>2</u>	<u>1</u>	<u>1</u>	
	<u>10,000-99,999</u>	<u>Per quarter</u>	<u>4</u>	<u>2</u>	<u>1</u>	<u>1</u>
	<u>100,000-499,999</u>	<u>Per quarter</u>	<u>6</u>	<u>3</u>	<u>2</u>	<u>1</u>
	<u>>500,000</u>	<u>Per quarter</u>	<u>8</u>	<u>3</u>	<u>3</u>	<u>2</u>

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 ground water under the direct influence of surface water systems serving 500-3,300. Systems on annual monitoring and surface water and ground water 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. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location, and month, if monitored annually).

(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 (c)(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 (c)(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 ground water 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.
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 ground water 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) 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) to (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**

<u>If you are this type of system</u>	<u>You must comply with monitoring required under 310 CMR 22.07F(7) by:¹</u>
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Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system

<u>1. System serving >= 100,000</u>	<u>April 1, 2012</u>
<u>2. System serving 50,000-99,999</u>	<u>October 1, 2012</u>
<u>3. System serving 10,000-49,999</u>	<u>October 1, 2013</u>
<u>4. System serving <= 10,000</u>	<u>October 1, 2013 if no <i>Cryptosporidium</i> monitoring is required under 310 CMR 22.07F(2)(a)(4) or October 1, 2014 if <i>Cryptosporidium</i> monitoring is required under 310 CMR 22.07F (2)(a)(4) or (a)(6)</u>

Other systems that are part of a combined distribution system

<u>5. Consecutive system or wholesale system</u>	<u>--at the same time as the system with the earliest compliance date in the combined distribution system.</u>
--------------------------------------------------	----------------------------------------------------------------------------------------------------------------

¹The 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.

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.

**TABLE 7 – 310 CMR 22.07F
ROUTINE MONITORING FREQUENCY**

<u>Source Water Type</u>	<u>Population Size Category</u>	<u>Monitoring Frequency</u> ¹	<u>Distribution system monitoring location total per monitoring period</u> ²
<u>Surface Water and Ground Water under the Influence of Surface Water</u>	<u><500</u>	<u>Per year</u>	<u>2</u>
	<u>500-3,300</u>	<u>Per quarter</u>	<u>2</u>
	<u>3,301-9,999</u>	<u>Per quarter</u>	<u>2</u>
	<u>10,000-49,999</u>	<u>Per quarter</u>	<u>4</u>
	<u>50,000-249,999</u>	<u>Per quarter</u>	<u>8</u>
	<u>250,000-999,999</u>	<u>Per quarter</u>	<u>12</u>
	<u>1,000,000-4,999,999</u>	<u>Per quarter</u>	<u>16</u>
	<u>>5,000,000</u>	<u>Per quarter</u>	<u>20</u>
<u>Ground Water</u>	<u><500</u>	<u>Per year</u>	<u>2</u>
	<u>500-9,999</u>	<u>Per year</u>	<u>2</u>
	<u>10,000-99,999</u>	<u>Per quarter</u>	<u>4</u>
	<u>100,000-499,999</u>	<u>Per quarter</u>	<u>6</u>
	<u>>500,000</u>	<u>Per quarter</u>	<u>8</u>

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 ground water under the influence of surface water systems serving 500-3,300. Systems on annual monitoring and surface water and ground water systems under the 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. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

3. If 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(6). 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 (a)(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.

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 have been identified.

(b) If the supplier of water is a surface water or a ground water 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 ground water 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 <= 0.040 mg/L for TTHM and <= 0.030mg/L for HAA5 at all monitoring locations. They may only use data collected under the provisions of 310 CMR 22.07F (8) or under 310 CMR 22.07E to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be <= 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under 310 CMR 22.07E(7)(b)1.c. or (7)(d).

TABLE 8 – 310 CMR 22.07F
REDUCED MONITORNG FREQUENCY AND LOCATION

<u>Source water type</u>	<u>Population size category</u>	<u>Monitoring frequency¹</u>	<u>Distribution system monitoring location per monitoring period</u>
<u>Surface Water or Ground Water under the Influence of Surface Water</u>	<u><500</u>	<u>.....</u>	<u>Monitoring may not be reduced.</u>
	<u>500-3,300</u>	<u>Per year</u>	<u>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.</u>
	<u>3,3001-9,999</u>	<u>Per year</u>	<u>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.</u>
	<u>10,000-</u>	<u>Per quarter</u>	<u>2 dual sample sets at the</u>

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	<u>49,999</u>		<u>locations with the highest TTHM and highest HAA5 LRAAs.</u>
	<u>50,000-249,999</u>	<u>Per quarter</u>	<u>4 dual sample sets--at the locations with the two highest TTHM and two highest HAA5 LRAAs.</u>
	<u>250,000-999,999</u>	<u>Per quarter</u>	<u>6 dual sample sets--at the locations with the three highest TTHM and three highest HAA5 LRAAs.</u>
	<u>1,000,000-4,999,999</u>	<u>Per quarter</u>	<u>8 dual sample sets--at the locations with the four highest TTHM and four highest HAA5 LRAAs.</u>
	<u>>5,000,000</u>	<u>Per quarter</u>	<u>10 dual sample sets--at the locations with the five highest TTHM and five highest HAA5 LRAAs.</u>
<u>Ground Water</u>			
	<u><500</u>	<u>Every third year</u>	<u>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.</u>
	<u>500-9,999</u>	<u>Per year</u>	<u>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</u>

	<u>10,000- 99,999</u>	<u>Per year</u>	<u>location and quarter. 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.</u>
	<u>100,000- 499,999</u>	<u>Per quarter</u>	<u>2 dual sample sets; at the locations with the highest TTHM and highest HAA5 LRAAs.</u>
	<u>>500,000</u>	<u>Per quarter</u>	<u>4 dual sample sets at the locations with the two highest TTHM and two highest HAA5 LRAAs.</u>

¹ Systems on quarterly monitoring must take dual sample sets every 90 days.

(b) The supplier of water may remain on reduced monitoring as long as the TTHM LRAA < =0.040 mg/L and the HAA5 LRAA < =0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample < =0.060 mg/L and each HAA5 sample < =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 < =4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either 310 CMR 22.07E(7)(b)1.c. or (7)(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 ground water 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 4 to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average, exceeds 0.060 mg/L.

(b) 1. If 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.

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. of this section 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 this 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 10 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 310 CMR 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 ground water 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 ground water under the direct influence of surface water to the Department within 10 days of the end of any quarter in which monitoring is required:

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.

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

(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, inclusive 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, Milwaukee, 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.

22.09A: Maximum Radionuclide Contaminant Levels, Monitoring Requirements and Analytical Methods

Effective as of December 8, 2003

(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.

TABLE F
ANALYTICAL METHODS FOR RADIONUCLIDE MONITORING

Contaminant	Methodology	Reference (method or page number)									
		EPA1	EPA2	EPA3	EPA4	SM5	ASTM6	USGS7	DOE8	Other	
Naturally Occurring:											
Gross alpha & beta ¹¹	Evaporation	900	p. 1	00-01	p. 1	302, 7110 B, <u>7110 B-00</u>		R-1120-76			
Gross alpha ¹¹	Co-precipitation			00-02		7110 C <u>7110 C-00</u>					
Radium 226	Radon emanation	903.1	p. 16	Ra-04	p. 19	<u>305, 7500-Ra C D 3454-97</u> <u>7500 Ra C-01</u>		R-1141-76	Ra-04	N.Y. ⁹	
	Radiochemical	903.0	p. 13	Ra-03		304, 7500-Ra B D 2460-97 <u>7500-Ra B-01</u>		R-1140-76		GA ¹⁴	
Radium 228	Radiochemical	904.04	p. 24	Ra-05	p. 19	7500-Ra D, <u>7500-RaD-01</u>		R-1142-76		N.Y. ⁹ N.J. ¹⁰ GA ¹⁴	
Uranium ¹²	Radiochemical	908.0				7500-U B <u>7500-U B-00</u>					
	Fluorometric	908.1				7500-U C (17th Ed.) D 2907-97		R-1180-76 R-1181-76	U-04		
	Alpha spectrometry			00-07	p. 33	7500-U C (18 th , 19 th , or 20 th edition) <u>7500-U C-00</u>		D 3972-97, <u>02.</u>	R-1182-76	U-02	
	Laser phosphorimetry							D 5174-97, <u>02</u>			
	ICP-MS	200.8 ¹				3125		D 5673-03			

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Man-made:

Radioactive cesium	Radiochemical	901.0	p 4		7500-Cs B, <u>7500-Cs B-00</u>	D 2459-72	R-1111-76	
	Gamma ray spectrometry	901.1		p. 92	7120, <u>7120-97</u>	D 3649-91, <u>98a</u>	R-1110-76	4.5.2. 3
Radioactive iodine	Radiochemical	902.0	p 6		7500-1 B, <u>7500-1 B-00</u>			
				p 9	7500-1 C, <u>7500-1C-00</u>	D 3649-91, <u>98a.</u>		
	Gamma ray spectrometry	901.1		p. 92	7120, <u>7120-97</u>	D 4785-93, <u>00a.</u>		4.5.2. 3
Radioactive Strontium 89, 90	Radiochemical	905.0	p. 29	Sr-04 p. 65	303, 7500-Sr B, <u>7500-Sr B-01</u>		R-1160-76	Sr-01
								Sr-02
Tritium	Liquid scintillation	906.0	p. 34	H-02 p. 87	306, 7500- ³ H B, <u>7500-³H B-00</u>	D 4107-91, <u>98 (Re-approved 2002).</u>	R-1171-76	
Gamma emitters	Gamma ray Spectrometry	901.1		p. 92	7120, <u>7120-97</u>	D 3649-91, <u>98a</u>	R-1110-76	Ga-01-R
		902.0			7500-Cs B, <u>7500-Cs B-00</u>	D 4785-88, <u>93, 00a</u>		
		901.0			7500-I B, <u>7500-I B-00</u>			

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.

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 spectrometry is only in the 18th, 19th, and 20th editions. Method 7120 is only in the 19th and 20th editions. 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 7500-³H 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.](http://www.standardmethods.org)

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 Geological Survey, 1977. Available at US 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.](#)

22.15: General Reporting Requirements

(5) Annual Statistical Report: Every supplier of water shall report to the Department in January of each year on a form prescribed by the Department the amount of water that passes through their distribution systems during the preceding calendar year. 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, and
 3. sold or otherwise supplied to other consumers.
- (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.
 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) An annually updated 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.
- (f) Names and Grades of Certified Operators.

Add (9)

(9) Emergency Reporting

- (a) Unless otherwise determined by the Department in writing, each public water supplier shall notify the Department and their local Board of Health as soon as possible but not more than two hours after obtaining knowledge of a potential or actual emergency, such as those described in 310 CMR 22.04(13), by telephone or facsimile and 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 said two hour time period. In that event, 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:
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 cross connection incident;
 5. Collapse of a reservoir, reservoir roof, or pump house structure;
 6. Break in a transmission or distribution line that results in a loss of service to customers for more than four hours;

7. Chemical or microbiological contamination of the water supply, including overfeed of drinking water treatment chemicals

8. Act of vandalism or sabotage or poor maintenance that impacts the water quality or quantity of the system; and

9. 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.

(c) Unless otherwise determined by the Department in writing, 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, a water supplier must file an Emergency Response Report. 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 within 10 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 5 years for the Department's review a completed Emergency Response Checklist;

(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:

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.

- (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), Massachusetts Drinking Water Regulations and for other situations, as listed in 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. Table 2 of 310 CMR 22.16 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, 310 CMR 22.13A and 310 CMR 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 310 CMR 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 this section, not already listed in 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 Table 1 of 310 CMR 22.16 are determined by the tier to which the violation is assigned. Table 2 of 310 CMR 22.16 provides the definition of each tier. 310 CMR 22.16: *Table 6* identifies the tier assignment for each specific violation or

situation.

(2) Tier 1 Public Notice.

(a) Violations or Situations Requiring Tier 1 Public Notice. Table 3 of 310 CMR 22.16 lists the violation categories and other situations requiring a Tier 1 public notice. Table 6 of 310 CMR 22.16 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 for total coliforms when fecal coliform or *E. coli* are present in the water distribution system (as specified in 310 CMR 22.05(8)(b), or when the water system fails to test for fecal coliforms or *E. coli* when any repeat sample tests positive for coliform (as specified in 310 CMR 22.05).
2. Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, 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 or nitrite MCL, as specified in 310 CMR 22.06(9);
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 310 CMR 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 310 CMR 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 22.20, 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 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 22.01(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. Emergency situations identified in 310 CMR 22.04(13);

(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 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 2 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 an emergency situation identified in 310 CMR 22.04(13). For emergency situations 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 or specified 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.

(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.

**310 CMR 22.16 - Table 6
Violations and Other Situations Requiring Public Notice¹**

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 Regulations³ and 310 CMR 22.00				
A. Microbiological Contaminants				
1. Total coliform	2	310 CMR 22.05	3	310 CMR 22.05
2. Fecal coliform/E. coli	1	310 CMR 22.05	⁴ 1, 3	310 CMR 22.05
3. Turbidity MCL	2	310 CMR 22.08 310 CMR 22.20A	3	310 CMR 22.08 310 CMR 22.20A

310 CMR 22.16 - Table 6
Violations and Other Situations Requiring Public Notice¹

Contaminant	MCL/MRDL/TT violations ²		Monitoring & testing procedure violations	
		310 CMR 22.20D		310 CMR 22.20D
4. Turbidity MCL (average of 2 days' samples > 5 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, 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 310 CMR 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
<u>10. Long Term 2 Enhanced Surface Water Treatment Rule violations</u>	<u>2</u>	<u>310 CMR 22.20G (11) – 22.20G (21)</u>	<u>²²2,3</u>	<u>310 CMR 22.20G (11) – 22.20G (21)</u>
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	¹⁰ 1, 3	310 CMR 22.06
12. Nitrite	1	310 CMR 22.06	¹⁰ 1, 3	310 CMR 22.06

310 CMR 22.16 - Table 6
Violations and Other Situations Requiring Public Notice¹

Contaminant	MCL/MRDL/TT violations ²		Monitoring & testing procedure violations	
13. Total Nitrate and Nitrite	1	310 CMR 22.06	3	310 CMR 22.06
14. Perchlorate	1	310 CMR 22.06	¹⁰ 1, 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
26. Pentachlorophenol	2	310 CMR 22.07A	3	310 CMR 22.07A
27. Picloram	2	310 CMR 22.07A	3	310 CMR 22.07A

310 CMR 22.16 - Table 6
Violations and Other Situations Requiring Public Notice¹

Contaminant	MCL/MRDL/TT violations ²		Monitoring & testing procedure violations	
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**

**310 CMR 22.16 - Table 6
Violations and Other Situations Requiring Public Notice¹**

Contaminant	MCL/MRDL/TT violations ²		Monitoring & testing procedure violations	
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	2 ⁺⁵¹⁴ , 3	310 CMR 22.07E
8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL	^{+6,15} 1	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:⁺⁷¹⁶				
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	⁺⁸³¹⁰310 ¹⁷ 310 CMR 22.13 310 CMR 22.14	N/A	N/A
B. Violation of conditions of a variance or exemption	2	⁺⁹³¹⁰310 ¹⁸ 310 CMR 22.13	N/A	N/A

**310 CMR 22.16 - Table 6
Violations and Other Situations Requiring Public Notice¹**

Contaminant	MCL/MRDL/TT violations ²	Monitoring & testing procedure violations
310 CMR 22.14		
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 <u>or water supply</u> emergency ²⁰¹⁹ .	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

Table 6 - Endnotes

- 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 310 CMR 22.16(3)(a).
- MCL-Maximum contaminant level, MRDL-Maximum residual disinfectant level, TT-Treatment technique.
- The term Violations of 310 CMR 22.00 is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.
- 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.
- Systems that violate the turbidity MCL of 5 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.
- 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.

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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 ground water 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. ~~Until then, the citations are 310 CMR 22.06.~~
9. The arsenic Tier 3 violation citations are effective January 23, 2006. ~~Until then, the citations are 310 CMR 22.06.~~
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 ground water 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 systems shall meet the MCLs and MRDLs beginning January 1, 2004. Transient non-community surface water sources systems (surface water systems and ground water 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 ground water systems under the direct influence of surface water) serving at least 10,000 persons and transient non-community systems serving fewer than 10,000 persons and transient non-community systems using only ground water 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 310 CMR 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

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health.

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. Total coliform	Zero	See footnote ³	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/E. coli	Zero	Zero	Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
2a. Turbidity (MCL) ⁴	None	1 NTU ⁵ 5 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

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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
			nausea, cramps, diarrhea and associated headaches.
<u>B.</u> 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).			
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).			
	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.
<u>BC.</u> 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)	⁷ MFL 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

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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
14. Chromium (total).	0.1	0.1	cadmium in excess of the MCL over many years could experience kidney damage. 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 less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
17. Mercury (inorganic)	0	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage
18. Nitrate	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
19. Nitrite	1	1	Infants below the age of six months 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.
20. Total Nitrate and Nitrite	10	10	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
21. Perchlorate	None	0.002	Perchlorate interferes with the normal

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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
22. Selenium	0.05	0.05	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. 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.
ED. 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.
DE. 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

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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
27. 2,4,5-TP (Silvex)	0.05	0.05	with their kidneys, liver, or adrenal glands 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

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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
			(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 endo-thall in excess of the MCL over many years could experience problems with their stomach or intestines
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

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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
45. Heptachlor epoxide	Zero	0	years could experience liver damage and may have an increased risk of getting cancer. 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. Hexachlorocyclopentadiene.	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach
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.

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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 may have an increased risk of getting cancer.
EF. 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

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			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-di-chloroethane 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-di-chloroethylene 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.
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

70. Toluene	1	1	getting cancer. 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 trichloroethylene 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.
FG. 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

79. Combined radium (226 & 228).	Zero	5 pCi/l	of getting cancer. 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.
GH. 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	0.060 ^{20,21}	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
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 (MRDL G) 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 (MRDL)	4.0 (MRDL)	Some people who use water containing chloramines well in excess of the MRDL

	G)	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 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL.	0.8 (MRDLG) 0.8 (MRDL)	<p>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.</p> <p><i>Add for public notification only:</i> 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.</p>

87b. Chlorine dioxide, where one or more distribution system samples are above the MRDL.	0.8 (MRDLG)	0.8 (MRDL)	<p>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.</p> <p><i>Add for public notification only:</i> The chlorine dioxide violations reported today include exceed-ances of the EPA standard within the distribution system which delivers water to consumers. Vio-lations 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.</p>
88. Control of DBP precursors (TOC)	None	TT	<p>Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byprod-ucts. 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.</p>
III. Other Treatment Techniques:			
89. Acrylamide	Zero	TT	<p>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.</p>
90. Epichlorohydrin	Zero	TT	<p>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.</p>

Table 7-Endnotes

1. MCLG-Maximum contaminant level goal
2. MCL-Maximum contaminant level
3. For water systems analyzing at least 40 samples per month, no more than 5.0% of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms.

4. There are various regulations that set turbidity standards for different types of systems, including 310 CMR 22.08, 310 CMR 22.20A, 310 CMR 22.20D, and 310 CMR 22.20F. The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 1 NTU for systems that are required to filter but have not yet installed filtration (310 CMR 22.08).
5. NTU-Nephelometric turbidity unit
6. There are various regulations that set turbidity standards for different types of systems, including 310 CMR 22.08, 310 CMR 22.20A, 310 CMR 22.20D, and 310 CMR 22.20F. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 1 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 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the Department.
7. TT-Treatment technique
8. There are various regulations that set turbidity standards for different types of systems, including 310 CMR 22.08, 310 CMR 22.20A, 310 CMR 22.20D, and 310 CMR 22.20F. For systems subject to 310 CMR 22.20D (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95% of monthly measurements, and the turbidity level of a system's combined filter effluent shall not exceed 1 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 310 CMR 22.20F (systems serving fewer than 10,000 people, using surface water or ground water 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 1 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, 310 CMR 22.20D, and 310 CMR 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. ~~Until then, the MCL is 0.05 mg/L and there is no MCLG.~~
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
18. Surface water systems and ground water 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 ground water 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 systems shall meet the MCLs and MRDLs beginning January 1, 2004. Transient non-community surface water sources systems (surface water systems and ground water 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 ground water systems under the direct influence of surface water) serving fewer than 10,000 persons and transient non-community systems using only ground water 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 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).

~~19.20~~ The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.

~~20. 21~~ The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.

~~21. 22~~ MRDLG-Maximum residual disinfectant level goal.

~~22. 23~~ MRDL-Maximum residual disinfectant level.

Add 12.

(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 3 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).

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.

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 1 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, ground water; 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:

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:

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:

1. Contaminants subject to an MCL, action level, maximum residual disinfectant 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 and in Appendix M of the Guidelines and Policies for Public Water Systems, the table(s) must contain:
 1. The MCL for that contaminant expressed as a number equal to or greater than 1.0 as provided in Appendix M of the Guidelines and Policies for Public Water Systems;
 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 total coliforms, 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 sampling point monitoring location: the highest average of any of the monitoring locations sampling points 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), systems must include the highest locational running annual average for TTHM and HAA5 and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5 MCL, the system must 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 sampling monitoring points locations: the average and range of detection expressed in the same units as the MCL. The system is required to include individual sample results for the IDSE conducted under 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.
 - e. When rounding of results to determine compliance with the MCL is allowed by 310 CMR 22.00, rounding should be done prior to multiplying the results by the factor listed in Appendix M of the Guidelines and Policies for Public Water Systems.
 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), 310 CMR 22.20D or 310 CMR 22.20F the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in 310 CMR 22.20A(4), 310 CMR 22.20D or 310 CMR 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.

a. The highest monthly number of positive samples for systems collecting fewer than 40 samples per month; or

b. The highest monthly percentage of positive samples for systems collecting at least 40 samples per month.

8. For fecal coliform or *E.coli*: the total number of positive samples; and.

9. The likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report must include one or more of the typical sources for that contaminant listed in Appendix M of the Guidelines and Policies for Public Water Systems 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 Appendix M of the Guidelines and Policies for Public Water Systems.

(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.

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 5 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 their 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.

(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 310 CMR 22.20F(7)(a) through 310 CMR 22.20F(7)(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 310 CMR 22.20F(4)(a) through 310 CMR 22.20F(4)(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 310 CMR 22.20F (5)(a) through 310 CMR 22.20F(5)(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.

22.20A: Surface Water Treatment Rule

(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), 310 CMR 22.20A(3), and 310 CMR 22.20A(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	Citation ¹
Total Coliform ²	Total Coliform Fermentation Technique ^{3,4,5}	9221 A, B, C
	Total Coliform Membrane Filter Technique ⁶	9222 A, B, C
	ONPG-MUG Test ⁷	9223
Fecal Coliforms ²	Fecal Coliform Procedure ⁸	9221 E
	Fecal Coliform Filter Procedure	9222 D
Heterotrophic bacteria ²	Pour Plate Method	9215 B
	SimPlate¹¹	
Turbidity ¹³		2130 B
	Nephelometric Method	180.1 ⁹
	Nephelometric Method	Method 2 ¹⁰
	Great Lakes Instruments Hach Filter Trak	10133 ¹²

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.

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 ¾ 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 ~~three months~~ 7 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™ 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. ~~Except for the method for ozone residuals, the disinfectant residual methods are contained in the 18, 1992, 1995; either edition may be used.~~ 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 3300 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 (HOCL₂ and OCL₂) by Test Strip,” Revision 3.0, November 21, 2003, available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730.

Residual	Methodology	Methods SM ¹	s	
			SM <u>Online</u> ²	Other
Free Chlorine	Amperometric Titration	4500-C1 D	<u>4500-C1 D-00</u>	<u>D 1253-033</u>
	DPD Ferrous Titrimetric	4500-C1 F	<u>4500-C1 F-00</u>	
	DPD Colorimetric	4500-C1 G	<u>4500-C1 G-00</u>	
	Syringaldazine (FACTS)	4500-C1 H	<u>4500 C1 H-00</u>	
Total	Amperometric Titration	4500-C1 D	<u>4500 C1 D-00</u>	<u>D 1253-03³</u>

Chlorine	Amperometric Titration (low level measurement)	4500-CI E	4500 C1 E-00	327.0, Revision 1.1⁴	
	DPD Ferrous Titrimetric	4500-CI F	4500 C1 F-00		
	DPD Colorimetric	4500-CI G	4500 C1 G-00		
	Iodometric Electrode	4500-CI I	4500 C1 I-00		
Chlorine Dioxide	Amperometric Titration	4500-CIO ₂ C	4500-CIO₂ C- 00		
	DPD Method	4500-CIO ₂ D			
	Amperometric Titration	4500-CIO ₂ E	4500 C1O₂ E-00		
	Spectrophotometric				
Ozone	Indigo Method	4500-O ₃ B	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.](http://www.standardmethods.org)

³ [Annual Book of ASTM Standards, Vol. 11.01, 2004; ASTM International; any year containing the cited version of the method may be used. Copies of this method may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428-2959.](#)

⁴ [EPA Method 327.0, Revision 1.1, “Determination of chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry,” USEPA, May 2005, EPA 815-R-05-008. Available online at *http://www.epa.gov/safewater/methods/sourcalt.html*.](http://www.epa.gov/safewater/methods/sourcalt.html)

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, 310 CMR 22.20D, and 310 CMR 22.20F.

(b) *Applicability*. 310 CMR 22.20G applies to all suppliers of water using a surface water source, or ground water source under the direct influence of surface water.

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 Massachusetts Drinking Water Regulations 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, 310 CMR 22.20D, and 310 CMR 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 ground water 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 310 CMR 22.20G(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 310 CMR 22.20G(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 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. 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 paragraph 310 CMR 22.20G(2)(a)4. The system must notify the Department no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring under 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.
 - c. The system does not conduct *E. coli* monitoring as described in 310 CMR 22.20G(2)(a)3.
 - d. Systems using ground water 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 paragraph 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 Table 1 310 CMR 22.20G.

TABLE 1 - 310 CMR 22.20G
SOURCE WATER MONITORING STARTING DATES

<u>Systems that serve:</u>	<u>Must begin the first round of source water monitoring no later than the month beginning:</u>	<u>And must begin the second round of source water monitoring no later than the month beginning:</u>
<u>At least 100,000 people</u>	<u>October 1, 2006</u>	<u>April 1, 2015</u>
<u>From 50,000 to 99,999 people</u>	<u>April 1, 2007</u>	<u>October 1, 2015</u>
<u>From 10,000 to 49,999 people</u>	<u>April 1, 2008</u>	<u>October 1, 2016</u>
<u>Fewer than 10,000 and monitor for <i>E. coli</i>¹</u>	<u>October 1, 2008</u>	<u>October 1, 2017</u>
<u>Fewer than 10,000 and monitor for <i>Cryptosporidium</i>²</u>	<u>April 1, 2010</u>	<u>April 1, 2019</u>

¹Applies only to filtered systems.

²Applies to filtered systems that meet the conditions of paragraph (a)(4) of this section 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).

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 ground water 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 ground water 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 310 CMR 22.20G(12) or 310 CMR 22.20G(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 ground water 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 6 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 310 CMR 22.20G(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) of this section. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in 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 3 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.

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 ground water 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 310 CMR 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.

(e) *Multiple sources*. Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in 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 42.05(1)(a).

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 42.05(1)(a).

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.

(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 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 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 10 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 people 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. Data element,

b. PWS ID,

c. Facility ID,

d. Sample collection date,

e. Sample type (field or matrix spike),

- f. Sample volume filtered (L), to nearest ¼ L,
 - g. Was 100% of filtered volume examined, and
 - h. 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. Data element,
 - b. PWS ID,
 - c. Facility ID,
 - d. Sample collection date,
 - e. Analytical method number,
 - f. Method type,
 - g. Source type (flowing stream, lake/reservoir, GWUDI),
 - h. *E. coli*/100 mL, and
 - i. Turbidity.¹

¹ Systems serving fewer than 10,000 people 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.

(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 this paragraph.
 - 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 Departments Environmental Protection Agency, EPA-815-R-05-002.*
 - b. *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA, 2005, United Departments Environmental Protection Agency, EPA-815-R-05-001.*
 - c. *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/ FA, 2001, United Departments Environmental Protection Agency, EPA-82 1-R-01-025.*
 - d. *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA, 2001, United Departments Environmental Protection Agency, EPA-821--R-01-026.*

e. Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/ FA, 1999, United Departments Environmental Protection Agency, EPA-821-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 2 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).

2. Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in 310 CMR 22.20G(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 this section.

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 310 CMR 22.20G(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 this section, 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.

(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 this section. 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 Tables 1.1 through 1.6, 2.1, and 3.1 of 310 CMR 22.20A(5)(b) 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 this section 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 310 CMR 22.20F(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 310 CMR 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 22.20G(10)(d)1.a. or b.
 - a. Determine one inactivation ratio (CT_{calc}/CT_{99.9}) before or at the first customer during peak hourly flow.
 - b. Determine successive CT_{calc}/ 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 (CT_{calc}/CT_{99.9}) for each sequence and then adding the (CT_{calc}/ CT_{99.9}) values together to determine (Σ (CT_{calc}/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 (CT_{calc}/ CT_{99.9}) value of each segment and (Σ (CT_{calc}/CT_{99.9})) must be calculated using the method in 310 CMR 22.20G(10)(d)1.b.
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. t
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 Table 2 - 310 CMR 22.20G and using the *Cryptosporidium* bin concentration calculated under 310 CMR 22.20G(11)(a) and (b):

TABLE 2 – 310 CMR 22.20G
BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS

<u>For Systems that are:</u>	<u>With a <i>Cryptosporidium</i> bin concentration of ...¹</u>	<u>The bin classification is...</u>
<u>Required to monitor for <i>Cryptosporidium</i> under 310 CMR 22.20G (2)</u>	<u><i>Cryptosporidium</i> <0.075 oocysts/L</u>	<u>Bin 1</u>
	<u><i>Cryptosporidium</i> between 0.075 and <1.0 oocysts/L</u>	<u>Bin 2</u>
	<u><i>Cryptosporidium</i> between 1.0 and <3.0 oocysts/L</u>	<u>Bin 3</u>
	<u><i>Cryptosporidium</i> > 3.0 oocysts</u>	<u>Bin 4</u>
<u>Serving fewer than 10,000</u>	<u>NA</u>	<u>Bin 1</u>

people and NOT required to monitor for *Cryptosporidium* under 310 CMR 22.20G (2) (a) 4.

¹Based 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 6 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 6 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).

**TABLE 3 – 310 CMR 22.20G
FILTERED SYSTEM ADDITIONAL *Cryptosporidium* TREATMENT REQUIREMENTS**

<u>If the system bin classification is ...</u>	<u>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 <i>Cryptosporidium</i> treatment requirements are ...</u>			
	<u>Conventional Filtration treatment</u>	<u>Direct Filtration</u>	<u>Slow Sand or Diatomaceous earth filtration</u>	<u>Alternative filtration technologies</u>
<u>Bin 1</u>	<u>No additional treatment</u>	<u>No additional treatment</u>	<u>No additional treatment</u>	<u>No additional treatment</u>
<u>Bin 2</u>	<u>1-log treatment</u>	<u>1.5-log treatment</u>	<u>1-log treatment</u>	⁽¹⁾
<u>Bin 3</u>	<u>2-log treatment</u>	<u>2.5-log treatment</u>	<u>2-log treatment</u>	⁽²⁾
<u>Bin 4</u>	<u>2.5-log treatment</u>	<u>3-log treatment</u>	<u>2.5-log treatment</u>	⁽³⁾

¹As determined by the Department such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log

²As 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 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 to comply with the additional *Cryptosporidium* treatment required in 310 CMR 22.20G(11)(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(11)(a) using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in Massachusetts Drinking Water Guidelines and Policies, Requirements for Microbial Toolbox Options for Meeting *Cryptosporidium* Treatment Requirements under the Long Term 2 Enhanced Surface Water Treatment Rule, Appendix N, Sections B-F.

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in 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, Appendix N, Sections B through F 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 listed in 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.

(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 6 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 6 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).

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)(a), 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)(3).

1. Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.

2. Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3-log *Cryptosporidium* inactivation.

(c) Inactivation treatment technology requirements. Unfiltered systems must use chlorine dioxide, ozone, or UV as described in 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, Section F to meet the *Cryptosporidium* inactivation requirements of 310 CMR 22.20G(13)(c).

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 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, Section F 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)(c) 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.

Table 4 - 310 CMR 22.20G

CRYPTOSPORIDIUM TREATMENT COMPLIANCE DATES TABLE

<u>Systems that serve ...</u>	<u>Must comply with <i>Cryptosporidium</i> treatment requirements no later than...*</u>
<u>(1) At least 100,000 people</u>	<u>April 1, 2012</u>
<u>(2) From 50,000 to 99,999 people</u>	<u>October 1, 2012</u>
<u>(3) From 10,000 to 49,999 people</u>	<u>October 1, 2013</u>
<u>(4) Fewer than 10,000 people</u>	<u>October 1, 2014</u>

* 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.

(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 this section 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.

TABLE 5
- 310 CMR 22.20G

MICROBIAL TOOLBOX REPORTING REQUIREMENTS

<u>Toolbox option</u>	<u>Systems must submit the following information</u>	<u>On the following schedule</u>
<u>(1) Watershed</u>	<u>(i) Notice of intention to develop</u>	<u>No later than two years before the applicable</u>

<u>control program.</u>	<u>a new or continue an existing watershed control program...</u> <u>(ii) Watershed control plan...</u> <u>(iii) Annual watershed control program status report.....</u> <u>(iv) Watershed sanitary survey report.....</u>	<u>treatment compliance date in 310 CMR 22.20G(14).</u> <u>No later than one year before the applicable treatment compliance date in 310 CMR 22.20G(14).</u> <u>Every 12 months, beginning one year after the applicable treatment compliance date in 310 CMR 22.20G(14).</u> <u>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)</u>
<u>(2) Alternative source/intake management</u>	<u>Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.</u>	<u>No later than the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(3)Pre-sedimentation</u>	<u>Monthly verification of the following:</u> <u>(i) Continuous basin operation</u> <u>(ii) Treatment of 100% of the flow</u> <u>(iii) Continuous addition of a coagulant</u> <u>(iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative Department approved performance criteria.</u>	<u>Monthly reporting within 10 days following the month in which the monitoring was conducted beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(4) Two-stage lime softening</u>	<u>Monthly verification of the following:</u> <u>(i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration</u> <u>(ii) Both stages treated 100% of the plant flow.</u>	<u>Monthly reporting within 10 days following the month in which the monitoring was conducted beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(5) Bank filtration</u>	<u>(i) Initial demonstration of the following:</u> <u>(A) Unconsolidated, predominantly sandy aquifer</u> <u>(B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit).</u> <u>(ii) If monthly average of daily max turbidity is greater than 1</u>	<u>No later than the applicable treatment compliance date in 310 CMR 22.20G(14).</u> <u>Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment</u>

	<u>NTU then system must report result and submit an assessment of the cause.</u>	<u>compliance date in 310 CMR 22.20G(14).</u>
<u>(6) Combined filter performance</u>	<u>Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.</u>	<u>Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(7) Individual filter performance</u>	<u>Monthly verification of the following: (i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter. (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.</u>	<u>Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(8) Demonstration of performance</u>	<u>(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.</u>	<u>No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(9) Bag filters and cartridge filters</u>	<u>(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 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. (ii) Monthly verification that 100% of plant flow was filtered.</u>	<u>No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(10) Membrane filtration</u>	<u>(i) Results of verification testing demonstrating the following:</u>	<u>No later than the applicable treatment compliance date in 310 CMR 22.20G(14).</u>

	<p><u>(A) Removal efficiency established through challenge testing that meets criteria in 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.</u></p> <p><u>(B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.</u></p> <p><u>(ii) Monthly report summarizing the following:</u></p> <p><u>(A) All direct integrity tests above the control limit;</u></p> <p><u>(B) If applicable, any turbidity or alternative Department approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.</u></p>	<p><u>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u></p>
<u>(11) Second stage filtration</u>	<u>Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step.</u>	<u>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(12) Slow sand filtration (as secondary filter)</u>	<u>Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from surface water sources or ground water under the direct influence of a surface water.</u>	<u>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(13) Chlorine dioxide</u>	<u>Summary of CT values for each day as described in 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.</u>	<u>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>

<u>(14) Ozone</u>	<u>Summary of CT values for each day as described in 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.</u>	<u>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>
<u>(15) UV</u>	<u>(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 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.</u>	<u>No later than the applicable treatment compliance date in 310 CMR 22.20G(14). Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 310 CMR 22.20G(14).</u>

(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 3 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 3 years.
- (c) Systems must keep the results of treatment monitoring associated with microbial toolbox options 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 and with uncovered finished water reservoirs under 310 CMR 22.20G(15), as applicable, for 3 years.