UNOFFICIAL COMPILATION OF CODES, RULES AND REGULATIONS OF THE STATE OF NEWYORK
TITLE 10. DEPARTMENT OF HEALTH
CHAPTER I. STATE SANITARY CODE
PART 5. DRINKING WATER SUPPLIES
SUBPART 5-1. PUBLIC WATER SYSTEMS

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This document presents an unofficial version of Subpart 5-1 of the State Sanitary Code under NYCRR Title 10. The New York State Department of State publishes the official compilation of State of New York Codes, Rules and Regulations, including 10 NYCRR Part 5, Subpart 5-1 Public Water Systems.

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General Provisions

Section 5-1.1 Definitions. (Effective Date: November 9, 2011)

As used in this Subpart the following words and terms shall have the stated meaning, except as otherwise specifically provided:

(a) "-log treatment" means the reduction of a specified proportion of viruses, bacteria, protozoa or other organisms present in drinking water expressed as factors of ten, through disinfection (inactivation) and/or removal. For example, 3-log treatment removes or inactivates 999 out of 1000 organisms or 99.9 percent.

(b) Action level means the concentration of copper or lead that when exceeded triggers actions to be taken by a water system.
Copper action level = 1.3 milligrams per liter
Lead action level = 0.015 milligrams per liter

(c) Auxiliary source means a source of water supply which is not normally used but which has been approved for use by the department or other State agencies having jurisdiction, and has been developed for use when the normal source or sources fail to meet the water supply requirements.

(d) Coagulation means a process using coagulants and mixing by which colloidal and suspended material are destabilized and agglomerated into flocs.

(e) Commissioner means the Commissioner of Health of the State of New York.

(f) Community water system (CWS) means a public water system which serves at least five service connections used by year-round residents or regularly serves at least 25 year-round residents.

(g) Comprehensive Performance Evaluation (CPE) is a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. For purposes of compliance with section 5-1.72 (c) (2) (iv) of this Subpart, the CPE 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.

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

(i) Contaminant means any physical, chemical, microbiological or radiological substance or matter in water.

(j) Conventional filtration means a series of processes including coagulation, flocculation, sedimentation and filtration.

(k) Corrective action means the action(s) taken by a water system consistent with the requirements of this code including one or more of the following: correcting significant deficiencies; providing an alternate source of water; removing source(s) of contamination; providing treatment; or other action acceptable to the State.

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

(m) CT means the product of the free residual disinfectant concentration (C) in milligrams per liter determined before or at the first customer, and the corresponding disinfectant contact time (T) in minutes, expressed by the formula (C) x (T) = CT. Disinfectant contact time (T), is the time that it takes for water to move from the point of disinfectant application or the previous point of residual disinfectant measurement to a point before or at the point where residual disinfectant concentration (C) is measured.

(n) Designated representative means the health commissioner or health officer of a city of 50,000 population or over, or the health commissioner or health officer of a county or part-county health district, the state regional health director, or district director having jurisdiction; a public health director or public health engineer qualified as duly appointed pursuant to Part 11 of this Title; or a county health commissioner, or county health director having the powers and duties prescribed in section 352 of the Public Health Law, or any other individual so designated by the commissioner.

(o) Disinfection station means a facility consisting of one or more points where water is routinely treated with an oxidant for disinfection, odor control or other purposes including the inactivation of pathogenic organisms and excluding treatment on a raw water transmission main.

(p) Distribution point means a sampling point representative of drinking water within the distribution system.

(q) Department means the New York State Department of Health.

(r) Diatomaceous earth filtration means a process resulting in substantial particulate removal which a precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum), and 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.

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

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

(u) Dwelling unit means one or more rooms with provisions for living, sanitary and sleeping facilities arranged for the use of one family.

(v) Effective corrosion inhibitor residual means a concentration sufficient to form a protective coating on the interior walls of a pipe.

(w) Emergency source means a source of water supply which is not the regular source or auxiliary source and which is developed during an emergency for temporary use.

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

(y) Entry point means a representative sampling location after the last point of treatment but before the first consumer connection.

(z) Fecal indicator means a microorganism (for example a bacteriophage, coliphage, or bacterium) that is used to determine the sanitary quality of drinking water and the likelihood of the presence of pathogen contamination from the waste of warm-blooded animals. The most commonly used fecal indicator is ***Escherichia coli (E. coli).***

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

(ab) Filtration means a process for removing particulate matter from water by passage through porous material.

(ac) First draw tap sample for lead and copper means a one liter sample of water collected from a cold water tap after the water has stood in the plumbing system for at least six hours and is collected without flushing the tap.

(ad) 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 mechanisms.

(ae) GAC10 means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation or replacement frequency of every 180 days, and is the Best Available Technology for compliance with total trihalomethanes (TTHM) and haloacetic acids (five) (HAA5) maximum contaminant levels (MCLs).

(af) Gross alpha particle activity means the total radioactivity because of alpha particle emission as inferred from measurements on a dry sample.

(ag) Gross beta particle activity means the total radioactivity because of beta particle emission as inferred from measurements on a dry sample.

(ah) Ground water directly influenced by surface water, also known as Ground Water Under the Direct Influence of surface water, or GWUDI, means any water beneath the surface of the ground which exhibits significant and rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlates to climatological or surface water conditions and/or which contains macroorganisms, algae, large diameter (three microns or greater) pathogens or insect parts of a surface water origin.

(ai) Ground water source means a source of water supply taken from a ground water aquifer and developed in accordance with section 5-1.22 of this Subpart, but shall not include an admixture of surface water or water exposed to the ground surface. Any ground water source at a system that uses surface water or ground water under the direct influence of surface water that does not receive treatment as described in subdivision 5-1.30(b) of this Subpart, prior to the first customer, is subject to all requirements applicable to ground water systems and ground water sources.

(aj) Ground water system means a public water system that uses only ground water, excluding any surface water or ground water under the direct influence of surface water.

(ak) Haloacetic acids (five) (HAA5) mean the sum of the concentrations in milligrams per liter of five specific haloacetic acid compounds, rounded to two significant figures after addition. The five haloacetic acids that comprise the HAA5 are monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid.

(al) Large water system means a water system that serves more than 50,000 persons.

(am) Lead service line means a service line made of lead which connects the water main to the building inlet and any lead appurtenances connected to the lead service line.

(an) Lead service line sample means a one liter sample for lead, collected after the water has stood in the service line for at least six hours. The sample must be collected directly from a tap on the service line or by calculating and wasting the amount of water in the plumbing system from the sampling point to the service line. At a single family structure, the sample may be collected by running the water until there is a significant change in water temperature.

(ao) Man-made beta particle and photon emitters means all radionuclides emitting beta particles and/or photons, except the daughter products of thorium-232, uranium-235 and uranium-238, listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, National Bureau of Standards, Handbook 69, as amended August 1963, U.S. Department of Commerce. Copies of this publication are available from N.C.R.P. Publications, 7910 Woodmont Avenue, Bethesda, MD, and a copy is available for inspection and copying at the offices of the records access officer of the Department of Health, Corning Tower, Empire State Plaza, Albany, NY 12237.

(ap) Maximum contaminant level (MCL) means the maximum permissible level of a contaminant in water, which is delivered to any user of a public water system. For entry point turbidity and inorganic chemicals listed in section 5-1.52 tables 1 and 2 of this Subpart, the maximum permissible level is measured at the point of entry to the distribution system. For organic chemicals with MCLs listed in section 5-1.52 table 3 of this Subpart, the MCL is measured at

the individual sources, unless otherwise specified by the State. Substances added to the water by the user, and limited to the premises of the user, are excluded from this definition.

(aq) Maximum residual disinfectant level (MRDL) means a level of disinfectant measured at a consumer's tap, above which the possibility of unacceptable health effects exists.

(ar) Maximum total trihalomethane potential (MTP) means the maximum concentration of total trihalomethane produced in a given water containing a free chlorine residual after seven days at a temperature of 25 degrees Celsius or above.

(as) Medium water system means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

(at) Noncommunity water system (NCWS) means a public water system that is not a community water system.

(au) Nontransient noncommunity water system (NTNC) means a public water system that is not a community water system but is a subset of a noncommunity water system that regularly serves at least 25 of the same people, four hours or more per day, for four or more days per week, for 26 or more weeks per year.

(av) Optimal corrosion control treatment means the corrosion control treatment that reduces the lead and copper concentrations at users' taps to the lowest reasonably achievable level while insuring that the treatment does not cause the water system to violate Part 5 of the State Sanitary Code or cause adverse health or operational effects.

(aw) Person means an individual, corporation, company, association, partnership, State agency, municipality, including a county, or Federal agency.

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

(ay) Potable water means a water which meets the requirements established by this Subpart.

(az) Point of use means the free-flowing outlet of the ultimate user of a public water system.

(ba) Principal organic contaminant (POC) means any organic chemical compound belonging to the following classes, except for trichloromethane (chloroform), dibromochloromethane, bromodichloromethane, tribromomethane (bromoform) and any other organic contaminant with a specific MCL listed in section 5-1.52 table 3 of this Subpart:

(1) halogenated alkane: Compound containing carbon (C), hydrogen (H) and halogen (X) where X = fluorine (F), chlorine (Cl), bromine (Br) and/or iodine (I), having the general formula $C_nH_yX_z$, where $y + z = 2n + 2$; n, y and z are integer variables; n and z are equal to or greater than one and y is equal to or greater than zero;

(2) halogenated ether: Compound containing carbon (C), hydrogen (H), oxygen (O) and halogen X (where X = F, Cl, Br and/or I) having the general formula $C_nH_yX_zO$, where $y + z = 2n + 2$; the oxygen is bonded to two carbons; n, y and z are integer variables; n is equal to or greater than two, y is equal to or greater than zero and z is equal to or greater than one;

(3) halobenzenes and substituted halobenzenes: Derivatives of benzene which have at least one halogen atom attached to the ring and which may or may not have straight or branched chain hydrocarbon, nitrogen or oxygen substituents;

(4) benzene and alkyl- or nitrogen-substituted benzenes: Benzene or a derivative of benzene which has either an alkyl- and/or a nitrogen-substituent;

(5) substituted, unsaturated hydrocarbons: A straight or branched chain unsaturated hydrocarbon compound containing one of the following: halogen, aldehyde, nitrile, amide; and

(6) halogenated non-aromatic cyclic hydrocarbons: A non-aromatic cyclic compound containing a halogen.

(bb) Process compliance monitoring means the State-approved measurements and records of water system operation and/or water quality parameters that demonstrate the effectiveness of the treatment process(es) employed by the public water system to achieve a treatment technique requirement.

(bc) Public health hazard means an existing or imminent condition which can be responsible for or cause illness, injury or death and for which immediate corrective or remedial action is required. Public health hazards include, but are not limited to, the following:

(1) an Escherichia coli (E. coli) MCL violation, or failure to test for E. coli after any repeat sample tests positive for coliform;

(2) a nitrate/nitrite MCL violation, or failure to take a confirmation sample within 24 hours for nitrate or nitrite after an initial sample exceeds the MCL;

(3) an acute MRDL violation for chlorine dioxide as specified in section 5-1.52 table 3A of this Subpart, or failure to take the required samples in the distribution system the day after the MRDL is exceeded at the entry point as specified in section 5-1.52 table 15A of this Subpart;

(4) turbidity violations or exceedances specified in paragraph 5-1.78(d)(3) of this Subpart and determined by the State to present an existing or imminent condition which can be responsible for or cause illness, injury or death and for which immediate corrective or remedial action is required;

(5) use of an unapproved or contaminated water supply source;

(6) insufficient quantity of water to meet drinking or sanitary demands;

(7) hazardous or toxic chemical contamination;

(8) disinfection which is inadequate to destroy harmful microorganisms or to maintain a specified chlorine residual;

(9) disruption of water service of four hours or more, determined by the State to present an existing or imminent condition which can be responsible for or cause illness, injury or death and for which immediate corrective or remedial action is required;

(10) cross-connections of sufficient hazard to adversely affect the health of a water consumer; and

(11) any other conditions, including a waterborne disease outbreak, determined to be a public health hazard by the commissioner.

(bd) Public notification means disseminating information about a problem with a public water system in a form and manner consistent with section 5-1.78 of this Subpart.

(be) Public water system means a community, noncommunity or nontransient noncommunity water system which provides water to the public for human consumption through pipes or other constructed conveyances, if such system has at least five service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. Such term includes:

(1) collection, treatment, storage and distribution facilities under control of the supplier of water of such system and used with such system; and

(2) collection or pretreatment storage facilities not under such control which are used with such system.

(bf) Raw water means water immediately before the first or only point of disinfection or other treatment.

(bg) Regular source means a source of water supply which is normally used and is approved by the department and other State agencies having jurisdiction.

(bh) Rem means the unit dose equivalent from ionizing radiation to the total body or any internal organ or organ system.

(bi) Millirem (MREM) means 0.001 of a rem.

(bj) Reporting period means a time period designated by the State for determining maximum contaminant level compliance.

(bk) Sanitary survey means an onsite review of a water system including the water source, facilities, equipment, operations maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water. The survey must include evaluation of the following components: source; treatment; distribution system; finished water storage; pumps, pump facilities, and controls; monitoring, reporting, and data verification; system management and operation; and operator compliance with State requirements. Review of each of these categories of system operation need not be completed in a single visit.

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

(bm) Service connection means the pertinent pipes, valves and fittings that connect a distribution system to a consumer's facility.

(bn) Significant deficiency means a defect in a system’s design, operation or maintenance, or a failure or malfunction of its source, treatment, storage, or distribution, that causes or is reasonably expected to cause the introduction of contamination into water delivered to consumers. Significant deficiencies also include: loss of ability to deliver an adequate

quantity of water; inadequate barriers of protection including failure of monitoring; conditions that pose an obvious security risk to the water system; or any other condition with the potential to cause a future public health hazard (i.e. before the next scheduled sanitary survey).

(bo) Single family structure means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

(bp) Slow sand filtration means a process involving passage of raw water through a bed of sand at low velocity resulting in particulate removal by physical or biological mechanisms.

(bq) Small water system means a water system that serves 3,300 or fewer persons.

(br) Source of water supply means any ground water aquifer, surface water body or watercourse from which water is taken either periodically or continuously for drinking, culinary or food-processing purposes, or which has been designated for present or future use as a source of water supply for domestic or municipal purposes.

(bs) State means the State Commissioner of Health, or his designated representative.

(bt) State notification means notifying the State by telephone, facsimile (FAX) copy, e-mail or other means about the existence or potential existence of a public health hazard, or the existence of any other violation or situation that may pose a risk to public health.

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

(bv) Surface water means all water open to the atmosphere and subject to surface runoff.

(bw) SUVA means the UV absorption at 254 nanometers (measured in 1/meters) divided by the dissolved organic carbon concentration (measured in mg/L). SUVA is an indicator of the humic content of water and the ability of the water to be treated for the removal of disinfection byproduct precursors.

(bx) Tier 1 notification means the category for public notifications that are required within 24 hours of learning of a public health hazard. Section 5-1.78(c) of this Subpart lists the specific requirements for Tier 1 notifications.

(by) Tier 2 notification means the category for public notifications that are required within 30 days of learning of a violation or situation with the potential to have serious adverse effects on human health after long term exposure, such as most MCL, MRDL and treatment technique violations that are not public health hazards. Section 5-1.52 table 13 of this Subpart lists violations and situations that require Tier 2 notification; section 5-1.78(d) of this Subpart lists the specific requirements for Tier 2 notifications.

(bz) Tier 3 notification means the category for public notifications that are required within one year (30 days for transient noncommunity water systems) of learning of a less serious violation or situation that does not require a Tier 1 or Tier 2 notification, such as most monitoring violations. Section 5-1.52 table 13 of this Subpart lists violations and situations that require Tier 3 notification; section 5-1.78(e) of this Subpart lists the specific requirements for Tier 3 notifications.

(ca) Total Organic Carbon (TOC) means total organic carbon in mg/L, measured by converting organic carbon to carbon dioxide, rounded to two significant figures.

(cb) Total trihalomethane (TTHM) means the sum of the concentration of trichloromethane (chloroform), dibromochloromethane, bromodichloromethane and tribromomethane (bromoform).

(cc) Transient noncommunity water system (TNC) means a noncommunity water system that does not regularly serve at least 25 of the same people over six months per year.

(cd) Treatment technique means any minimum treatment or action specified by this Part or designated by the State as necessary to prevent the entry of contamination into or to reduce the level of a contaminant in drinking water delivered by a public water system.

(ce) Unspecified organic contaminant (UOC) means any organic chemical compound not otherwise specified in this Subpart.

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

(cg) Violation means failure to comply with or conform to the provisions of this Subpart.

(ch) Waterborne disease outbreak means the occurrence of acute infectious illness epidemiologically associated with the ingestion of water from a public water system.

(ci) Watercourse means any surface water listed in 6 NYCRR, Chapter 10.

(cj) Water supply emergency plan means a plan approved by the State and filed with the State at such location as specified by the commissioner. The plan shall address the actions to be taken by a water supplier to anticipate water supply emergencies and the steps to be taken to ensure the delivery of potable water during a water supply emergency.

(ck) Water treatment plant means any plant or equipment which, through the addition of chemicals or through aeration, ion exchange, demineralization, coagulation, sedimentation or filtration, or through any other means or combinations of treatment, shall change the physical, chemical, radiological or microbiological quality of water.

(cl) 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.

Sources of Water Supply

5-1.10 Statement. (Effective Date: June 24, 1977)

The rules contained in this Subpart, together with the watershed rules and regulations set forth in Parts 100 through 158 of this Title, have been promulgated to protect present or future sources of water supply.

5-1.11 Applicability. (Effective Date: Jan 19, 1990)

The provisions of sections 5-1.10 through 5-1.15 of this Subpart shall apply, throughout the State of New York, to all existing and proposed sources of water supply.

5-1.12 Water quality for existing sources of water supply. (Effective Date: May 26, 2004)

(a) Whenever the supplier of water determines or is advised by the State that one or more of the MCLs set forth in this Subpart are or may be exceeded; or that effectiveness of treatment processes diminishes to the extent that a violation of the treatment techniques or MCLs set forth in this Subpart may occur; or that any deleterious changes in raw water quality have occurred; or that a change in the character of the watershed or aquifer has been observed which may affect water quality; or that any combination of the preceding exists, the supplier of water shall notify the State and do the following:

(1) undertake a study to determine the cause or causes of such conditions, independent of known or anticipated treatment technology;

(2) modify existing or install treatment to comply, to the extent practicable, with sections 5-1.30, 5-1.50, 5-1.51 and 5-1.60 of this Subpart;

(3) initiate water sampling as needed to delineate the extent and nature of the cause of concern;

(4) investigate all or part of the watershed or aquifer to verify any existing or potential changes in the character of the sources of water supply; and

(5) submit a written report to the State within 30 days of the onset of the foregoing conditions summarizing the findings outlined in paragraphs (1) through (4) of this subdivision.

(b) The State may require the supplier of water to conduct sanitary surveys and to conduct water sampling related to watersheds and ground water aquifers which are sources of water supply to identify and evaluate the significance of existing and potential sources of pollution and to report the results to the State. Also, sanitary surveys shall be used to evaluate the adequacy of the public water system, the source or sources of water supply and the water treatment plant to produce a potable water.

5-1.13 Sampling and analytical requirements. (Effective Date: May 27, 1998)

The supplier of water shall collect raw water samples at a frequency prescribed by the State and analyze for contaminants in accordance with requirements set forth in "Acceptable Methods for the Analyses of Contaminants in Water"[1] and section 5-1.74 of this Subpart.

[1]See Appendix 5-C, infra.

5-1.14 Water quality for proposed sources of water supply. (Effective Date: January 19, 1990)

Before the approval of a source of water supply for public water system purposes, a report shall be submitted to the State. Such report shall include, but may not be limited to, all of the following:

(a) a summary of available raw water quality data for at least 10 years before the date of the report or as otherwise required by the State;

(b) a sanitary survey of the watershed or aquifer, with particular emphasis on water quality as affected by existing or potential spills, point and non-point discharges, and natural seasonal occurrences; and

(c) a description of the proposed water treatment processes.

5-1.15 Limitation. (Effective Date: June 24, 1977)

If the information required is already available for the same source of water supply or if an emergency exists which requires the development of an emergency source, the requirements of section 5-1.14 of this Subpart shall not apply.

Planning, Siting Treatment and Approval

5-1.20 Applicability. (Effective Date: December 30, 1992)

The provisions of sections 5-1.20 through 5-1.33 of this Subpart shall apply to all public water systems, provided the systems serve 15 or more service connections or serve 25 or more persons.

5-1.21 Siting requirements. (Effective Date: July 3, 1991)

Before a person shall enter a financial commitment for or initiate construction of a public water system, such person shall notify the State and to the extent practicable, avoid locating part or all of the public water system at a site which:

(a) is subject to a significant risk from earthquake, floods, fires or other disasters; or

(b) except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide.

5-1.22 Approval of plans and completed works. (Effective Date: November 9, 2011)

(a) No supplier of water shall make, install or construct, or allow to be made, installed or constructed, a public water system or any addition or deletion to or modification of a public water system until the plans and specifications have been submitted to and approved by the State. Materials used in the design, construction and repair of a public water system shall be lead-free. For this Subpart, lead-free shall mean solder or flux which contains no more than 0.2 percent lead and pipes, pipe fittings or any appurtenances which contain no more than eight percent lead.

(b) Approval of plans and specifications for public water systems shall be based on the following standards in their entirety. The State may allow deviations from these standards in accordance with procedures established by the commissioner.

(1) "Recommended Standards for Water Works", (Appendix 5-A)

(2) Standards for Water Wells (Appendix 5-B)

(3) Special Requirements for Wells Serving Public Water Systems (Appendix 5-D)

(c) The State may approve such plans or may require such modification which is deemed necessary to protect public health or safety. Application for plan approval shall be made on a form prescribed by the department.

(d) A supplier of water shall receive the approval of the State before placing into service any public water system constructed under the requirements of this section.

5-1.23 Reporting emergencies. (Effective Date: March 11, 1992)

(a) The supplier of water shall not take, use, or cause to be taken for use water from any emergency source or stop or alter disinfection or other treatment processes without first having notified by telephone or telegram, and received the approval of, the State. On receipt of such notification, the State shall advise the supplier of water and interested local officials of the approved action or proposed action by the supplier of water to protect the public health during the emergency.

(b) The supplier of water must make State notification when he determines that the delivery of water is interrupted to a minimum of 25 individuals or 15 service connections, or to a minimum of one percent of the total number of individuals served or service connections, whichever is larger, for a period of four hours or more.

(c) A printed copy of this section shall be conspicuously posted in the office used by the supplier of water.

5-1.24 Approval of fluoridation of public water system. (Effective Date: April 6, 1987)

Fluorine compounds shall not be added to a public water system until a written application has been submitted to, and written approval is granted by, the State.

5-1.25 Disinfection of facilities. (Effective Date: March 11, 1992)

No spring basin, collecting basin, well, infiltration gallery, water main, pumping station, standpipe or reservoir shall be placed in service following cleaning or repairs until it has been disinfected in a manner approved by the State.

5-1.26 Dewatering trenches. (Effective Date: January 19, 1990)

No repair to the public water system shall be made until the trench has been dewatered to a point below the mains, valves or other structures. Every effort shall be made to prevent the entrance of foreign material and seepage into the public water system.

5-1.27 Adequacy of distribution system. (Effective Date: June 24, 1981)

The public water system shall be maintained and operated by the supplier of water to assure a minimum working pressure of 20 pounds per square inch at ground level at all points in the distribution system. Measurement of pressure may be obtained from representative points of use.

5-1.28 Blowoff facilities. (Effective Date: June 24, 1977)

All blowoff drains or discharge pipes connected to the public water system should be terminated at points where these structures will not be subject to flooding or otherwise subject to contamination.

5-1.29 Pumping equipment. (Effective Date: July 3, 1991)

Pumping equipment of a public water system, for water which is not subject to later treatment, shall be installed and operated to prevent contamination of the public water system. Whenever priming is necessary, such pump shall be primed with water meeting the requirements of sections 5-1.51 and 5-1.52 of this Subpart.

5-1.30 Providing treatment for public water systems. (Effective Date: November 9, 2011)

The supplier of water shall provide such treatment as necessary to deliver to the consumer a water conforming to the requirements of this section and determined in accordance with the analytical methods contained in Appendix 5-C and section 5-1.74 of this Subpart.

(a) Minimum treatment for a ground water source shall be disinfection by chlorination or other microbial contaminant treatment acceptable to the State in accordance with the provisions of section 5-1.22 of this Subpart. If chemical disinfection is used, the disinfectant residual concentration must be maintained at all times and under no circumstances shall be less than the required concentration for more than four hours. Unless other corrective action is approved by the State, any ground water source where fecal contamination has been observed, or where a significant deficiency may be causing or has the potential to cause the introduction of contamination into the water delivered to customers, must be treated to remove or inactivate 99.99% (4-log) of viruses. Continuous monitoring of active microbial treatment processes is required, except as provided in section 5-1.52 table 15 of this Subpart.

(b) Minimum treatment for surface water sources or ground water sources directly influenced by surface water shall be filtration and disinfection techniques, approved by the State in accordance with section 5-1.22 of this Subpart, capable of 99 percent removal of ***Cryptosporidium*** oocysts, 99.9 percent removal and/or inactivation of ***Giardia*** lamblia cysts and 99.99 percent removal and/or inactivation of viruses, between a point where the raw water is no longer subject to recontamination by surface water runoff and a point downstream before or at the first consumer. Compliance with this treatment technique requirement shall be no later than June 29, 1993 for surface water sources or within 18 months for ground water sources determined to be directly influenced by surface water sources, unless the department determines that the supplier of water can meet specific avoidance criteria as defined in subdivision (c) of this section. Required performance monitoring shall be conducted in accordance with section 5-1.52 table 10A of this Subpart. Compliance with these treatment technique requirements shall also include:

(1) filtration facilities designed and operated to meet performance standards in accordance with section 5-1.52 table 4A of this Subpart;

(2) For systems using chlorine, the free chlorine residual disinfection concentration in the water entering the distribution system must be at least 0.2 milligrams per liter and may not be less than the required minimum concentration for compliance for more than four hours. Systems using other chemical disinfectants shall maintain residual disinfection levels entering the distribution system comparable to requirements for systems using chlorination. Continuous monitoring is required, except as provided in section 5-1.52 table 15 of this Subpart; and

(3) By June 8, 2004, any system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering process must return these flows through the processes of a system's existing conventional or direct filtration system.

(c) A public water system that uses a surface water source or a ground water source directly influenced by surface water which fails to comply with any of the following avoidance criteria shall develop and submit to the State, within three months of such failure to comply, a written plan for installing filtration and disinfection. Also, filtration and disinfection shall be installed, in accordance with subdivision (b) of this section, within 18 months of such failure to comply.

(1) Raw water fecal coliform concentrations must be equal to or less than 20 colonies per 100 milliliters or total coliform concentration must be equal to or less than 100 colonies per 100 milliliters in at least 90 percent of measurements made over the previous six months that the system was in operation. Monitoring shall be conducted in accordance with section 5-1.52 table 11A of this Subpart. If both fecal and total coliform analyses are performed, the fecal coliform results will take precedence.

(2) Raw water turbidity levels must not exceed five nephelometric turbidity units unless the department determines that the turbidity was caused by an unusual and unpredictable event. No more than two such events in the previous 12 months or no more than five events in the previous 120 months that the system was in operation are allowed. An event means a series of consecutive days during which at least one turbidity measurement each day exceeds five nephelometric turbidity units. Monitoring is to be conducted in accordance with section 5-1.52 Table 10A of this Subpart.

(3) Disinfection must be sufficient to ensure at least 99.9 percent inactivation of ***Giardia lamblia*** cysts and 99.99 percent inactivation of viruses, between a point where the raw water is no longer subject to recontamination by surface water runoff and a point downstream before or at the first consumer. Actual CT values must be equal to or greater than the required values found in section 5-1.52 tables 14A through 14G of this Subpart, except for one day in each month that the system served water to the public, or except where the State determines that an additional failure in one month in the previous twelve months was caused by circumstances that were unusual and unpredictable. The supplier of water must calculate the CT values of the system for each day the system is in operation to document satisfactory disinfection. The necessary parameters and related monitoring frequencies to conduct this evaluation include:

(i) temperature of the disinfected water measured at least once per day at each residual disinfectant concentration sampling point;

(ii) pH of the disinfected water, measured at least once per day at each chlorine residual disinfectant concentration sampling point by systems using chlorine;

(iii) the disinfectant contact time (T), determined daily during peak hourly flow; and

(iv) the residual disinfectant concentration (C), before or at the first customer, measured daily during peak hourly flow.

(4) The disinfection system must have redundant components to ensure continuous disinfection. Auxiliary power with automatic start and alarm is required at all disinfection facilities where a power outage would result in a loss or reduction in the ability of the system to maintain a disinfection concentration as required by this Subpart.

(5) For systems using chlorine, the free chlorine residual disinfection concentration in the water entering the distribution system must be at least 0.2 milligrams per liter and may not be less than the required minimum concentration for compliance for more than four hours, unless the State determines that any such failure was caused by circumstances that were unusual and unpredictable. Systems using other chemical disinfectants shall maintain residual disinfection levels entering the distribution system comparable to requirements for systems using chlorination. Continuous monitoring is required except as provided in section 5-1.52 table 15 of this Subpart.

(6) The disinfection residuals or the heterotrophic plate count results in the water in the distribution system must meet the requirements outlined in subdivision (g) of this section and section 5-1.52 Table 11 of this Subpart unless the State determines that the failure to meet the requirements was not caused by a deficiency in the treatment of the source water.

(7) The watershed control program must provide natural or man made barriers to the occurrence, transport and/or survival of ***Cryptosporidium*** oocysts, ***Giardia lamblia*** cysts and viruses. The watershed control program must include, but is not limited to the following:

(i) ownership or protective controls of the watershed, except where the supplier of water submits written justification to show that the travel time of the water to the intake is greater than 60 days under all but emergency conditions. Protective controls can include written agreements with landowners within the watershed but must include as a minimum the absence of any bathing beach as defined in Part 6-2 of this Title, except for a bathing beach owned and/or maintained by an individual for use by the individual's family or friends;

(ii) no new sewage discharges to any watercourse shall be allowed where the time of travel from the point of discharge to the intake is 60 days or less. Existing sewage discharges with a current State Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation, where the time of travel from the point of discharge to the intake is 60 days or less, shall, as a minimum, have secondary treatment followed by sand filtration and disinfection at facilities designed to achieve 99.9 percent removal and/or inactivation of ***Giardia lamblia*** cysts and 99.99 percent removal and/or inactivation of viruses by June 29, 1993. Existing or new sewage discharges with a SPDES permit issued by the New York State Department of Environmental Conservation, where the time of travel from the point of discharge to the intake is greater than 60 days, shall, as a minimum, have secondary treatment followed by sand filtration and disinfection at facilities designed to achieve 99.9 percent removal and/or inactivation of ***Giardia lamblia*** cysts and 99.99 percent removal and/or inactivation of viruses by June 29, 1993 or a later date set forth in a plan submitted to the commissioner and approved using the criteria for the long term plan as described in section 5-1.30(c)(7)(vii) of this Subpart. The sewage treatment facilities required herein

shall be operated in conformance with their design specifications and the conditions of their SPDES permit;

(iii) watershed rules and regulations promulgated and enforced in accordance with Title I of Article 11 of the Public Health Law; including as a minimum prohibition or controls on waste discharges which contain or potentially may contain ***Cryptosporidium*** oocysts, ***Giardia lamblia*** cysts, and/or viruses;

(iv) identification and evaluation of pertinent geological, hydrological and physical characteristics or features and potential conditions or activities which may influence water quality;

(v) a monitoring and surveillance program to assess water quality and water quantity trends;

(vi) an annual report submitted by the supplier of water to the department describing watershed activities, especially activities that affect water quality, identifying new and existing water quality concerns and remediation efforts taken and any other reports required pursuant to adopted watershed rules and regulations. The annual report must be submitted to the department no later than the 10th of October of each year; and

(vii) a long term plan for the implementation of the watershed control program, including a description of the commitment of human and financial resources for such program shall be submitted to the commissioner for approval from systems that serve more than 100,000 persons, obtain water from a watershed or watersheds that involve multiple political subdivisions and own less than 25 percent of the land in the watershed. The approval shall be based on the exercise of a reasonable discretion by the commissioner in reviewing and accepting the proposed levels of human and fiscal resources to be committed for successful implementation of the plan, measured by projected cost of the administration, inspection, enforcement, land acquisition, sewage treatment plant upgrading and other activities and/or services related to such watershed control program, including the resolution of inherent water quality and quantity questions and the reliability of the method of funding. Failure to obtain the approval of the long term plan or failure to secure the required human or financial resources will result in a requirement to provide filtration, in accordance with the provisions of this Subpart. The approval of the long term plan shall be for a period of ten years, subject to further review and approval for successive ten year periods. Notwithstanding any approval granted pursuant hereto, if Federal or State law or regulation shall hence forth unconditionally mandate filtration of surface water sources, then any such approvals shall forthwith cease and terminate with filtration thereafter to be provided, in accordance with the provisions of this Subpart, when reasonably feasible.

(8) The public water system must not have been identified as a source of a waterborne disease outbreak since 1980.

(9) The public water system must comply with the trihalomethane, haloacetic acid, bromate, and chlorite maximum contaminant levels and the maximum residual disinfectant levels in accordance with section 5-1.52 of this Subpart.

(10) The public water system must comply with the maximum contaminant level for total coliform in accordance with section 5-1.52 of this Subpart in eleven months of the twelve previous months that the system served water to the public on an ongoing basis, unless the State determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(d) Notwithstanding anything to the contrary in sections 5-1.12, 5-1.23, 5-1.51 or 5-1.77 of this Subpart, if the public water system fails to comply with the treatment technique and/or the monitoring requirements of subdivisions (a), (b), (c) or (g) of this section, fails to install the filtration and/or disinfection treatment required by this section or fails to comply with the avoidance criteria requirements contained in subdivision (c) of this section, the system violates this Subpart and shall make State and public notification, including any required mandatory health effects language. Pursuant to subdivision (c) of this section, if at any time the raw water turbidity exceeds five nephelometric turbidity units, the system shall consult with the State within 24 hours of learning of the exceedance. Based on this consultation, the State may determine that the exceedance constitutes a public health hazard, as found in paragraph (4) of subdivision 5-1.1(bc) of this Subpart, which requires a Tier 1 notification. When consultation does not take place within the 24 hour period, the water system must distribute a Tier 1 notification no later than 48 hours after the system learns of the violation. Ground water systems that are required to provide 4-log virus treatment, surface water systems and Ground Water Under the Direct Influence of surface water (GWUDI) systems that use chemical disinfection must notify the State whenever residual disinfectant levels in the water entering the distribution system are less than the specified concentration pursuant to subdivisions (b) and (c) of this section. Any water system that uses chemical disinfection must make State notification whenever disinfectant residual levels entering the distribution system are not restored within four hours.

(e) The State may grant a waiver, on the submission of a written application, renewable for a period of up to three years, to the disinfection rule established by this section for a ground water source if:

(1) the record of the microbiological and physical characteristics for the ground water source or sources not directly influenced by surface water demonstrates that they conformed to the MCLs of this Subpart, for the 12 months immediately preceding the date of application for waiver; such record shall be established under procedures provided by the department;

(2) an environmental laboratory approved pursuant to Subpart 55-2 of this Title, is used by the supplier of water to provide monitoring of drinking water quality and delivery of drinking water in conformity with this Subpart;

(3) an active cross-connection control program to prevent the backflow or entry of undesirable and toxic substances into the water distribution system is adopted and maintained by the supplier of water, and such cross-connection control program shall include the maintenance of adequate distribution system pressures, in accordance with section 5-1.27 of this Subpart;

(4) watershed rules and regulations to protect such ground water source are adopted pursuant to the provisions of article 11 of the Public Health Law, updated as necessary, and administered by the supplier of water, or other watershed controls satisfactory to the State are adopted, updated and administered;

(5) all water storage facilities are adequately protected pursuant to section 5-1.32 of this Subpart; and

(6) all sources of the water supply are properly located, constructed and effectively protected and maintained.

(f) The State may waive the requirements of paragraphs (e)(3) through (6) of this section for a ground water source at a noncommunity water system or a community water system serving fewer than 50 dwelling units, based on periodic evaluation of a sanitary survey and the geology of the area; the chemical characteristics of the water; the location, construction and protection of the ground water source; and the method of water storage and distribution.

(g) When a chlorine-based chemical disinfectant is used, the residual disinfectant concentration in the distribution system, measured as free or combined chlorine shall be maintained at detectable concentrations at representative points in the distribution system, in accordance with the monitoring requirements in section 5-1.52 Table 11 of this Subpart. No more than five percent of the free chlorine residual samples shall be undetectable in any two consecutive months that the system serves water to the public. Chlorine residual or heterotrophic bacteria analyses shall be performed in accordance with section 5-1.52 Table 11 of this Subpart. Monitoring for heterotrophic bacteria may be substituted for free chlorine residuals. A heterotrophic plate count result equal to or less than 500 colonies per milliliter is considered to be equivalent to a measurable free chlorine residual.

5-1.31 Cross connection control. (Effective Date: Dec.30, 1992)

(a) The supplier of water shall protect the public water system by containing potential contamination within the premises of the user in the following manner:

(1) by requiring an approved air gap, reduced pressure zone device, double check valve assembly or equivalent protective device consistent with the degree of hazard posed by any service connection;

(2) by requiring the users of such connections to submit plans for the installation of protective devices to the supplier of water and/or the State for approval; and

(3) by assuring that all protective devices be tested at least annually. Records of such shall be made available to and maintained by the supplier of water. Such tests shall be conducted by certified backflow-prevention device testers pursuant to the following requirements:

(i) a "general tester" certification will be issued when the applicant presents proof of satisfactory completion of a training course for testers of backflow-prevention devices which has been approved by the department.

(ii) a "limited tester" certification will be issued when the applicant presents proof of employment by a manufacturer as its agent for the servicing, maintaining and testing of backflow-prevention devices.

(iii) the department has the authority to require any person applying for certification or renewal of certification as a certified tester of backflow-prevention devices to take a written, oral or practical examination, if it deems such examinations to be reasonably necessary in determining the applicant's qualifications. The results of such examinations may be the sole basis for approval or disapproval of an application for certification or renewal of certification.

(iv) at least three months before the expiration date of a current certificate, both a general tester and a limited tester must submit proof that they are still engaged in the activity represented by their current certification.

(v) a certification will be suspended or revoked, on due notice and an opportunity for a hearing thereon, for any of following reasons: submission of false test reports for backflow prevention devices; proof that the person is no longer engaged in servicing, maintaining and testing backflow-prevention devices; or failure to apply for recertification.

(b) The supplier of water should not allow a user to establish a separate source of water. However, if the user justifies the need for a separate source of water, the supplier of water shall protect the public water system from a user who has a separate source of water and does not pose a hazard as detailed in subdivision (a) of this section in the following manner:

(1) by requiring the user to regularly examine the separate water source as to its quality;

(2) by approving the use of only those separate water sources which are properly developed, constructed, protected and found to meet the requirements of sections 5-1.51 and 5-1.52 of this Subpart; and

(3) by filing such approvals with the State annually.

(c) All users of a public water system shall prevent cross-connections between the potable water piping system and any other piping system within the premises.

(d) Any installation, service, maintenance, testing, repair or modification of a backflow prevention device shall be performed in accordance with the provision of any county, city, town or village having a plumbing code. For this section, a backflow prevention device is an approved air gap, reduced pressure zone device, double check valve assembly or equivalent protection device designed to prevent or contain potential contamination of a public water system. All individuals who perform testing of backflow prevention devices shall be certified, in accordance with paragraph (a)(3) of this section.

5-1.32 Protection of equalizing and distribution reservoirs. (Effective Date: Dec. 30, 1992)

Equalizing and distribution reservoirs which deliver water to the user without later treatment shall be covered, or the water from an uncovered reservoir must be continuously disinfected in a manner approved by the State, in accordance with section 5-1.22(b) of this Subpart, before being discharged to the distribution system.

5-1.33 Water supply emergency plans. (Effective Date: July 3, 1991)

(a) All community water systems with an annual gross operating revenue of more than one hundred twenty-five thousand dollars shall submit to the State a water supply emergency plan. The plan shall identify and outline the steps necessary to ensure that potable water is available during all phases of a water supply emergency.

(b) The water supply emergency plan shall include:

(1) The development of procedures to notify consumers during all phases of a water supply emergency.

(2) The development of criteria and procedures for determining and the subsequent reporting of critical water levels or safe yield of the source or sources of water.

(3) The identification of existing and future sources of water available during normal non-emergency and water supply emergency conditions.

(4) The identification of all available water storage. Available water storage includes source, transmission and distribution system storage.

(5) The identification, capacity and location of existing inter-connections. Identification of additional inter-connections needed to provide potable water during a water supply emergency.

(6) The development of a specific action plan outlining all the steps to be carried out, taken or followed during a water supply emergency, including State notification, emergency notification rosters of key water supply personnel with current telephone numbers both business and home, and follow-up corrective action to minimize the reoccurrence of an emergency.

(7) The identification and implementation of procedures for water conservation and water use restrictions to be put in place during a water supply emergency.

(8) The identification of and the procedures for prioritization of potable water use during a water supply emergency.

(9) The identification and availability of emergency equipment needed during a water supply emergency.

(10) The development of criteria and procedures for determining and the subsequent reporting of the system's capacity and ability to meet peak water demands and fire-flow conditions concurrently.

(c) A vulnerability analysis shall be performed on the source or sources of water supply, the public water system, disinfection stations and water treatment plants to determine the vulnerability of these water supply components to a water supply emergency. The system shall take whatever steps are necessary to ensure that potable water can be and is available during a water supply emergency.

(d) Before the final submission of the water supply emergency plan to the State, the system shall publish a notice in a newspaper of general circulation in the area served by the community water system stating that the proposed water supply emergency plan is available for review and comment. The notice shall be printed at least once in each of two successive weeks. Public comment shall be accepted for at least fourteen days following the date of first publication. All public comment shall be submitted with the water supply emergency plan to the State.

(e) The water supply emergency plan must be submitted to the State by no later than December 31, 1990. The system shall review, update and resubmit the water supply emergency plan every five years thereafter. The first revision is due no later than December 31, 1995.

(f) A community water system with an annual gross operating revenue of one hundred twenty-five thousand dollars or less, a non-transient noncommunity water system and a noncommunity water system may be required to prepare, update and submit to the State a written water supply emergency plan for providing potable water during a water supply emergency.

(g) If more than one system is responsible for providing potable water to a community water system, the water supply emergency plan shall be prepared and submitted jointly by the systems.

(h) Information may be exempt from public disclosure for public review and comment if it is determined the information will pose a security risk to the operation of the community water system. The commissioner may request, and the system must provide a copy of the exempt information and justification for why said information should not be subject to public review and comment.

Control of Copper and Lead in Drinking Water

5-1.40 Applicability. (Effective Date: May 27, 1998)

Unless otherwise noted all community water systems and nontransient, noncommunity water systems serving 15 or more service connections or serving 25 or more persons shall provide optimal corrosion control treatment or complete the applicable corrosion control requirements by the deadlines established in sections 5-1.40 through 5-1.49 of this Subpart.

(a) Optimal Corrosion Control Treatment. Any water system is considered by the State to have optimal corrosion control treatment if the water system satisfies one of the following applicable criteria.

(1) Any water system that services 50,000 people or less is considered to have optimal corrosion control treatment if the water system meets the copper and lead action levels during each of two consecutive six-month monitoring periods when monitoring is conducted in accordance with section 5-1.42 of this Subpart.

(2) Any water system that has carried out activities equivalent to the corrosion control steps applicable to that size water system in sections 5-1.40 through 5-1.49 of this Subpart can demonstrate optimal corrosion control treatment by submitting to the State a report with the following information:

(i) the results of all test samples collected for each of the water quality parameters in section 5-1.43 of this Subpart;

(ii) a description of the test methods, various treatments tested and the basis for the water systems selection of optimal corrosion control treatment;

(iii) a description of how optimal corrosion control treatment was installed and how it is being maintained and operated; and

(iv) the results of first draw lead and copper tap water samples collected in accordance with section 5-1.42 of this Subpart for two consecutive six-month monitoring periods after optimal corrosion control treatment has been installed.

(3) A water system is considered to have optimal corrosion control treatment if it demonstrates that the difference in the results of the 90th percentile first draw lead level and the highest source water lead level is less than 0.005 milligrams per liter for two consecutive six month monitoring periods. The 90th percentile lead level must be calculated in accordance with section 5-1.41 of this Subpart and sampled in accordance with section 5-1.42 of this Subpart. The source water lead level must be sampled in accordance with section 5-1.47 of this Subpart.

(b) A large water system that serves more than 50,000 people that has not demonstrated to the State that it has optimal corrosion control treatment shall complete the following corrosion control treatment steps.

Step 1: The water system shall conduct initial monitoring for first draw lead and copper tap samples in accordance with section 5-1.42 of this Subpart and sampling for water quality parameters in accordance with section 5-1.43 of this Subpart by January 1, 1993. If a water system exceeds the lead action level during the first or second six month monitoring period it shall deliver the public education materials in accordance with section 5-1.44 of this

Subpart within 60 days of the end of the monitoring period and begin source water monitoring in accordance with section 5-1.47 of this Subpart.

Step 2: The water system shall complete corrosion control studies in accordance with section 5-1.45 of this Subpart and submit a report to the State by July 1, 1994.

Step 3: After State designation of optimal corrosion control treatment the water system shall install optimal corrosion control treatment by January 1, 1997.

Step 4: After installation of optimal corrosion control treatment the water system shall complete lead, copper and water quality parameter follow-up sampling in accordance with section 5-1.46(e) of this Subpart by January 1, 1998. If follow-up sampling for lead does not meet the action level, the water system must begin replacing lead service lines in accordance with section 5-1.48 of this Subpart.

Step 5: After State specification of water quality parameters for optimal corrosion control treatment, the water system shall operate in compliance with State-specified water quality parameter values in accordance with section 5-1.46(g) of this Subpart; conduct lead and copper first-draw tap sampling in accordance with section 5-1.42 of this Subpart and report results to the State within ten days of the end of each monitoring period.

(c) A water system that serves 50,000 people or less that has not demonstrated to the State that it has optimal corrosion control treatment shall complete the following corrosion control treatment steps.

Step 1: The water system shall conduct initial lead and copper first draw tap sampling in accordance with section 5-1.42 of this Subpart until the water system either exceeds the lead and/or copper action level or becomes eligible for reduced monitoring. Results must be reported to the State within 10 days of the end of each monitoring period.

Step 2: A water system that exceeds the lead or copper action level shall:

(i) deliver public education materials in accordance with section 5-1.44 of this Subpart within 60 days of the end of the monitoring period;
(ii) submit a report to the State in accordance with section 5-1.46(b) of this Subpart recommending optimal corrosion control treatment within six months after it exceeds one of the action levels;
(iii) conduct water quality parameter monitoring in accordance with section 5-1.43 of this Subpart; and
(iv) conduct source water monitoring in accordance with section 5-1.47 of this Subpart.

Step 3: If the State requires a corrosion control study to be conducted, the water system shall conduct the corrosion control study in accordance with section 5-1.45 of this Subpart and submit a report on the results to the State within 18 months of the date the study was required.

Step 4: After State designation of optimal corrosion control treatment, the water system shall install optimal corrosion control treatment in accordance with section 5-1.46(d) of this Subpart within 24 months of the State's designation.

Step 5: After installation of optimal corrosion control treatment, the water system shall conduct lead, copper and water quality parameter follow-up sampling in accordance with section 5-1.46(f) of this Subpart within 36 months after State designation of optimal corrosion control treatment. The results shall be submitted to the State for designation of optimal water quality control parameters within 10

days of the end of the monitoring period. If follow-up sampling for lead does not meet the action level, the water system must begin replacing lead service lines in accordance with section 5-1.48 of this Subpart.

Step 6: After State specification of water quality parameters, for optimal corrosion control treatment the water system shall operate in compliance with State specified water quality parameters values in accordance with section 5-1.46(h) of this Subpart, conduct lead and copper tap sampling in accordance with section 5-1.42 of this Subpart and report results to the State within 10 days of the end of each monitoring period.

(d) Any community or nontransient noncommunity water system that serves 50,000 or less people and is required to complete the corrosion control steps because of its failure to meet the lead or copper action level may cease completing the treatment steps whenever the water system meets both action levels during each of two consecutive six month monitoring periods. The results must be submitted to the State for approval. If an action level is exceeded in a later monitoring period the water system must complete the applicable treatment steps.

5-1.41 Lead and copper action levels. (Effective Date: May 27, 1998)

(a) The lead action level is exceeded if the concentration of lead in more than 10 percent of one liter first draw tap water samples collected during any monitoring period and computed in accordance with subdivision (c) of this section exceeds 0.015 milligrams per liter.

(b) The copper action level is exceeded if the concentration of copper in more than ten percent of one liter first-draw tap water samples during any monitoring period and computed in accordance with section 5-1.42(c) of this Subpart exceeds 1.3 milligrams per liter.

(c) The 90th percentile lead and copper levels shall be computed as follows:

(1) The results of all lead and copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number one for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(2) Multiply the number of samples taken during the monitoring period by 0.9.

(3) The contaminant concentration of the numbered sample obtained by this calculation is the 90th percentile contaminant level.

(4) For water systems that are only required to collect five samples per monitoring period, the 90th percentile lead and copper level is computed by taking the average of the highest and second highest concentrations.

5-1.42 Monitoring requirements for lead and copper in tap water. (Effective Date: May 27, 1998)

All community and nontransient noncommunity water systems must monitor for lead and copper in accordance with this section.

(a) Sample site selection. By the applicable date for commencement of monitoring, stated in subdivision (d) of this section, each water system shall complete a materials evaluation of its distribution system to identify a pool of targeted sampling sites that meet the site selection criteria. The pool of sampling sites should be sufficiently large to ensure that the water system can collect the required number of first draw lead and copper tap samples should some of the sites become unavailable. All sampling sites from which first draw tap samples are collected shall be selected from this pool. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

(1) A materials evaluation of a water system shall consist of an examination and listing of all historical water system data on the materials used for construction of the distribution system and service lines, plus any available information on the interior plumbing materials of the buildings served. If the water system's records are inadequate to identify enough sampling sites the water system shall take the following steps:

(i) examine all plumbing codes, permits, and records in the files of the building department which show the plumbing materials that are installed within publicly and privately owned facilities connected to the distribution system;

(ii) examine all inspections and records of the distribution system that show the material composition of the service connections;

(iii) examine all existing water quality information from the distribution system or individual structures which may show locations susceptible to high lead or copper concentrations; and

(iv) use water system personnel to determine service line and interior plumbing materials when performing maintenance activities or reading meters.

(2) Tier 1 sampling sites selected for a community water system's sampling pool shall consist of single family structures that have copper pipes with lead solder joints installed after 1982, interior lead plumbing; or have a lead service line.

(3) Multiple-family residences may be used as tier 1 sampling sites when multiple-family residences comprise at least 20 percent of the facilities served by a water system and have copper pipes with lead solder joints installed after 1982, interior lead plumbing or have a lead service line.

(4) Any community water system with insufficient tier 1 sampling sites shall complete its sampling pool with tier 2 sampling sites. Tier 2 sampling sites consist of buildings, including multiple-family residences, that have copper pipes with lead solder joints installed after 1982 or interior lead plumbing or have a lead service line.

(5) Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with tier 3 sampling sites. Tier 3 sampling sites consist of single family structures that have copper pipes with lead solder joints installed before 1983.

(6) Tier 1 sampling sites for nontransient noncommunity water systems shall be buildings that have copper pipes with lead solder joints installed after 1982, interior lead plumbing or have a lead service line.

(7) A nontransient noncommunity water system with insufficient tier 1 sampling sites shall complete its sampling pool with sampling sites having copper pipes with lead solder joints installed before 1983.

(8) Any water system whose sampling pool does not consist exclusively of tier 1 sampling sites shall notify the State in writing before initiating sampling, why the water system was unable to locate enough tier 1 sampling sites.

(9) Any water system whose distribution system has lead service lines shall draw 50 percent of the first draw tap samples it collects during each monitoring period from sampling sites that have lead service lines and 50 percent from sampling sites having interior lead plumbing or copper pipe with lead solder joints. If a water system cannot identify enough sampling sites with lead service lines, the water system shall notify the State in writing of the steps taken to locate sites and the reasons why it was unable to locate enough sites and collect samples from all the sampling sites with lead service lines it has been able to locate.

(b) Sample collection methods. All tap samples for lead and copper collected in accordance with this section shall be first draw samples.

(1) Each first draw tap sample for lead and copper shall be one liter of water that has stood motionless in the plumbing system of each sampling site for at least six hours. First draw samples from residential housing shall be collected from the cold water kitchen or bathroom sink tap.

(2) First draw samples from a nonresidential building shall be collected at an interior cold water tap from which water is typically drawn for consumption. First draw samples may be collected by water system personnel or by residents who have been instructed on the proper sampling procedures by the water system. The water system must certify that the resident collecting the sample has been properly instructed. If a water system allows residents to perform sampling, it may not challenge the accuracy of sampling results based on alleged errors in sample collection. To avoid problems of residents handling nitric acid, acidification of first draw samples may be done up to 14 days after the sample is collected. All samples which are not immediately acidified shall stand in the original one liter container for at least 28 hours after acidification to insure that all of the lead has dissolved.

(3) Water systems shall collect first draw tap samples from the same sampling sites in each monitoring period. If a water system cannot gain entry to a previously used sampling site after making reasonable efforts to gain entry, the water system may collect the sample from another sampling site in its sampling pool if the new sampling site meets the same targeting criteria and is within reasonable proximity of the original sampling site.

(c) Number of samples. Water systems shall collect at least one first draw lead and copper tap sample during each monitoring period from the number of sampling sites listed in the table below under standard monitoring. A water system conducting reduced monitoring may collect one first draw lead and copper tap sample during each monitoring period from the number of sites listed in the table below under reduced monitoring.

Population Served	Standard Monitoring Number of Sites	Reduced Monitoring Number of Sites
>100,000	100	50
10,001 - 100,000	60	30
3,301 - 10,000	40	20
501 - 3,300	20	10
101 - 500	10	5
<101	5	5

Note: If a water system has less than the required number of sample taps in its distribution system it shall sample all the taps and report that 100 percent of the available taps were sampled.

(d) Initial first draw lead and copper tap sampling. The first six month monitoring period shall begin on the following dates for the size systems as follows:

Water System Size ***Population Served***	Initial Monitoring ***Period Begins***
>50,000(large)	January 1, 1992
3,301 - 50,000(medium)	July 1, 1992
<3,301(small)	July 1, 1993

(1) All large water systems shall monitor during two consecutive six month periods.

(2) All small and medium water systems shall monitor during each six month monitoring period until:

(i) the water system meets the lead and copper action levels during two consecutive monitoring periods and becomes eligible for reduced monitoring; or

(ii) the water system exceeds the lead or copper action level and is required to carry out corrosion control treatment.

(3) Any water system which installs optimal corrosion control treatment or source water treatment shall monitor for lead and copper at the standard number of sampling sites during two consecutive six month monitoring periods after facility start-up.

(i) Large water systems must complete their monitoring by January 1, 1998.

(ii) Small and medium water systems must complete their monitoring 36 months after the State designates optimal corrosion control treatment.

(iii) Any water system that installs source water treatment shall complete monitoring 12 months after installation of treatment.

(4) After State specification of water quality parameter values for optimal corrosion control treatment the water system shall monitor for lead and copper tap samples at the standard number of sampling sites during two consecutive six month monitoring periods beginning from the date of State specification.

(5) Reduced Monitoring. Water systems may reduce the number and frequency of first draw lead and copper tap samples if they meet the following criteria:

(i) small and medium water systems that meet the lead and copper action levels during two consecutive six month monitoring periods may reduce the number of sampling sites at which samples are collected to those listed in the above table under reduced monitoring and reduce the frequency of sampling to once a year;

(ii) small and medium water systems that meet the lead and copper action levels for three consecutive years under reduced monitoring may reduce the frequency of first draw lead and copper tap monitoring to every third year at the reduced number of sampling sites;

(iii) small or medium water systems on a reduced monitoring schedule for lead and copper tap samples that exceed the lead or copper action level shall resume monitoring at the standard number of sampling sites every six months;

(iv) any water system that maintains state specified water quality parameters for optimal corrosion control treatment during each of two consecutive six month monitoring periods may request the State to reduce the monitoring frequency for lead and copper tap samples to once per year at the reduced number of monitoring sites;

(v) any water system that maintains state specified water quality parameters for optimal corrosion control treatment during three consecutive years may request the State to reduce the frequency of lead and copper tap samples at the reduced number of sites to once every three years;

(vi) any water system on a reduced monitoring frequency that fails to maintain state specified water quality parameters for optimal corrosion control treatment shall resume monitoring at the standard number of sites every six months; and

(vii) any water system on a reduced monitoring schedule for lead and copper tap samples shall collect these samples from the pool of sampling sites used for initial monitoring. The samples shall be collected during the periods from June 1 through September 30.

(e) Additional Monitoring. The results of any monitoring conducted besides the minimum requirements of this section shall be considered in making any determinations under this Subpart.

5-1.43 Monitoring requirements for water quality parameters. (Effective Date: May 27, 1998)

All large water systems and all small and medium water systems that exceed the lead and copper action level shall monitor for the following water quality parameters:

- pH;
- alkalinity;
- calcium;
- conductivity;
- water temperature;
- silica (when an inhibitor containing silicate is used); and
- orthophosphate (when an inhibitor containing phosphate is used)

Water quality parameter samples shall be representative of water quality throughout the distribution system. Sites should be selected to represent the population served, seasonal variability, different sources of water and different treatment methods used by the water system. Water quality parameter samples are not first draw samples and need not be collected from consumer's taps.

(a) Number of samples. Water systems shall collect two samples for the applicable water quality parameters during each monitoring period from the following number of distribution system sampling sites:

Population Served	Standard Monitoring (Sample Sites)	Reduced Monitoring (Sample Sites)
>100,000	25	10
10,001 - 100,000	10	7
3,301 - 10,000	3	3
501 - 3,300	2	2
101 - 500	1	1
<101	1	1

(b) Entry point sampling. Two water quality parameter samples must be collected at each entry point to the distribution system during each monitoring period which distribution water quality parameter samples are collected. Samples collected at entry points shall be representative of each source after treatment during normal operation of the water system. After the installation of corrosion control and/or after the State specifies water quality parameter values for optimal corrosion control treatment, entry point water quality parameter samples shall be collected biweekly.

(c) Distribution monitoring. All large water systems shall monitor for water quality parameters in section 5-1.45(c) of this Subpart in each initial six-month monitoring period that they monitor for first-draw lead and copper tap samples. All small and medium water systems shall monitor for water quality parameters in section 5-1.45(c) of this Subpart during the six month monitoring period which the water system exceeds the copper or lead action level. After a water system installs optimum corrosion control treatment, the water system shall monitor for water quality parameters for two consecutive six month monitoring periods. After the State specifies water quality parameters for optimal corrosion control treatment, all water systems shall monitor for water quality parameters at the frequencies stated in subdivision (a) of this section for two consecutive six month monitoring periods.

(d) After State specification of minimum values or ranges for water quality parameters for optimal corrosion control treatment, water systems shall maintain water quality parameter values at or above specified minimum values or within ranges specified by the State. If the water quality parameter value of any sample is below the minimum value or outside the range specified by the State, the water system is out of compliance with the State Sanitary Code.

(e) Reduced monitoring. Any water system that maintains State-specified water quality parameters for optimal corrosion control treatment for two consecutive six month monitoring periods may reduce the number of distribution sampling sites to the number listed in the above table under reduced monitoring. Entry point samples shall continue to be collected biweekly. Any water system that maintains state specified water quality parameters for three consecutive years may reduce the monitoring frequency of distribution system samples to once a year. Any water system that maintains state specified water quality parameters for three consecutive years when monitoring once a year may reduce the monitoring frequency to once every three years. Entry point samples must continue to be collected biweekly. When samples are collected once a year

or once every three years and more than one sample is required, the samples shall be spaced evenly throughout the year in which they are collected.

(f) Any water system conducting reduced monitoring that fails to maintain State-specified water quality parameters for optimal corrosion control treatment shall resume standard monitoring.

(g) Confirmation samples. Any water system may collect a confirmation sample of any water quality parameter. The confirmation sample must be collected from the same site within three days. If a confirmation sample is collected it must be averaged with the first sample and the average value must be used for compliance determinations.

(h) Additional monitoring. The results of any monitoring conducted besides the minimum requirements of this section shall be considered in making any decisions under this Subpart.

5-1.44 Public education and supplemental monitoring requirements. (Effective Date: May 27, 1998)

A water system that exceeds the lead action level based on first draw lead tap samples shall deliver the public education materials contained in subdivision (a) and (b) of this section in accordance with the requirements in subdivision (c) of this section.

(a) Content of written materials. A water system shall include the following text in all of the printed materials it distributes through its lead public education program. Any additional information presented shall be consistent with the information below and be expressed in a way that can be understood by persons without medical or technical backgrounds.

(1) Introduction. The New York State Health Department and (insert name of water supplier) are concerned about lead in your drinking water. Although most homes have very low levels of lead in their drinking water, some homes in the community have lead levels above the action level of 15 parts per billion, or 0.015 milligrams of lead per liter of water. Under the State Sanitary Code we are required to have a program in place to minimize lead in your drinking water by (insert date when corrosion control will be completed for your system). This program includes corrosion control treatment, source water treatment (if necessary) and public education. We are also required to replace each lead service line that we control if the line contributes lead concentrations of more than 15 parts per billion after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation please give us a call at (insert water systems phone number). This brochure explains the simple steps you can take to protect you and your family by reducing your exposure to lead in drinking water.

(2) Health effects of lead. Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food, certain types of pottery, porcelain, pewter and water. Lead can pose a significant risk to your health if too much of it enters your body. Lead builds up in the body over many years and can cause damage to the brain, red blood cells and kidneys. The greatest risk is to young children and pregnant women. Amounts of lead that won't hurt adults can slow down normal mental and physical development of growing bodies. Also, a child at play often comes into contact with sources of lead contamination, like dirt and dust, that rarely affect an adult. It is important to wash children's hands and toys often, and try to make sure they only put food into their mouths.

(3) Lead in drinking water. Although rarely the sole cause of lead poisoning, lead in drinking water can significantly increase a person's total lead exposure, particularly the exposure of infants who drink baby formulas and concentrated juices that are mixed with water. It is estimated that drinking water can make up to 20 percent or more of a person's total exposure to lead.

(i) Lead is unusual among drinking water contaminants in that it seldom occurs naturally in rivers and lakes. Lead enters drinking water primarily because the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. These materials include lead-based solder used to join copper pipe, brass and chrome plated brass faucets, and at times, pipes made of lead that connect your house to the water main (service lines). In 1986, Congress banned the use of lead solder containing greater than 0.2 percent lead, and restricted the lead content of faucets, pipes and other plumbing materials to 8.0 percent.

(ii) When water stands in lead pipes or plumbing systems containing lead for several hours or more, the lead may dissolve into your drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon after returning from work or school, can contain high levels of lead.

(4) Steps you can take in the home to reduce exposure to lead in drinking water.

(i) Despite our best efforts mentioned earlier to control water corrosivity and remove lead from the water supply, lead levels in some homes or buildings can be high. To find out whether you need to take action in your own home, have your drinking water tested to determine if it contains excessive concentrations of lead. Testing the water is essential because you cannot see, taste, or smell lead in drinking water. Some local approved environmental laboratories that provide this service are listed at the end of this booklet. For more information on having your water tested, please call (insert phone number of water system).

(ii) If a water test shows that the drinking water drawn from a tap in your home contains lead above 15 parts per billion, then you should take the following precautions:

(a) let the water run from the tap before using it for drinking or cooking any time the water in a faucet has stood for more than six hours. The longer water resides in your home's plumbing the more lead it may contain. Flushing the tap means running the cold water faucet until the water gets noticeably colder, usually about 15 to 30 seconds. If your house has a lead service line to the water main, you may have to flush the water for a longer time, perhaps one minute, before drinking. Although toilet flushing or showering flushes water through a portion of your home's plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive measure you can take to protect your family's health. It usually uses less than one or two gallons of water and costs less than (insert a cost estimate based on flushing two times a day for 30 days) per month. To conserve water, fill a couple of bottles for drinking water after flushing the tap, and whenever possible use the first flush water to wash dishes, watering plants or other purposes that do not involve cooking and drinking. If you live in a high rise building, letting the water flow before using it may not work to lessen your risk from lead. The plumbing systems have more, and sometimes larger pipes than smaller buildings. Ask your landlord for help in locating the source of lead and for advice on reducing the lead level;

(b) do not to cook with, or drink water from the hot water tap. Hot water can dissolve lead more quickly than cold water. If you need hot water, draw water from the cold water tap and heat it on the stove;

(c) remove loose lead solder and debris from the plumbing by removing the faucet strainers from all taps and running the water from 3 to 5 minutes. Thereafter, periodically remove the strainers and flush out any debris that has accumulated;

(d) if your copper pipes are joined with lead solder that has been installed illegally since it was banned in 1986, (if an earlier lead ban was in effect in your community insert the earlier date) notify the plumber who did the work and request replacement of the lead solder with lead-free solder. Also, notify (insert name and phone number of the local office of the health department and the name and phone number of the office responsible for enforcing the plumbing codes) about the violation. Lead solder looks dull gray, and when scratched with a metal object looks shiny;

(e) determine whether the service line that connects your home or apartment to the water main is made of lead. The public water system that delivers water to your home should maintain records of the materials located in the distribution system. If they do not have any records concerning your service line, try to contact the plumbing contractor who installed the service line. You usually can identify the plumbing contractor by checking the office that issues or keeps records of the building permits (insert name and phone number of office). If the plumbing contractor can't be located, hire a licensed plumber to determine if the service line is made of lead. A licensed plumber can also check to see if your home's plumbing contains lead solder, lead pipes or pipe fittings that contain lead;

(f) if you have a lead service line that connects your dwelling to the water main and it contributes more than 15 parts per billion of lead to your drinking water after our comprehensive treatment program is in place, we are required to replace the line. If the service line is only partially controlled by (insert name of water system with partial control of service line), we are required to replace the portion of the line under our control and we are required to provide you with information on how to replace your portion of the lead service line. We are also required to offer to replace your portion of the service line at your expense and take a follow-up tap sample within 14 days of the replacement. Acceptable replacement alternatives include copper, steel, iron, and plastic pipes; and

(g) have an electrician check your wiring. If grounding wires from the electrical system are attached to your pipes, corrosion may be greater. Check with the electrician or your local electrical code to determine if your wiring can be grounded elsewhere. DO NOT attempt to change the wiring yourself because improper grounding can cause electrical shock and fire hazards.

(iii) The steps described above will reduce the lead concentrations in your drinking water. However, if a water test shows that the drinking water coming from your tap contains lead concentrations more than 15 parts per billion after flushing and after we have completed our actions to minimize lead levels, then you may want to take the following additional measures:

(a) Purchase or lease a home water treatment device to remove lead. Home treatment devices are limited because each unit treats only the water that flows from the faucet to which it is connected, and all of the devices require periodic maintenance and

replacement. Devices such as reverse osmosis systems or distillers can effectively remove lead from your drinking water. Some activated carbon filters may reduce lead levels at the tap, however, all lead reduction claims should be investigated. Be sure to check the actual performance of a specific home treatment device before and after installing the unit.

(b) Purchase, for drinking and cooking, bottled water that is certified by the New York State Department of Health.

(iv) You can consult a variety of sources for additional information. Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead. State and local government agencies that can be contacted include:

(a) (Insert name and phone number of the local office of the health department) can provide you with information about your community's water supply, a list of local certified laboratories, plus information about the health effects of lead and how to have your child's blood tested for lead.

(b) (Insert name and phone number of local office that issues building permits) can provide you with information about building permit records that should contain the names of plumbing contractors that plumbed your home.

(v) The following is a list of certified laboratories in your area that you can call to have your water tested for lead. (Insert the names and phone numbers of at least two laboratories certified for testing lead).

(b) Content of broadcast materials. A water system shall include the following information in all public service announcements submitted under its lead public education program to television and radio stations for broadcasting:

(1) Why should everyone want to know the facts about lead and drinking water? Because unhealthy amounts of lead can enter drinking water through the plumbing in your home. That's why I urge you to do what I did. I had my water tested for (insert free or $ per sample). You can contact the (insert name of water system) for information on testing and on simple ways to reduce your exposure to lead in drinking water.

(2) To have your water tested for lead, or to get more information about this public health concern, please call (insert phone number of water system).

(c) Delivery of public education program.

(1) In communities where a significant proportion of the population speaks a language other than English, public education materials shall be communicated in the appropriate language.

(2) A community water system that fails to meet the lead action level based on first draw lead tap samples shall within 60 days:

(i) Insert notices in each consumer's water utility bill containing the information in subdivision (a) of this section, along with the following alert on the water bill in large print: "SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS IN THEIR DRINKING WATER. LEAD CAN POSE A SIGNIFICANT RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER

INFORMATION." (If the utility bill is not scheduled to be sent out in the 60 day period a separate mailing must be sent.)

(ii) Submit the information in subdivision (a) of this section to the editorial departments of the major daily and weekly newspapers circulated throughout the community.

(iii) Deliver pamphlets and/or brochures that contain the public education materials in paragraphs (a)(2) and (4) of this section to the following persons, facilities and organizations that serve the areas served by the water system:

- public and private schools and/or local school boards;
- local health department;
- women, infants, and children and headstart programs;
- public and private hospitals and/or clinics;
- pediatricians;
- family planning clinics; and
- local welfare agencies.

(iv) Submit the public service announcement in subdivision (b) of this section to at least five of the radio and television stations with the largest audiences that broadcast to the community served by the water system.

(3) A community water system shall deliver the public education materials and pamphlets to its consumers and organizations every 12 months and public service announcements to radio and television stations every six months for as long as the water system exceeds the lead action level.

(4) A nontransient noncommunity water system shall deliver the public education materials contained in paragraphs (a)(1), (2) and (4) of this section within 60 days after it exceeds the lead action level based on first draw lead tap samples. The materials shall be delivered as follows:

(i) post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the water system; and

(ii) distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the water system

(5) Nontransient noncommunity water systems shall repeat the public education process at least once during each calendar year which the water system exceeds the lead action level.

(6) Any water system may stop delivery of public education materials if the system has met the lead action level during the most recent six month monitoring period. The water system must recommence public education in accordance with this section if it exceeds the lead action level in a later monitoring period.

(d) Supplemental monitoring and notification of results. A water system that fails to meet the lead action level based on first draw lead tap samples shall offer to sample or have the tap water sampled of any consumer who requests it. The water system is not required to collect, analyze or to pay for analyzing the sample.

5-1.45 Corrosion control studies. (Effective Date: Jan 6, 1993)

(a) All water systems that are required to perform corrosion control studies shall evaluate the effectiveness of each of the following treatments, and if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for their water system:

(1) alkalinity and pH adjustment;

(2) calcium hardness adjustment; and

(3) the addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective corrosion inhibitor residual concentration in all test tap samples.

(b) The water system shall evaluate each of the corrosion control treatments using either pipe loop tests, metal coupon tests, partial system tests or analyses based on documented analogous treatments with other systems of similar size, water chemistry and distribution system configuration.

(c) The water system shall measure the following water quality parameters in any tests conducted for the corrosion control study before and after evaluating the corrosion control treatments listed above:

- lead;
- copper;
- pH;
- alkalinity;
- calcium;
- conductivity;
- orthophosphate (when an inhibitor containing phosphate compounds is used);
- silicate (when an inhibitor containing silicate compounds is used); and
- water temperature.

(d) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment such as:

(1) data showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics, and/or

(2) data demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.

(e) The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.

(f) Based on an analysis of the data generated during the study, the water system shall submit a report to the State recommending the treatment option that constitutes optimal corrosion control treatment for their water system. The report shall contain the rationale for its recommendation along with all supporting documentation specified in subdivisions (a) through (e) of this section.

5-1.46 Corrosion control treatment. (Effective Date: May 27, 1998)

Each water system shall complete the applicable corrosion control treatment requirements listed below.

(a) Large water systems that do not have optimal corrosion control treatment shall conduct a corrosion control study as specified in section 5-1.45 of this Subpart. The corrosion control study must be completed and submitted to the State by July 1, 1994.

(b) Small and medium water systems that exceed the lead or copper action level shall recommend a corrosion control treatment to the State which they believe will result in optimal corrosion control treatment. The recommendation shall be submitted within six months after exceeding the lead or copper action level and be based on the following:

(1) an evaluation of existing water quality parameters;

(2) source water lead and copper levels;

(3) constraints placed on the corrosion control process; and

(4) theoretical determination of which the following corrosion control methods or combination of methods will result in optimal corrosion control:

- carbonate passivation;
- inhibitor passivation; and
- calcium carbonate precipitation.

(c) The State shall designate optimal corrosion control treatment after review of a water system's recommendation for optimal corrosion control treatment and all supporting documentation.

(1) The State review of supporting documentation shall determine if water systems which were required to perform corrosion control studies, submitted documentation that conformed to the requirements of Section 5-1.45 ; and if

(2) Small and medium water systems which exceed the lead or copper action level submit documentation with their recommendation for optimal corrosion control treatment conforming to the requirements of subdivision (b) of this section.

(3) Based on the review of water system recommendations for optimal corrosion control treatment, the State may:

(i) require the water system to provide additional information;

(ii) designate the recommended corrosion control treatment as optimal corrosion control treatment with or without modifications to the recommendation; and

(iii) designate an alternate form of corrosion control treatment as optimal corrosion control treatment.

(4) State designation of an alternate form of optimal corrosion control treatment shall be carbonate passivation, inhibitor passivation or calcium carbonate precipitation and be based on the following considerations:

(i) existing water quality parameters;
(ii) source water lead and copper levels;

(iii) first draw lead and copper levels;

(iv) adverse health, safety and operational impacts of the corrosion control process; and

(v) optimal corrosion control treatment at similar water systems.

(d) After State designation of optimal corrosion control treatment all water systems shall complete final design of the corrosion control facilities, and submit plans and specifications to the State for approval. The corrosion control facilities shall be installed and operational within 24 months after State designation of optimal corrosion control treatment.

(e) The water system shall collect and analyze samples for first draw lead and copper and water quality parameters for two six month monitoring periods after installation of optimal corrosion control treatment facilities. The results and any additional information requested by the State shall be submitted to the State for specification of water quality parameters for optimal corrosion control treatment within 10 days of the end of each monitoring period.

(f) The State will evaluate the data submitted by the water system after installation of optimal corrosion control treatment to determine if the optimal corrosion control treatment designated by the State was properly installed and operated and to specify water quality parameter values for optimal corrosion control treatment. State specified water quality parameter values for optimal corrosion control treatment will be set to provide the maximum reduction of first draw lead and copper levels after evaluating the following data and constraints:

(1) the levels of lead and copper in first draw water before and after installation of State-designated optimal corrosion control treatment;

(2) the type of corrosion control treatment installed;

(3) characteristics of the water system;

(4) variation of source water quality parameter values;

(5) impact on other water treatment processes;

(6) operational and economic limitations;

(7) limitations of treatment process equipment; and

(8) range of water quality values observed after installation of optimal corrosion control treatment.

(g) After State specification of water quality parameters for optimal corrosion control treatment the water system shall operate within the ranges set by the State. If a water quality parameter value of any required sample is outside the established range, the water system shall take a confirmation sample within three days of the first sample. The result reported to the State shall be the average of the two samples.

(h) A water system may request a modification of its State designated optimal corrosion control treatment. The request must be submitted in writing and include the reason for the modification along with supporting data.

5-1.47 Source water monitoring and treatment. (Effective Date: May 27, 1998)

Any water system which exceeds the lead and/or copper action level shall collect one source sample for lead and copper from each entry point to the distribution system within six months after exceeding the lead and/or copper action level. If the sample results exceed five micrograms per liter for lead and/or 0.8 milligrams per liter for copper, the water system shall collect and analyze one more sample within 14 days from the same locations. The results of the two samples shall be averaged. All source water sample results and any additional information requested by the State shall be reported to the State with a recommendation for source water treatment within six months of exceeding the lead or copper action level.

(a) The types of source water treatments that can be considered by a water system include:

(1) No treatment. Based on a demonstration that:

(i) source water treatment is not necessary because source lead levels do not exceed five micrograms per liter and source copper levels do not exceed 0.8 milligrams per liter;

(ii) entry point lead and/or copper levels do not represent source water levels because of lead and/or copper pickup from facilities between the source and the entry point. A plan to eliminate the source of lead and/or copper must be presented with the recommendation; or

(iii) source water treatment will not reduce the lead levels at users' taps more than five micrograms per liter.

(2) Ion exchange.

(3) Reverse osmosis

(4) Coagulation/filtration.

(5) Lime softening.

(b) If the State requires installation of source water treatment, the water system shall install source water treatment within 24 months of the State requirement and begin source water and entry point monitoring. Samples for lead and copper shall be collected from the source or sources and at each entry point to the distribution system for two consecutive six month monitoring periods and be reported to the State within ten days of end of the monitoring period.

(c) If the State specifies that source water treatment is not necessary or specifies maximum permissible source water levels for lead and copper, the water system shall monitor for lead and copper at each entry point to the distribution system. Water systems using only ground water sources shall collect lead and copper samples once during each three year monitoring period. Water systems using surface sources or a combination of surface and ground water sources shall collect lead and copper samples annually beginning on the date of the State specification. If a water system meets the first draw lead and copper action levels for the entire source monitoring period, the water system may cease source water monitoring.

(d) State determination of the necessity of source water treatment and specification of maximum source water levels for lead and copper shall be based on an evaluation of the following:

(1) levels of lead and copper in first draw water;

(2) effectiveness of optimal corrosion control treatment if installed;

(3) levels and variability of lead and copper in source water;

(4) effectiveness of source water treatment; and

(5) operational constraints.

(e) The water system shall maintain lead and copper levels below the maximum permissible concentrations at each entry point during each monitoring period. If a sample exceeds the maximum permissible concentration a second sample must be collected from the same site within two weeks and the results averaged with the first sample. If the average value of lead and/or copper is greater than the maximum permissible source levels specified by the State the water system will be considered out of compliance.

(f) A water system may request modification of its source water treatment or maximum permissible lead and copper concentrations at entry points. The request must be submitted to the State in writing and include the reason for requesting the modification and supporting data.

(g) Reduced monitoring. A water system using only groundwater that has maintained entry point lead and copper levels below the maximum permissible levels for three consecutive three year monitoring periods may reduce the monitoring frequency to once in nine years. A water system using surface water or a combination of ground and surface water that has maintained entry point lead and copper levels below the maximum permissible levels for three consecutive years may reduce the monitoring frequency to once in nine years.

(h) A water system that uses a new source of water is not eligible for reduced monitoring for lead and copper until concentrations in samples collected from the new source entry point are below permissible levels for three consecutive monitoring periods.

5-1.48 Lead service line replacement. (Effective Date: May 27, 1998)

(a) Water systems that fail to meet the lead action level in tap samples collected after installing optimal corrosion control treatment and/or source water treatment (whichever occurs later) shall replace lead service lines. Water systems that fail to install optimal corrosion control treatment or source water treatment on time may be required to begin replacement of lead service lines.

(b) At least seven percent of the initial number of lead service lines shall be replaced annually. Based on the number of lead service lines in the water system, the State may require the water system to replace more than seven percent of the initial number of lead service lines each year. The initial number of lead service lines is the number of lead service lines in place at the time the replacement program begins. The water system shall identify the initial number of lead service lines in its distribution system based on a materials evaluation. The first year of lead service line replacement shall begin on the date the action level was exceeded after installing corrosion control and/or source water treatment.

(c) A water system is not required to replace an individual lead service line if the lead service line sample result is less than or equal to 0.015 milligrams per liter. Each service line sample shall be one liter of first draw water that has stood motionless in the lead service line for at least six hours and shall be collected in one of the following ways:

(1) The sample may be collected at a tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line.

(2) The sample may be collected by tapping directly into the lead service line.

(3) The sample may be collected at a tap by allowing the water to run until there is a significant change in water temperature which would be indicative of the temperature of the water that has been standing in the lead service line. This method can only be used for a building constructed as a single-family residence.

(d) A water system shall replace the entire service line (up to the building inlet) unless it demonstrates to the satisfaction of the State that it controls less than the entire service line. In such cases the water system shall replace the portion of the line which the State determines is under the water system's control. The water system shall notify the user served by the lead service line that it will replace the portion of the line under its control and shall offer to replace the building owner's portion of the line, but it is not required to bear the cost of replacing the building owner's portion of the line. For buildings where only a portion of the service line is replaced, the water system shall offer to collect a first draw tap water sample after partial replacement of the lead service line is completed. In cases where the residents accept the offer, the water system shall collect the sample and report the results to the resident within 14 days of the partial lead service line replacement.

(e) A water system is presumed to control the entire lead service line (up to the building inlet) unless the water system demonstrates to the State that the owner of the lead service or the property on which it is located has denied the water system entry or that it does not have any of the following forms of control over the entire lead service line, as defined by State statutes, municipal ordinances, public service contracts or other applicable legal authority:

(1) authority to set standards for construction, repair, or maintenance of the lead service line;

(2) authority to replace, repair, or maintain the lead service line; or

(3) ownership of the lead service line;

(f) Any water system may cease replacing lead service lines whenever first draw tap water samples meet the lead action level during each of two consecutive six-month monitoring periods. Monitoring results must be submitted to the State. If first draw tap water samples in the water system again exceed the lead action level the water system shall recommence replacing lead service lines.

5-1.49 Reporting and record keeping requirements. (Effective Date: May 27, 1998)

(a) All water systems shall report the following information to the State within ten days of the end of each applicable monitoring period:

(1) results of all first draw lead and copper tap samples, including site locations and criteria;

(2) certification that the first draw sample for lead and copper was a one liter sample and that to the best of their knowledge has stood in the plumbing system for at least six hours;

(3) if a resident collected the samples, certification that the water system informed the resident of the proper sampling procedures;

(4) the 90th percentile lead and copper values;

(5) an explanation of changes in sampling sites if any; and

(6) results of all distribution tap samples, entry point and source water samples for lead, copper, pH, alkalinity, calcium, conductivity, temperature and orthophosphate or silica.

(b) Water systems shall submit the following applicable reports:

(1) Water systems that cannot complete their sampling pool with tier 1 sampling sites must notify the State in writing justifying their selection of tier 2 or tier 3 sampling sites.

(2) Water systems that are unable to locate enough sampling sites with lead service lines to equal 50 percent of the required sampling pool must notify the State in writing why they were unable to locate enough sampling sites.

(3) Water systems that have maintained optimal water quality parameters for two consecutive six month monitoring periods and wish to reduce the sampling frequency for first draw lead and copper tap samples to once a year and the number of sites to the reduced monitoring number shall submit a request to the State with supporting data.

(4) Water systems that have maintained optimal water quality parameters for three consecutive years and wish to reduce the sampling frequency for first draw lead and copper tap samples to once every three years shall submit a request to the State with supporting data.

(5) Water systems that wish to demonstrate that they have achieved optimal corrosion control treatment under section 5-1.40(a) of this Subpart shall submit a report to the State demonstrating that they have met the criteria.

(6) Small and medium water systems that exceed the action level for lead or copper must submit their recommendation for optimal corrosion control treatment within six months of failure to meet the action level.

(7) Water systems that perform corrosion control studies must submit a report of the study within the applicable time frame.

(8) Water systems that are required to install optimal corrosion control treatment designated by the State must notify the State in writing certifying installation completion by the applicable date.

(9) Water systems which exceed lead or copper action levels must submit a report to the State recommending installation of a source water treatment or demonstrate why the source does not need treatment.

(10) Water systems that are required to install source water treatment must notify the State in writing certifying that source water treatment was installed within 24 months after the State required source water treatment.

(c) All water systems that are required to replace lead service lines shall report the following information to the State:

(1) Within 12 months after a water system exceeds the lead action level after installing optimal corrosion control treatment and/or source water treatment, the water system shall submit a report to the State. The report shall include the results of a material evaluation of the distribution system, the initial number of lead service lines and a schedule for replacing at least seven percent of the lead service lines annually.

(2) Submit an annual report to the State containing the following information:

(i) the number of lead service lines scheduled to be replaced during the previous year;

(ii) the number and location of the lead service lines actually replaced during the previous year; and

(iii) the number and location of lead service lines where service line samples were collected during the previous year.

(3) When a water system elects not to replace a lead service line because the lead service line sample was equal to or less than 15 micrograms per liter, the water system shall report the sampling method, date and results of the lead service line sample.

(4) If a water system seeks to prove that it does not have control over the entire lead service line, it shall submit to the State the appropriate documentation within three months of becoming subject to the requirement to replace lead service lines.

(d) All water systems subject to public education requirements shall report to the State by December 31st of each year the actions taken to meet its requirement. This report shall include the content of materials distributed, the dates of delivery and a list of the means of delivery (names of newspapers, radio stations etc. used).

(e) Additional monitoring. Any water system which collects sampling data besides that required by sections 5-1.40 through 5-1.48 of this Subpart shall report the results to the State within the first ten days following the end of the monitoring period which the samples were collected.

(f) Notwithstanding anything to the contrary in section 5-1.72 of this Subpart, any water system subject to the requirements of sections 5-1.40 through 5-1.48 of this Subpart shall retain on its premises records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, State approvals and conditions and any other information pertaining to sections 5-1.40 through 5-1.48 of this Subpart for at least 12 years.

Public Water Systems; Maximum Contaminant Levels; Monitoring Requirements; Notifications Required

5-1.50 Applicability and responsibility. (Effective Date: November 9, 2011)

The provisions of this section and sections 5-1.51 through 5-1.52 of this Subpart shall apply to all public water systems. The supplier of water of a public water system is responsible for completion of the monitoring requirements set forth in such sections and for performing all analyses in accordance with the analytical requirements set forth in Appendix 5-C of this Subpart. At the discretion of the State, analyses performed by the State may be used for monitoring purposes.

5-1.51 Maximum contaminant levels, maximum residual disinfectant levels and treatment technique requirements (Effective Date: November 9, 2011)

(a) The maximum contaminant levels, maximum residual disinfectant levels and treatment technique requirements are listed in section 5-1.52 tables 1 through 7 of this Subpart. In the case where an MCL, MRDL, or treatment technique requirement is exceeded, notwithstanding anything to the contrary contained in section 5-1.12 of this Subpart, the supplier of water will take the necessary steps to comply with this section, to ensure the protection of the public health, including the undertaking of remedial feasibility studies and the installation of a suitable treatment process. Compliance with the MCLs, MRDLs and treatment technique requirements shall be determined by the procedures contained in section 5-1.52 tables 1 through 7 of this Subpart.

(b) The minimum monitoring requirements for each contaminant are listed in section 5-1.52 tables 8A through 12 and 15A of this Subpart, except for public water systems with fewer than 15 service connections and which serve fewer than 25 persons, where monitoring will be at State discretion. For this section, State discretion shall mean requiring monitoring when the State has reason to believe an MCL, MRDL, or treatment technique requirement has been violated, the potential exists for an MCL, MRDL, or treatment technique violation or a contaminant may present a risk to public health.

(c) Each system must develop and implement a monitoring plan that includes all monitoring requirements specified in this Subpart. This plan must be completed by January 31, 2012. The system must maintain the plan and make it available for inspection by the State and the general public After review, the State may require changes in any plan elements. Failure to monitor in accordance with the monitoring plan is a monitoring violation. Systems may only use data collected in accordance with the monitoring plan to qualify for reduced monitoring. The monitoring plan must include at least the following elements, as applicable:

(1) specific locations and schedules for collecting samples for all applicable parameters listed in section 5-1.42, section 5-1.43, Tables 8A-12 of section 5-1.52, and section 5-1.61 of this Subpart;

(2) how the system will calculate compliance with MCLs, MRDLs, and treatment techniques;

(3) if the system is a consecutive system, or it is providing water to a consecutive system, and has been approved for modified monitoring under the provisions of section 5-1.76 of this Subpart, the sampling plan must reflect the entire distribution system for any analytes approved for modified monitoring;

(4) consecutive ground water systems must define and implement a protocol for notifying the system from which they receive water of any total coliform positive samples so the source can be tested for fecal contamination, unless the wholesale ground water system provides 4-log virus treatment at peak flow before or at the first customer as confirmed through process compliance monitoring.

(d) The notification requirements for each contaminant are listed in section 5-1.52 table 13 of this Subpart.

(e) The CT values for inactivation of ***Giardia lamblia*** cysts by free chlorine at various pH and temperature levels are listed in section 5-1.52 tables 14A through 14F of this Subpart. The CT values for inactivation of ***Giardia lamblia*** cysts by chlorine dioxide and ozone at various temperature levels are listed in section 5-1.52 table 14G of this Subpart.

(f) The alternative disinfection monitoring frequency requirements using grab samples instead of continuous chlorine concentration monitoring is listed in section 5-1.52 table 15 of this Subpart.

(g) Monitoring and reporting frequencies for specific contaminants may be established at State discretion whenever the State believes that a potential exists for an MCL or MRDL violation or a contaminant may present a risk to public health.

(h) Notwithstanding anything to the contrary in subdivision (a) of this section, the Commissioner may recommend values lower than the MCLs if sufficient valid information based on commonly accepted scientific standards and principles demonstrates an increased public health concern. Within one year from the date of such recommendation, the State shall hold a public hearing regarding the justification for the lower value, and whether a new MCL is warranted.

(i) Notwithstanding anything to the contrary in section 5-1.52 table 3 the Commissioner may in specific cases except specific organic chemicals from the MCLs for general organic chemicals if the supplier of water can demonstrate that sufficient valid scientific information exists to show that the organic chemical does not pose an unreasonable risk to human health, the organic chemical is present at a level and under circumstances not indicative of contamination, and the cost of compliance is unreasonable in light of the risk to human health.

(j) Notwithstanding anything to the contrary in section 5-1.52 table 3 of this Subpart, the Commissioner may, based on receipt and review of a justification submitted by the supplier of water, allow a higher MCL for a period of up to 60 days following application of a paint or lining to a potable water structure, if he determines that an unreasonable risk to human health does not exist.

(k) Notwithstanding anything to the contrary in section 5-1.52 table 3A of this Subpart, systems may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

(l) A system that is installing granular activated carbon (GAC) or membrane technology to comply with the trihalomethane and haloacetic acid MCLs listed in section 5-1.52 table 3 may apply to

the State for an extension of up to 24 months past the compliance dates for those MCLs. Systems must comply with any interim measures and schedules of compliance set by the State.

(m) Each public water system must certify annually in writing to the State that when Acrylamide and Epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified as follows:

Acrylamide = 0.05% dosed at 1 ppm (or equivalent)
Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent)
Certification can rely on manufacturers or third parties, as approved by the State.

(n) For microbiological analysis, a standard sample size of 100 milliliters shall be used.

5-1.52 Tables. (Effective Date: November 9, 2011)

Table 1. Inorganic Chemicals and Physical Characteristics Maximum Contaminant Level Determination

Contaminants	MCL (mg/l) [4]	Determination of MCL violations
Asbestos	7.0 million fibers/liter (MFL) (longer than 10 microns)	If the results of a monitoring sample analysis exceed the MCL, the supplier of water shall collect one more sample from the same sampling point within 2 weeks or as soon as practical. An MCL violation for all contaminants listed in this table, except for Arsenic, occurs when the average[1] of the initial sample and any confirmation sample exceeds the MCL. MCL violations for Arsenic will be determined as follows: Compliance with the Arsenic MCL shall be determined based on the analytical result(s) obtained at each sampling point. For systems which are conducting monitoring at a frequency greater than annual, an Arsenic MCL violation occurs when the running annual average[7,8,9] at any sampling point is greater than the MCL. If any one sample would cause the annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately. Systems monitoring annually or less frequently whose sample result exceeds the Arsenic MCL[7] must begin quarterly sampling[10]. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling and the running annual average[7,8,9] at that sampling point is greater than the Arsenic MCL. If any one sample would cause the annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.
Antimony	0.006	
Arsenic	0.010	
Barium	2.00	
Beryllium	0.004	
Cadmium	0.005	
Chromium	0.10	
Cyanide(as free cyanide)	0.2	
Mercury	0.002	
Selenium	0.05	
Silver	0.1	
Thallium	0.002	
Fluoride	2.2	
Chloride	250.0	
Iron	0.3[2]	
Manganese	0.3[2]	
Sodium	No designated limits[3]	
Sulfate	250.0	
Zinc	5.0	
Color	15 Units	
Odor	3 Units	
Bromate[5]	0.010	Compliance is based on a running annual average of monthly samples, computed quarterly. If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public.
Chlorite[6]	1.0	Compliance is based on an average of each three-sample set taken in the distribution system in accordance with Table 8B. If the average exceeds the MCL, the system is in violation of the MCL and must notify the public.

[1]Rounded to the same number of significant figures as the MCL for the contaminant in question.
[2]If iron and manganese are present, the total concentration of both should not exceed 0.5 mg/L. Higher levels may be allowed by the State when justified by the supplier of water.
[3]Water containing more than 20 mg/L of sodium should not be used for drinking by people on severely restricted sodium diets. Water containing more than 270 mg/L of sodium should not be used for drinking by people on moderately restricted sodium diets.
[4]mg/L = milligrams per liter
[5]Community and nontransient noncommunity systems using ozone for disinfection or oxidation must comply with the bromate standard. Systems using surface water or ground water under the direct influence of surface water and serving 10,000 or more people must comply by January 1, 2002. Systems using surface water or ground water under the direct influence of surface water and serving fewer than 10,000 people, or systems using ground water must comply by January 1, 2004.
[6]Community and nontransient noncommunity systems using chlorine dioxide as a disinfectant or oxidant must comply with the chlorite standard. Systems using surface water or ground water under the direct influence of surface water and serving 10,000 or more people must comply by January 1, 2002. Systems using surface water or ground water under the direct influence of surface water and serving fewer than 10,000 people, or systems using ground water must comply by January 1, 2004.
[7]Arsenic sampling results shall be reported to the nearest 0.001 mg/L.
[8]Any sample below the method detection limit shall be calculated at zero for the purpose of determining the annual average. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.
[9]If confirmation samples are collected, the average of the initial sample and any confirmation samples will be used for the determination of compliance and future monitoring requirements.
[10]Systems are only required to conduct the increased monitoring frequency at the sampling point where the MCL was exceeded and for only the specific contaminant(s) that triggered the system into the increased monitoring frequency.

Table 2 - Nitrate, Nitrite, Total Nitrate/Nitrite Maximum Contaminant Level Determination

Contaminants	MCL (mg/L)	Determination of MCL violation
Nitrate	10 (as Nitrogen)[1]	If the results of a monitoring sample analysis exceed the MCL, the supplier of water shall collect another sample from the same sampling point, within 24 hours of the receipt of results or as soon as practical.[2] An MCL violation occurs when the average of the two results exceeds the MCL.
Nitrite	1 (as Nitrogen)	
Total Nitrate and Nitrite	10 (as Nitrogen)	

[1]An MCL of 20 mg/L may be permitted at a noncommunity water system if the supplier of water demonstrates that:
(a) the water will not be available to children under six months of age;
(b) a notice that nitrate levels exceed 10 mg/L and the potential health effects of exposure will be continuously posted according to the requirements of a Tier 1 notification;
(c) the State will be notified annually of nitrate levels that exceed 10 mg/L; and
(d) no adverse health effects shall result.

[2]Systems unable to collect an additional sample within 24 hours must issue a Tier 1 notification and must collect the additional sample within two weeks of receiving the initial sample results.

Table 3. Organic Chemicals Maximum Contaminant Level Determination

Contaminants	MCL (mg/L)	Type of water system	Determination of MCL violation
General organic chemicals		Community, NTNC and Noncommunity	If the results of a monitoring sample analysis exceed the MCL, the supplier of water shall collect one to three more samples from the same sampling point, as soon as practical, but within 30 days. An MCL violation occurs when at least one of the confirming samples is positive and the average of the initial sample and all confirming samples exceeds the MCL.
Principal organic contaminant (POC)	0.005		
Unspecified organic contaminant (UOC)	0.05		
Total POCs and UOCs	0.1		
Disinfection byproducts[1,2]		Community and NTNC	The results of all analyses per quarter must be arithmetically averaged and must be reported to the State within 30 days of the public water system's receipt of the analyses. A violation occurs if the average of the four most recent sets of quarterly samples (12-month running average) exceeds the MCL. If a system fails to complete four consecutive quarters of monitoring, compliance with the MCL will be based on an average of the available data. For systems monitoring less than quarterly, compliance must be based on an average of samples taken that year. If, during the first year of monitoring, any individual quarter's average will cause the annual average of that system to exceed the MCL the system is out of compliance at the end of that quarter.
Total trihalomethanes	0.08		
Haloacetic acids	0.06		
		Transient noncommunity	Not applicable.

[1]Systems using surface water or ground water under the direct influence of surface water and serving 10,000 or more people must comply with the disinfection byproducts standards by January 1, 2002. Systems using surface water or ground water under the direct influence of surface water and serving fewer than 10,000 people, or systems using ground water must comply by January 1, 2004. Until then, community water systems serving fewer than 10,000 persons must comply with an MCL of 0.1 mg/L for total trihalomethanes.

[2]A system that is installing granular activated carbon (GAC) or membrane technology to comply with the trihalomethane and haloacetic acid MCLs may apply to the State for an extension of up to 24 months past the compliance dates for those MCLs. Systems must comply with any interim measures and schedules of compliance set by the State.

Table 3. Organic Chemicals Maximum Contaminant Level Determination (continued)

Contaminants	MCL (mg/L)	Type of Water System	Determination of MCL violation
Specific Organic Chemicals		Community, NTNC and Noncommunity	If the results of a monitoring sample analysis exceed the MCL, the supplier of water shall collect one to three more samples from the same sampling point, as soon as practical, but within 30 days. An MCL violation occurs when at least one of the confirming samples is positive and the average of the initial sample and all confirming samples exceeds the MCL.
Alachlor	0.002		
Aldicarb	0.003		
Aldicarb sulfone	0.002		
Aldicarb sulfoxide	0.004		
Atrazine	0.003		
Benzo(a)pyrene	0.0002		
Carbofuran	0.04		
Chlordane	0.002		
Di(2-ethylhexyl)phthalate	0.006		
Dibromochloropropane(DBCP)	0.0002		
2,4-D	0.05		
Dinoseb	0.007		
Diquat	0.02		
Endrin	0.002		
Ethylene dibromide(EDB)	0.00005		
Heptachlor	0.0004		
Heptachlor epoxide	0.0002		
Hexachlorobenzene	0.001		
Lindane	0.0002		
Methoxychlor	0.04		
Methyl-tertiary-butyl-ether(MTBE)	0.010		
Pentachlorophenol	0.001		
Polychlorinated biphenyls(PCBs)	0.0005		
Propylene glycol	1.0		
Simazine	0.004		
Toxaphene	0.003		
2,4,5-TP (Silvex)	0.01		
2,3,7,8-TCDD (dioxin)	0.00000003		
Vinyl chloride	0.002		

Table 3A. Maximum Residual Disinfectant Level (MRDL) Determination

Disinfectant	MRDL[1] (mg/L)	Type of water system	Determination of MRDL violation
Chlorine	4.0 (as Cl_2)	Community and NTNC using chlorine or chloramines as disinfectant or oxidant	Compliance is based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system. If the running annual average exceeds the MRDL, the system is in violation and must notify the public.
Chloramines[2]	4.0 (as Cl_2)		
Chlorine Dioxide	0.8 (as ClO_2)	Community, NTNC, and Transient Noncommunity using chlorine dioxide as disinfectant or oxidant	Public Health Hazard (Acute Violation) Compliance is based on daily samples collected by the system. 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 exceeds the MRDL, the system is in violation.
			Nonacute Violation Compliance is based on daily samples collected by the system. If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL, and all distribution system samples taken are below the MRDL, the system is in violation.

[1]Systems using surface water or ground water under the direct influence of surface water and serving 10,000 or more people must comply by January 1, 2002. Systems using surface water or ground water under the direct influence of surface water and serving fewer than 10,000 people, or systems using ground water must comply by January 1, 2004.

[2]In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines.

Table 4. Entry Point Turbidity Maximum Contaminant Level Determination [1]

Contaminant	MCL	Determination of MCL violation
Entry point turbidity (surface water and groundwater directly influenced by surface water)	1 NTU [2,4] (Monthly Average) 5 NTU [3,4]	A violation occurs when the average of all daily entry point analyses for the month exceeds the MCL rounded off to the nearest whole number. A violation occurs when the average of two consecutive daily entry point analyses exceeds the MCL rounded off to the nearest whole number.

[1]The requirements of this table apply to unfiltered systems that the State had determined, in writing pursuant to section 5-1.30 of this Subpart, must install filtration, until filtration is installed.

[2]If the daily entry point analysis exceeds one NTU, a repeat sample must be taken as soon as practicable and preferably within one hour. If the repeat sample exceeds one NTU, the supplier of water must make State notification. The repeat sample must be used for the monthly average and the two consecutive day average.

[3]If the two consecutive day average exceeds the MCL, the supplier of water shall analyze for microbiological contamination at a point downstream of the first consumer, but as close to the first consumer as is feasible. The additional microbiological sample should be taken within one hour as soon as feasible after determining the two consecutive day average. The supplier of water shall report the result of this microbiological analysis to the State within 48 hours of obtaining the result. The result of this analysis shall not be used for monitoring purposes.

[4]NTU = Nephelometric Turbidity Units

Table 4A. Surface Water Turbidity Performance Standards [1]

Contaminant	Filtration type	Performance standard[1]	Determination of treatment technique violation	
Filtered water turbidity	Conventional filtration and Direct Filtration	0.3 NTU[2,4,5]	A treatment technique violation occurs if more than five percent of the composite filter effluent measurements taken each month exceed the performance standard values.	The turbidity level of representative samples of the filtered water must at no time exceed 1 NTU.[4,5]
	Slow sand filtration	1.0 NTU[2]	A treatment technique violation occurs if more than five percent of the composite filter effluent measurements taken each month exceed the performance standard values.	The turbidity level of representative samples of the filtered water must at no time exceed 5 NTU.
	Diatomaceous earth filtration	1.0 NTU[2]		
	Alternative filtration	1.0 NTU[2, 3]		

[1]The standards apply to systems with surface water sources or groundwater sources directly influenced by surface water.

[2]NTU= Nephelometric Turbidity Unit

[3]The performance standard applies to alternative filtration technologies capable of complying with requirement of section 5-1.30(b) of this Subpart as demonstrated to the department by pilot studies, unless the department sets a turbidity performance standard for a specific system.

[4]System serving 10,000 or more people must comply by January 1, 2002. If the combined filter effluent turbidity exceeds 1 NTU, the system must consult with the State in accordance with paragraph 5-1.78 (d)(3) of this Subpart.

[5]Systems serving fewer than 10,000 people must comply by January 14, 2005. If the combined filter effluent turbidity exceeds 1 NTU, the system must consult with the State in accordance with paragraph 5-1.78(d)(3) of this Subpart. Until January 14, 2005, the performance standard is 0.5 NTU and the turbidity level of representative samples of the filtered water must at no time exceed 5.0 NTU.

Table 5. Distribution System Turbidity Maximum Contaminant Level Determination

Contaminant	MCL	Determination of MCL violation
Distribution point turbidity	5 NTU	A violation occurs when the monthly average of the results of all distribution samples collected in any calendar month exceeds the MCL rounded off to the nearest whole number.

Table 6. Microbiological Contaminants Maximum Contaminant Level (MCL)/Treatment Technique (TT) Violation Determination

Contaminant	Sample Location	MCL or TT	Performance Standard1,2	Determination of MCL/TT violation3
Total coliform	Distribution Sample Sites	MCL	No positive sample[4]	An MCL violation occurs at systems collecting 40 or more samples per month when more than 5.0 percent of the total coliform samples are positive.
		MCL		An MCL violation occurs at systems collecting less than 40 samples per month when two or more samples are total coliform positive.
Escherichia coli (E. coli)		MCL	No positive sample[4]	An MCL violation occurs when a total coliform positive sample is positive ***for E. coli*** and a repeat total coliform sample is positive or when a total coliform positive sample is negative for ***E. coli*** but a repeat total coliform sample is positive and the sample is also positive for ***E. coli***.[5]
Fecal indicator: ***E. coli***, and/or enterococci, and/or coliphage	Untreated Water from a Ground Water Source	TT	No fecal indicator in samples collected from raw source water from a ground water source.[6]	A TT violation occurs when a raw water sample is positive for the fecal indicator contaminant and system does not provide and document, through process compliance monitoring, 4-log virus treatment during peak flow at first customer. If repeat sampling of the raw water is directed by the State and all additional samples are negative for fecal indicator, there is no TT violation.[6]

[1]A public water system must comply with the MCL for total coliform each month the system is required to monitor for total coliform.

[2]All samples collected in accordance with Table 11 footnotes 1, and 2 and Table 11B of this section, and samples collected in accordance with section 5-1.51(g) of this Subpart shall be included in determining compliance with the MCL unless any of the samples have been invalidated by the State.

[3]For notification purpose, an ***E. coli*** MCL violation in the distribution system is a public health hazard requiring Tier 1 notification.

[4]See Table 13 for public notification requirements.

[5]If any total coliform or ***E. Coli*** sample is positive, repeat samples must be collected in accordance with Table 11B of this section.

[6]If raw water source sample is fecal indicator positive, the water system, in consultation with the State, may collect an additional 5 samples within 24 hours at each source that tested fecal indicator positive. If none of the additional samples are fecal indicator positive, then there is no TT violation. Note that Tier 1 notification must be made after the initial raw water fecal indicator positive sample, even if it is not confirmed.

Table 7. Radiological Maximum Contaminant Level Determination[1]

Contaminant	MCL	Type of water system	Determination of MCL violation[2]
Combined radium-226 and radium-228	5 picocuries per liter	Community	A violation occurs when a sample or the annual average of samples at any sampling point exceeds the MCL[3,4,5,6,7].
Gross alpha activity (including radium-226 but excluding radon and uranium)	15 picocuries per liter	Community	
Uranium	30 micrograms per liter	Community	
Beta particle and photon radioactivity from manmade radionuclides	Four millirems per year as the annual dose equivalent to the total body or any internal organ[8].	Community Water Systems designated by the State as vulnerable	A violation occurs when a sample or the annual average of samples at any sampling point exceeds the MCL[3,4,5,7,9,10].
		Community systems designated by the State as utilizing waters contaminated by effluents from nuclear facilities	A violation occurs when a sample or the annual average of samples at any sampling point exceeds the MCL[3,4,5,7,9,10].

[1]The Radionuclides Rule including the MCLs and minimum monitoring requirements applies to only community water systems.
[2]To judge compliance with the maximum contaminant levels, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.
[3]For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point. If the average of any sampling point is greater than the MCL, then the system is out of compliance with the MCL.
[4]For systems monitoring more than once a year, if any sample result will cause the running average to exceed the MCL at any sample point, e.g., a single sample result is greater than four times of the MCL, the system is out of compliance with the MCL immediately.
[5]If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running average of the samples collected.
[6]If a sample result is less than the detection limit, zero will be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226 and/or uranium. If the gross alpha particle activity result is less than detection and is substituted for radium-226 and/or uranium, ½ the detection limit will be used to calculate the annual average.
[7]If the MCL for radionuclides in this Table is exceeded, the community water system must give notice to the State.
[8]A system must determine compliance with the MCL for beta particle and photon radioactivity by using the calculation described below:

[pCi/L found in sample (from laboratory results) / pCi/L equivalent of 4 mrem of exposure] = fraction of the maximum 4 mrem/year exposure limit

[9]To determine compliance with the MCL, a system must monitor at a frequency as described in Table 12.
[10]If the results show an MCL violation for any of the constituents, the system must conduct monthly monitoring for all species at any sampling point that exceeds the MCL. Monitoring must be conducted in accordance with Table 12 in this section. A system can resume quarterly monitoring if the rolling average of three months of samples is at or below the MCL.

Table 8A. Inorganic Chemicals and Physical Characteristics Minimum Monitoring Requirements for Asbestos

Contaminant	Type of water system	Initial frequency by source type[5]		Repeat sampling and compliance
		Groundwater only	Surface only or surface and groundwater	
Asbestos[1]	Community and NTNC	One sample at entry point by 12/31/95 [2,3,4]	One sample at entry point by 12/31/95 [2,3,4]	If GT MCL, one sample quarterly.[6, 7] If LT MCL, one sample every nine years.

GT = Greater Than LT = Less Than

[1]If a system is not vulnerable to asbestos contamination, either at its source or due to corrosion of asbestos cement pipe, it is not required to monitor if granted a waiver by the State. The waiver must be renewed by the State every nine years. The basis for a waiver must include the following:

1. Lack of potential asbestos contamination of the water source
2. No use of asbestos cement pipe for finished water distribution and noncorrosive nature of the water.

[2]If asbestos monitoring data collected after January 1, 1990 are consistent with the requirements of this table, the State may allow systems to use that data to satisfy the initial monitoring requirement beginning January 1, 1993.

[3]If a system is vulnerable to asbestos contamination due to source water and corrosion of asbestos cement pipe or solely to corrosion of asbestos cement pipe, it shall take one sample at a tap served by asbestos cement pipe and under conditions where asbestos contamination is most likely to occur.

[4]If a system is vulnerable to asbestos contamination due to source water only, monitoring shall be conducted as follows:

- Groundwater - Collect a minimum of one sample at every entry point to the distribution system representative of each well after treatment.
- Surface water - Collect a minimum of one sample at each 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.

[5]For both types of water sources 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. 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 when water is representative of all sources.

[6]A system which exceeds the MCL for asbestos shall monitor quarterly beginning in the next quarter after the violation occurred.

[7]State may decrease the quarterly monitoring requirement to the initial sampling requirement provided that the State has determined that the system is reliably and consistently below the MCL on the basis of a minimum of two quarterly groundwater samples and a minimum of four quarterly samples for surface water.

Table 8B. Inorganic Chemicals and Physical Characteristics Minimum Monitoring Requirements

Contaminant	Type of water system	Initial frequency of source type[3]		Accelerated sampling[7]
		Groundwater only	Surface only or surface and ground water	
Antimony Arsenic Barium Beryllium Cadmium Chromium Cyanide Mercury Nickel Selenium Thallium Fluoride	Community and NTNC[1,2,6]	One sample per entry point every 3 years by 12/31/95[8]	One sample per entry point per year[9]	If GT MCL, one sample quarterly. [4,5] If LT MCL, maintain initial frequency.
	Transient noncommunity	State discretion[10]	State discretion[10]	State discretion[10]
Bromate[11]	Community and NTNC using ozone for disinfection or oxidation	One sample per month at each entry point[13, 17]	One sample per month at each entry point[13, 17]	State discretion[10]
Chlorite[12]	Community and NTNC using chlorine dioxide for disinfection or oxidation	Daily samples at each entry point. Additional three-sample set monthly in the distribution system[14, 15, 16, 17]	Daily samples at each entry point. Additional three-sample set monthly in the distribution System[14, 15, 16, 17]	State discretion[10]

GT = Greater Than LT = Less Than

[1]A waiver from the required initial monitoring frequencies may be granted by the State, based upon the following conditions:

a. A minimum of one sample shall be collected while the waiver is effective.
b. Surface water systems must have monitored annually for at least three years and groundwater systems must have conducted a minimum of three rounds of monitoring with at least one sample taken since January 1, 1990.
c. All results must be less than the MCL.
d. New sources are not eligible for a waiver until completion of three rounds of sampling
e. Waivers issued by the State shall be made in writing, shall cite the basis for determination and shall not exceed a maximum of nine years.

[2]To determine the appropriate reduced monitoring frequency, the State shall consider:

a. Reported concentrations from all previous monitoring
b. Variations in reported concentrations; and
c. other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the system's configuration, operating procedures, stream flows or other characteristics

[3]For all types of water sources 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. 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 when water is representative of all sources, or separately at the individual sources. The State may allow systems to composite samples in accordance with the conditions in Appendix 5-C. All samples taken and analyzed in accordance with the monitoring plan must be included in determining compliance, even if the number is greater than the minimum required.

[4]The State may decrease the quarterly monitoring requirement to the initial sampling requirement provided that it is determined that the system is reliably and consistently below the MCL on the basis of a minimum of two quarterly groundwater samples and a minimum of four quarterly samples for surface water.
[5]If concentrations of a listed contaminant exceed the MCL, the Department requires the collection of an additional sample as soon as possible but not to exceed two weeks.
[6]The State may require or the water system may request more frequent monitoring frequencies than is minimally required. The State, at its discretion, may require confirmation samples for positive and negative results.
[7]The average of the initial and confirmation sample contaminant concentration at each sampling point shall be used to determine compliance with the MCL.
[8]Systems with fewer than 150 service connections may postpone initial monitoring for antimony, beryllium, cyanide, nickel and thallium until 1998, but no later than three years after conducting its last result set of analysis for arsenic, barium, cadmium, mercury, selenium and fluoride.
[9]Systems with fewer than 150 service connections may postpone initial monitoring for antimony, beryllium, cyanide, nickel and thallium until 1996.
[10]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.
[11]Community and nontransient noncommunity systems using ozone for disinfection or oxidation must comply with the bromate monitoring requirement. Systems using surface water or ground water under the direct influence of surface water and serving 10,000 or more people must comply by January 1, 2002. Systems using surface water or ground water under the direct influence of surface water and serving fewer than 10,000 people, or systems using ground water must comply by January 1, 2004.
[12]Community and nontransient noncommunity systems using chlorine dioxide as a disinfectant or oxidant must comply with the chlorite monitoring requirement. Systems using surface water or ground water under the direct influence of surface water and serving 10,000 or more people must comply by January 1, 2002. Systems using surface water or ground water under the direct influence of surface water and serving fewer than 10,000 people, or systems using ground water must comply by January 1, 2004.
[13]Systems required to analyze for bromate may reduce monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based on representative monthly bromide measurements for one year. A system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/L. If the average bromide concentration is equal to or greater than 0.05 mg/L, the system must resume routine monthly bromate monitoring.
[14]On each day following a sample result that exceeds the chlorite MCL at the entrance to the distribution system, the system must 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 in a location representative of maximum residence time. The samples comprising the three-sample set required for routine monitoring must be collected at the same three locations in the distribution system that are used when following up on a daily MCL exceedance at the entry point. The system may use results of additional monitoring, conducted as the result of an entry point MCL exceedance, to meet the requirement for routine monthly monitoring.
[15]Daily chlorite monitoring at the entrance to the distribution system may not be reduced. Monthly chlorite monitoring in the distribution system 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 has exceeded the chlorite MCL. If the system has had to conduct distribution system monitoring as a result of an MCL exceedance at the entry point, the system cannot reduce monitoring. The system may remain on a reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system exceeds the chlorite MCL or the system is required to conduct distribution system monitoring because of an entry point chlorite MCL exceedance.
[16]A system must monitor according to its monitoring plan as described in section 5-1.51(c) of this Subpart. Failure to monitor in accordance with the monitoring plan is a monitoring violation.
[17]Failure to monitor will be treated as a monitoring violation for the entire period covered by an annual average where compliance is based on an annual average of monthly or quarterly samples or averages and a system's failure to monitor makes it impossible to determine MCL compliance.

Table 8C. Inorganic Chemicals and Physical Characteristics Minimum Monitoring Requirements - Nitrates, Nitrites

Contaminant	Type of water system	Initial frequency of source type[1,6]		Accelerated sampling[7]
		Groundwater only	Surface only or surface and ground water	
Nitrate	Community and Noncommunity[2]	One sample per entry point per year	One sample per entry point quarterly	For Groundwater: if equal to or GT 50 percent MCL, quarterly for one year[3] For Surface Water: If LT 50 percent MCL, one sample per year[3,4]
Nitrite	Community and Noncommunity	One sample per entry point by 12/31/95	One sample per entry point by 12/31/95	If equal to or GT 50 percent MCL, repeat quarterly for at least one year[3,4] If LT 50 percent MCL, sample frequency at State discretion[5]

GT = Greater Than LT = Less Than

[1]The State may require, or the water system may request, more frequent monitoring frequencies than is minimally required. The State at its discretion may require confirmation samples for positive and negative results.

[2]Noncommunity water systems must sample annually beginning 1/1/93 regardless of the water source.

[3]The frequency may be reduced to annual if the State determines the systems contaminant concentration is consistently and reliably less than the MCL and annual samples are collected during the quarter(s) having the highest analytical results.

[4]A surface water shall return to quarterly monitoring if any one sample is GT 50 percent of MCL.

[5]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.

[6]For both types of water sources 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. 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 when water is representative of all sources.

Table 8D. Inorganic Chemicals and Physical Characteristics Minimum Monitoring Requirements - Other Chemicals

Contaminant	Type of water system	Initial frequency of source type		Sampling and compliance
		Groundwater only	Surface only or surface and ground water	
Chloride Iron Manganese Silver Sodium[1] Sulfate Zinc Color Odor	Community and NTNC	State discretion[2]	State discretion[2]	State discretion[2]

[1]All community systems with sodium levels exceeding 20 mg/l will be required to sample for sodium analysis.

[2]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.

Table 9A. Organic Chemicals - Disinfection Byproducts Minimum Monitoring Requirements

Surface Water Systems, Ground Water Systems Under the Direct Influence of Surface Water, or Combined Surface and Ground Water Systems				
Contaminant	**Type of water system**	**Routine Monitoring Frequency[1]**	**Reduced Monitoring Frequency**	**Sample Locations in the Distribution System[1]**
Total Trihalomethanes Haloacetic Acids	Community and NTNC serving at least 10,000 persons[2]	Four samples per quarter per treatment plant [3,4]	One sample per quarter per treatment plant.[3,4,5]	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.[6] If monitoring has been reduced, sample must be collected at location reflecting maximum residence time.
	Community and NTNC serving 500 to 9,999 persons[7]	One sample per quarter per treatment plant [3,4]	One sample per year per treatment plant during month of warmest water temperature.[5]	Location representing maximum residence time.[6]
	Community and NTNC serving fewer than 500 persons[7]	One sample per year per treatment plant collected during the month of warmest water temperature. If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, system must increase monitoring to one sample per treatment plant per quarter	Cannot reduce monitoring.	Location representing maximum residence time.[6]
	Transient Noncommunity	State discretion[8]	State discretion[8]	State discretion[8]

Table 9A. Organic Chemicals - Disinfection Byproducts Minimum Monitoring Requirements (continued)

Ground Water Systems Using Chemical Disinfectant				
Contaminant	**Type of water system**	**Routine Monitoring Frequency[1]**	**Reduced Monitoring Frequency**	**Sample Locations in the Distribution System[1]**
Total Trihalomethanes Halocetic Acids	Community and NTNC using chemical disinfectant and serving at least 10,000 persons	One sample per quarter per treatment plant.[3,4,10]	One sample per year per treatment plant during month of warmest water temperature.[9,10]	Locations representing maximum residence time.[6]
	Community and NTNC using chemical disinfectant and serving fewer than 10,000 persons[7]	One sample per year per treatment plant during month of warmest water temperature.[10] If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system.	One sample every three years per treatment plant.[11] Sample must be collected during month of the year with the warmest water temperature.	Locations representing maximum residence time.[6]
	Transient Noncommunity	State discretion[8]	State discretion[8]	State discretion[8]

[1]A system must monitor according to its monitoring plan as described in section 5-1.51 (c) of this Subpart. Failure to monitor in accordance with the monitoring plan is a monitoring violation.

[2]Effective January 1, 2002.

[3]Failure to monitor will be treated as a monitoring violation for the entire period covered by an annual average where compliance is based on an annual average of monthly or quarterly samples or averages and a system's failure to monitor makes it impossible to determine MCL compliance. If a system fails to complete four consecutive quarters of monitoring, compliance with the MCL will be based on an average of the available data.

[4]If, during the first year of monitoring, any individual quarter's average will cause the annual average of that system to exceed the MCL the system is out of compliance at the end of that quarter.

[5]System may reduce monitoring if at least one year of samples have been collected and the annual average of total THMs is less than or equal to 0.040 mg/L and the annual average of haloacetic acids is less than or equal to 0.030 mg/L. In order to be eligible for reduced monitoring, the source water annual average total organic carbon (TOC) level, before any treatment, must be less than or equal to 4.0 mg/L. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L and 0.045 mg/L for total trihalomethanes and haloacetic acids, respectively. Systems that exceed these levels must resume monitoring at the routine frequency in the quarter immediately following the exceedance.

[6]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) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system. A system must sample at locations identified in a monitoring plan approved by the State.

[7]Effective January 1, 2004. Until then, monitoring of these systems is at State's discretion.

[8]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.

[9]System may switch from routine monitoring to reduced monitoring if at least one year of samples have been collected and the annual average of total THMs is less than or equal to 0.040 mg/L and the annual average of haloacetic acids is less than or equal to 0.030 mg/L. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the result of the sample for the year is no more than 0.060 mg/L and 0.045 mg/L for total trihalomethanes and haloacetic acids, respectively. Systems that exceed these levels must resume quarterly monitoring in the quarter immediately following the exceedance.

[10]The State may allow multiple wells drawing water from a single aquifer to be considered one treatment plant for determining the minimum number of samples required.

[11]System may reduce monitoring if at least one year of samples have been collected and the annual average of total THMs is less than or equal to 0.040 mg/L and the annual average of haloacetic acids is less than or equal to 0.030 mg/L for two consecutive years, or if the annual average of total THMs is less than or equal to 0.020 mg/L and the annual average of haloacetic acids is less than 0.015 mg/L for one year. If a system qualifies for reduced monitoring, the three-year cycle will begin on January 1 following the quarter in which the system qualifies. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the result of the last sample is no more than 0.060 mg/L and 0.045 mg/L for total trihalomethanes and haloaceteric acids, respectively. Systems that exceed these levels must resume yearly monitoring in the year immediately following the exceedance.

Table 9B. Organic Chemicals - POCs, Vinyl Chloride, Methyl-tertiary-butyl-ether (MTBE), UOCs, Propylene Glycol Minimum Monitoring Requirements

Contaminant	Type of water system	Initial requirement[1]	Continuing requirement where detected[1]	Continuing requirement where not detected and vulnerable to contamination[1]	Continuing requirement where not detected and invulnerable to contamination[1]
Principal Organic Contaminants listed on Table 9D and Vinyl chloride and Methyl-tertiary-butyl-ether (MTBE)[7]	Community and Nontransient Noncommunity serving 3,300 or more persons	If not sampled between 1/1/88 and 1/1/92, quarterly sample per source for one year.[5]	Quarterly[2]	Annually[3]	Once every six years[4] for groundwater sources. State discretion[6] for surface water sources.
	Community and Nontransient Noncommunity serving fewer than 3,300 persons	If not sampled between 1/1/88 and 9/30/93, quarterly sample per source for one year.[5]	Quarterly[2]	Annually[3]	Once every six years[4] for groundwater sources. State discretion[6] for surface water sources.
	Noncommunity excluding NTNC	State discretion[6]	State discretion[6]	State discretion[6]	State discretion[6]
Unspecified Organic Contaminants and other POCs not listed on Table 9C or 9D and Propylene glycol	Community and Noncommunity	State discretion[6]	State discretion[6]	State discretion[6]	State discretion[6]

[1]The location for sampling of each groundwater source of supply shall be between the individual well and at or before the first service connection and before mixing with other sources, unless otherwise specified by the State to be at the entry point representative of the individual well. Public water systems which rely on a surface water shall sample at points in the distribution system representative of each source or at an entry point or points to the distribution system after any water treatment plant.

[2]The State may decrease the quarterly monitoring requirement to annually provided that the system is reliably and consistently below the MCL based on a minimum of two quarterly samples from a groundwater source and four quarterly samples from a surface water source. Systems which monitor annually must monitor during the quarter which previously yielded the highest analytical result.

[3]The State may reduce the frequency of monitoring of a groundwater source to once every three years for a public water system which has three consecutive annual samples with no detection of a contaminant.

[4]The State may determine that a public water system is invulnerable to a contaminant or contaminants after evaluating every three years the following factors:

a. Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the State reveals no previous use of the contaminant within the watershed or zone of influence, a waiver can be granted.
b. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver can be granted.
   1. Previous analytical results.
   2. The proximity of the system to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities.
   3. The environmental persistence and transport of the contaminants.
   4. The number of persons served by the public water system and the proximity of a smaller system to a larger system.
   5. How well the water source is protected against contamination, such as whether it is a surface or groundwater system. Groundwater systems must consider factors such as depth of the well, the type of soil, and wellhead protection. Surface water systems must consider watershed protection.

[5]The State may reduce the initial monitoring requirement to one sample if the State determines that the system is invulnerable in accordance with footnote 4.

[6]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.

[7]The initial requirement does not apply to MTBE monitoring

Table 9C. Organic Chemicals - Pesticides, Dioxin, PCBs Minimum Monitoring Requirements

Contaminant		Type of water system	Initial requirement[1,2]	Continuing requirement where detected[2,3,9,10]	Continuing requirement where not detected[2]
Group 1 Chemicals Alachlor Aldicarb Aldicarb sulfoxide Aldicarb sulfone Atrazine Carbofuran Chlordane Dibromochloropropane 2,4-D Endrin Ethylene Dibromide Heptachlor Heptachlor epoxide Lindane Methoxychlor Polychlorinated biphenyls Pentachlorophenol Toxaphene 2,4,5-TP (Silvex)	Group 2 Chemicals Aldrin Benzo(a)pyrene Butachlor Carbaryl Dalapon Di(2-ethylhexyl)adipate Di(2-ethylhexyl)phthalate Dicamba Dieldrin Dinoseb Diquat Endothall Glyphosate Hexachlorobenzene Hexachlorocyclopentadiene 3-Hydroxycarbofuran Methomyl Metolachlor Metribuzin Oxamyl vydate Picloram Propachlor Simazine 2,3,7,8-TCDD (Dioxin)	Community and Nontransient Noncommunity serving 3,300 or more persons[9]	Quarterly sample per source, for one year by 12/31/93[4]	Quarterly	One sample every eighteen months per source[5,6,7]
		Community and Nontransient Noncommunity serving fewer than 3,300 persons and more than 149 service connections	Quarterly samples per entry point, for one year by 12/31/94[5,6,7]	Quarterly	Once per entry point every three years[5,6,7]
		Community and Nontransient Noncommunity serving fewer than 3,000 persons and fewer than 150 service connections	Quarterly samples per entry point for one year by 12/31/95 for Group 1 and 12/31/98 for Group 2[5,6,7]	Quarterly	Once per entry point every three years[5,6,7]
		Noncommunity excluding NTNC	State discretion[8]	State discretion[8]	State discretion[8]

[1]If monitoring data collected after January 1, 1990 are consistent with the requirements of Appendix 5-C then the State may allow systems to use that data to satisfy the initial requirement. Systems serving a population of less than 3,300 persons shall not be required to collect additional quarterly monitoring for a specific contaminant or contaminants, if monitoring for only one quarter prior to October 1, 1993 did not detect the presence of such contaminant or contaminants.
[2]The location for sampling of each groundwater source of supply shall be between the individual well and at or before the first service connection and before mixing with other sources, unless otherwise specified by the State to be at the entry point representative of the individual well. Public water systems which take water from a surface water body or watercourse shall sample at points in the distribution system representative of each source or at entry point or points to the distribution system after any water treatment plant.

[3]The State may decrease the quarterly monitoring requirement to annually provided that system is reliably and consistently below the MCL based on a minimum of two quarterly samples from a groundwater source and four quarterly samples from a surface water source. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result. Systems serving fewer than 3,300 persons and which have three consecutive annual samples without detection may apply to the State for a waiver in accordance with footnote 6.
[4]The State may allow a system to postpone monitoring for a maximum of two years, if an approved laboratory is not reasonably available to do a required analysis within the scheduled monitoring period.
[5]The State may waive the monitoring requirement for a public water system that submits information every three years to demonstrate that a contaminant or contaminants was not used, transported, stored or disposed within the watershed or zone of influence of the system.

[6]The State may reduce the monitoring requirement for a public water system that submits information every three years to demonstrate that the public water system is invulnerable to contamination. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.
Previous analytical results.
The proximity of the system to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Nonpoint sources include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.
The environmental persistence and transport of the pesticide or PCBs.
How well the water source is protected against contamination due to such factors as depth of the well and the type of soil and the integrity of the well casing.
Elevated nitrate levels at the water supply source.
Use of PCBs in equipment used in production, storage or distribution of water.

[7]The State may allow systems to composite samples in accordance with the conditions in Appendix 5-C of this Title.
[8]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.
[9]If a contaminant is detected, repeat analysis must include all analytes contained in the approved analytical method in Appendix 5-C of this Title for the detected contaminant.
[10]Detected as used in the table shall be defined as reported by the State approved laboratory to be greater than or equal to the method detection levels as specified in Appendix 5-C of this Title.

Table 9D. Organic Chemicals - POCs Minimum Monitoring Requirements

Contaminant	Specific Contaminants for analysis	
POCs	Benzene[1]	cis-1,3-Dichloropropene
	Bromobenzene	Trans-1,3-Dichloropropene
	Bromochloromethane	ethylbenzene[1]
	Bromomethane	hexachlorobutadiene
	N-Butylbenzene	Isopropylbenzene
	Sec-Butylbenzene	p-Isopropyltoluene
	Tert-Butylbenzene	Methylene Chloride[1]
	Carbon Tetrachloride[1]	n-Propylbenzene
	Chlorobenzene	Styrene[1]
	Chloroethane	1,1,1,2-Tetrachloroethane
	Chloromethane	1,1,2,2-Tetrachloroethane
	2-Chlorotoluene	Tetrachloroethene[1]
	4-Chlorotoluene	Toluene[1]
	Dibromomethane	1,2,3-Trichlorobenzene
	1,2-Dichlorobenzene[1]	1,2,4-Trichlorobenzene[1]
	1,3-Dichlorobenzene	1,1,1-Trichloroethane[1]
	1,4-Dichlorobenzene[1]	1,1,2-Trichloroethane[1]
	Dichlorodifluoromethane	Trichloroethene[1]
	1,1-Dichloroethane	Trichlorofluoromethane
	1,2-Dichloroethane[1]	1,2,3-Trichloropropane
	1,1-Dichloroethene[1]	1,2,4-Trimethylbenzene
	cis-1,2-Dichloroethene[1]	1,3,5-Trimethylbenzene
	trans-1,2-Dichloroethene[1]	m-Xylene[1]
	1,2-Dichloropropane[1]	o-Xylene[1]
	1,3-Dichloropropane	p-Xylene[1]
	2,2-Dichloropropane	
	1,1-Dichloropropene	

[1]Notification must contain mandatory health effect language.

Table 10. Turbidity Minimum Monitoring Requirements[1]

Contaminant	Source Type		Surface only, surface and groundwater or groundwater directly influenced by surface water
	Type of water system	Groundwater only	
Entry point turbidity	Community	State discretion[2]	Collect and analyze one sample per day from each entry point. All results must be recorded to two significant figures.
	Noncommunity	State discretion[2]	Collect and analyze one sample annually. Monitoring requirement may be increased at State discretion.[2]
Distribution point turbidity	Community	State discretion[2]	Five distribution samples each week unless otherwise determined by the State. No two samples may be obtained on the same day and no two samples are to be collected from the same distribution point during the week.
	Noncommunity	State discretion[2]	State discretion[2]

[1]The requirements of this table apply to unfiltered systems that the State has determined, in writing pursuant to section 5-1.30 of this Subpart, must install filtration. These requirements only apply until filtration is installed.

[2]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.

Table 10A. Turbidity Minimum Monitoring Requirements[1]

Contaminant	Type of water system	Source type	
		Groundwater	Surface water[1]
Filtered water turbidity	Community and Noncommunity	Not applicable	Continuous monitoring for composite filter effluent and individual filters.[2,3,4,5]
Raw water turbidity	Unfiltered surface: Community and Noncommunity	Not applicable	Every four hours or continuous monitoring. [5]
Distribution point turbidity	Community	State discretion [6]	Five distribution samples each week unless otherwise determined by the State. No two samples may be obtained on the same day and no two samples are to be collected from the same distribution point during the same week.
	Noncommunity	State discretion [6]	State discretion [6]

[1]Surface water sources or groundwater sources directly influenced by surface water.

[2]Effective January 1, 2002 systems serving 10,000 or more people must record the results of individual filter monitoring every fifteen minutes, and combined filter effluent every four hours. Effective January 14, 2005 systems serving fewer than 10,000 persons must record the results of individual filter monitoring every fifteen minutes, and combined filter effluent every four hours. Until January 14, 2005, systems serving fewer than 10,000 persons must continuously monitor the composite filter effluent turbidity, or record the turbidity every four hours. The state may allow systems with two filters to monitor the combined filter effluent continuously (recording every 15 minutes) in lieu of monitoring individual filter turbidity. Results of individual filter monitoring must be maintained for at least three years.

[3]If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours instead of continuous monitoring, but for no more than five working days following the failure of the equipment.

[4]For systems using slow sand filtration or filtration treatment, other than conventional treatment, direct filtration or D.E. filtration, the State may reduce sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance.

[5]If a system uses continuous monitoring, it must use the turbidity values recorded every four hours to determine if a treatment technique violation occurs, unless the State has approved in writing a different time interval.

[6]State discretion shall mean requiring monitoring when the State has reason to believe the MCL has been violated, the potential exists for an MCL violation or the contaminant may present a risk to public health.

Table 11 Microbiological Minimum Monitoring Requirements (Refer to Table 11B following any positive samples) [1,2,3,4]

Contaminant	Type of water system	Number of samples based on population			
		Population Served	**Minimum number of Samples per month**[4]	**Population Served**	**Minimum number of Samples per month**[4]
Total coliform in distribution system[5]	Community	Up to 1,000[6]	1	59,001 to 70,000	70
		1,001 to 2,500	2	70,001 to 83,000	80
		2,501 to 3,300	3	83,001 to 96,000	90
		3,301 to 4,100	4	96,001 to 130,000	100
		4,101 to 4,900	5	130,001 to 220,000	120
		4,901 to 5,800	6	220,001 to 320,000	150
		5,801 to 6,700	7	320,001 to 450,000	180
		6,701 to 7,600	8	450,001 to 600,000	210
		7,601 to 8,500	9	600,001 to 780,000	240
		8,501 to 12,900	10	780,001 to 970,000	270
		12,901 to 17,200	15	970,001 to 1,230,000	300
		17,201 to 21,500	20	1,230,001 to 1,520,000	330
		21,501 to 25,000	25	1,520,001 to 1,850,000	360
		25,001 to 33,000	30	1,850,001 to 2,270,000	390
		33,001 to 41,000	40	2,270,001 to 3,020,000	420
		41,001 to 50,000	50	3,020,001 to 3,960,000	450
		50,001 to 59,000	60	3,960,001 or more	480
	Noncommunity using surface water or groundwater directly influenced by surface water	All	Same as community		
	Noncommunity using only groundwater not directly influenced by surface water	≤1,000 >1,000	Quarterly Same as community		
Escherichia coli (E. coli)	Community and Noncommunity	All	Any routine or repeat samples that are Coliform positive must be analyzed for ***E. coli.***[4]		
Fecal Indicator in Raw Source Water[7]	All ground water systems unless providing 4-log virus treatment and process compliance monitoring	All	State discretion[8]		

[1]Public water systems must collect total coliform samples at sites which are representative of water throughout the distribution system and throughout the reporting period according to a written monitoring plan which is subject of State review and revision as described in subdivision 5-1.51(c) of this Subpart.
[2]Public water systems using surface water or groundwater directly influenced by surface water, and which do not provide filtration, must collect and analyze at least one sample for total coliforms near the first service connection each day the turbidity level of the raw water exceeds 1.49 NTU. This sample shall be collected within 24 hours. Results of this sample must be included in determining compliance with the Maximum Contaminant Level (MCL) of total coliforms in Table 6 of this section.

Table 11 (cont.)

[3]Samples taken to determine disinfection practices after pipe repair, replacement, etc. are not to be used for determining MCL compliance for total coliforms in Table 6 of this section.

[4]See Table 11B for repeat sampling requirements following any total coliform or ***E. Coli*** positive samples.

[5]If chlorine or chloramines are used as the disinfectant, a chlorine residual determination shall be made at the same time and location that the sample is collected for total coliform analysis. Monitoring for heterotrophic bacteria may be substituted for free chlorine residuals. A heterotrophic plate count result equal to or less than 500 colonies per milliliter is considered to be equivalent to a measurable free chlorine residual.

[6]The State may, in writing, reduce the monitoring frequency to quarterly for a community water system serving 1,000 or fewer persons if the system has no history of total coliform contamination and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and the system and groundwater source are free of sanitary defects. Systems that have been granted a disinfection waiver are not eligible for reduced monitoring frequency.

[7]Fecal indicators include ***Escherichia coli (E. coli),*** enterococci, and coliphage. Only ***E. coli*** testing will be required, unless otherwise directed by the State.

[8]State discretion shall mean that monitoring is required when the State has reason to believe the Maximum Contaminant Level or Treatment Technique (MCL/TT) has been violated, the potential exists for an MCL/TT violation or the contaminant may present a risk to public health.

Table 11A. Microbiological/Filtration Avoidance Criteria Minimum Monitoring Requirements[1]

Contaminant[2]	Type of water system	Population served	Minimum number of samples per week[3,4]
Raw water fecal or total coliform	Community and Noncommunity	Up to 500	1
		501 to 3,300	2
		3,301 to 10,000	3
		10,001 to 25,000	4
		25,001 or more	5

[1]The monitoring requirement applies to surface water sources and groundwater sources directly influenced by surface water.
[2]Either fecal or total coliform density measurements are acceptable. If both analyses are performed, the fecal coliform results will take precedence.
[3]Monitoring sampling must be performed on separate days.
[4]Samples must be taken and analyzed every day the system serves water to the public and the turbidity of the raw water exceeds 1.49 NTU. The samples count toward the weekly sampling requirement.

Table 11B Repeat Microbiological Sampling Requirements following Total Coliform Positive and/or Fecal Indicator Positive Sample(s) [1]

Type of Positive Sample	Type of Water System/Source	System Size	Number of Repeat Samples Required within 24 hours of notification	Sampling Location	Required action for positive repeat samples
Routine total coliform sample(s) from distribution system positive	Surface water, GWUDI[2], or ground water performing 4-log virus treatment and process compliance	More than one service connection	Four distribution system samples	The same sampling site where the original coliform-positive sample was collected, one sample within five service connections upstream, one sample within five service connections downstream and one sample taken at random in the distribution system.	Distribution sampling must be repeated until total coliform is not detected in repeat samples or it is determined that the MCL has been violated.[3]
		One service connection	One distribution system sample[4]	Original sampling location	
	Ground water system or ground water source not providing (or not documenting) 4-log virus treatment[5]	Population >1,000	Four distribution system samples and source water sample(s) collected in accordance with a State-approved sampling plan[6]	The same distribution system sampling site where the original coliform-positive sample was collected, one sample within five service connections upstream, one sample within five service connections downstream and one sample taken at random in the distribution system. An additional sample must be collected from each raw water source or according to State approved sampling plan.[6,7]	Distribution sampling must be repeated until total coliform is not detected in repeat samples or it is determined that the MCL has been violated.[3]
		Population ≤ 1,000 and more than one service connection	Four samples, three at specified locations in the distribution system and one sample to characterize raw water quality. Additional raw water samples according to approved sampling plan if multiple sources are in use. [5, 8]	The same distribution system sampling site where the original coliform-positive sample was collected, one sample within five service connections upstream, and one sample within five service connections downstream. A fourth sample can be taken at random in the distribution system or collected from a single raw water source. An additional sample must be collected from each raw water source or according to State approved sampling plan.[6,7, 8]	
		One service connection	One distribution system sample and source water sample(s) in accordance with a State-approved sampling plan[4,6,8]	Original sampling location. An additional sample must be collected from each raw water source or according to State approved sampling plan.[6,7, 8]	
		Wholesale System of any size	After notification by consecutive system of total coliform-positive sample[6, 7, 9, 11]	Collect one raw water sample at each source or in accordance with a State-approved sampling plan.[6, 7, 9]	As directed by State[10]
Source water sample(s) fecal indicator positive[7, 10]	Ground water system or ground water source not providing or not documenting 4-log virus treatment	All	Five raw water samples for fecal indicator or immediate corrective action as directed by State[6, 9, 11]	Fecal indicator sampling from source or sources with initial fecal indicator positive samples[6, 7]	As directed by State[10, 11]

Table 11B (cont.)

[1]After any total coliform positive sample from the distribution system, the system must collect repeat samples on the same day and within 24 hours of being notified.

[2]GWUDI = Ground Water Under the Direct Influence of surface water

[3]The month following repeat sample collection, the system must collect a minimum of five routine distribution system samples. The State may waive, in writing, the requirement to collect five routine samples the next month the system provides water to the public, if the State carries out an onsite visit before the end of the next month and the State determines why the sample was total coliform positive and establishes that the system has corrected the problem. The State cannot waive the requirement to collect five routine samples solely on the basis that all the repeat samples were total coliform negative. Before the end of the next month the system serves water to the public, at least one routine sample to determine compliance with the MCL must be collected by the system as required in Table 11. If the State determines that the system has corrected the problem that allowed the total coliform contamination and if all repeat samples were total coliform negative, only the routine samples will be required the following month.

[4]The sample may be collected in four (4) bottles of equal sample volume taken consecutively from the same tap, or a single bottle four (4) times the minimum sample volume. If ***E. coli*** is used as the fecal indicator at a ground water system, a single sample of three (3) times the minimum sample volume or three (3) bottles of minimum required sample volume may be collected consecutively from the tap and the fourth sample collected from the raw water source. This source water sample result must be used to determine compliance with all Table 6 requirements.

[5]If a consecutive system purchasing (or otherwise obtaining) ground water from a wholesale system has a total coliform-positive sample from the distribution system, the system must notify the wholesale system and collect distribution system repeat samples as specified in Table 11B within 24 hours. The wholesale system must collect raw source water sample(s) unless the system provides 4-log virus treatment at peak flow before or at the first customer as confirmed through process compliance monitoring.

[6]Sampling plan requirements are given in subdivision 5-1.51 (c) of this Subpart.

[7]Fecal indicators include ***E. coli,*** enterococci and coliphage. Sampling for fecal indicators other than ***E.coli*** is at State discretion**.**

[8]A system with a single well may collect a single raw water sample to serve as both a distribution repeat sample to replace the “at random” location sample and a raw water sample taken following a routine total coliform positive sample, if ***E. coli*** is used as the fecal indicator**.** If this dual-purpose source water sample is collected, the sample result must be used to determine compliance with all Table 6 requirements.

[9]Wholesale system source water sampling requirements are in addition to distribution system sampling requirements for consecutive systems.

[10]In the event of a fecal indicator positive sample from the raw source water, the state must be notified immediately and may require immediate corrective action. In no case will notification be later than 24 hours as described in paragraph 5-1.78(d)(4) of this Subpart.

[11]If a ground water wholesale system does not perform 4-log virus treatment and process compliance monitoring, and has a fecal indicator positive sample from a raw source water, the system must notify any consecutive systems as well as any of its own customers.

Table 12. Radiological Minimum Monitoring Requirements

Contaminant	Type of water system	Monitoring Requirement[1]	
		Initial	**Reduced monitoring[2,3]**
Combined Ra-226 and Ra-228, uranium and gross alpha particle activity	Community	Four consecutive quarterly samples at every entry point before December 31, 2007.[4,5,6]	One sample every nine years at every entry point when monitoring results are below the detection limit.[7,8] One sample every six years at every entry point when monitoring results are at or above the detection limit but below half of the MCL.[7,8] One sample every three years at every entry point when monitoring results are above half of the MCL but at or below the MCL.[7,8]
	Noncommunity	Not applicable	
Beta particle and photon radioactivity from manmade radionuclides	Community systems designated by the State as vulnerable[9]	Quarterly samples for beta particle and annual samples for tritium and Sr-90, beginning within one quarter after being notified by the State.[10,11]	If the gross beta particle activity minus the naturally occurring K-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the State may reduce the frequency of monitoring at that sampling point to once every 3 years.[14,15]
	Community systems designated by the State as utilizing waters contaminated by effluents from nuclear facilities[9]	Quarterly samples for beta emitters and I-131 and annual samples for tritium and Sr-90, beginning within one quarter after being notified by the State.[10,11,12,13]	If the gross beta particle activity minus the naturally occurring K-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L (screening level), the State may reduce the frequency of monitoring at that sampling point to once every 3 years.[14,15]

[1]All radiological samples must be collected at every entry point to distribution system (EPTDS).
[2]The State may allow systems to reduce the frequency of monitoring based on initial monitoring or historical results as noted in footnote 4 below.
[3]Systems on a reduced monitoring schedule must perform quarterly sampling if a sample result exceeds the MCL.
[4]The State may allow historical monitoring data collected between June 2000 and December 8, 2003 for systems with;

(1) only one entry point to the distribution system;
(2) multiple entry points and having appropriate historical monitoring data for each entry point to the distribution system;
(3) appropriate historical data for a representative point in the distribution system, provided that the State finds that the historical data satisfactorily demonstrate that each entry point to the distribution system is expected to be in compliance based upon the historical data and reasonable assumptions about the variability of contaminant levels between entry points.

[5]The State may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.
[6]If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at the sampling point until the system has results from four consecutive quarters that are at or below the MCL.
[7]A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed 5 pCi/l. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/l. The gross alpha measurement shall have a confidence interval of 95 % (1.65σ, where σ is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, ½ the detection limit can be used to substitute to radium-226 and determine compliance for future monitoring frequency.
[8]Radium-228 measurement can not be substituted by the gross alpha particle activity result.
[9]For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring the systems entry point(s), where the State determines that such data is applicable.
[10]Systems already designated by the State must continue to sample until the State reviews and either reaffirms or removes the designation.
[11]Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples
[12]Annual monitoring for Sr-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples.
[13]For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.
[14]Systems must collect all samples for beta emitters, tritium and strontium-90 during the reduced monitoring period.
[15]A system that exceeds the gross beta particle activity minus the naturally occurring potassium-40 beta particle screening level (50 pCi/L for vulnerable systems or 15 pCi/L for systems utilizing waters contaminated by effluents from nuclear facilities), must further analyze the sample for the major radioactive constituents. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations in mg/L by a factor of 0.82

Table 13 - REQUIRED NOTIFICATIONS

Contaminant/Situation (Subpart 5-1 citations)	**Single sample exceeds MCL/MRDL[1]**	**MCL/MRDL/TT[1] violation**	**Failure to meet monitoring requirements and/or failure to use applicable testing procedure**
Public Health Hazard (section 5-1.1(bc))[2]	Not applicable	State Tier 1	State Tier 1
Escherichia coli (E. coli) in distribution system (section 5-1.52 tables 6, 11 and 11B)	[3]State Not applicable, or [4]Tier 1	State Tier 1	State [5]Tier 3, or Tier 1
E. coli or other fecal indicator detected in ground water source at system not providing both 4-log virus treatment and process compliance monitoring (section 5-1.52 tables 6, 11 and 11B)	[2,3, 5, 6]Tier 1	[6]Tier 1	State [2, 5, 7]Tier 3, or Tier 1
Total coliform in distribution system (section 5-1.52 tables 6, 11 and 11B)	Not applicable	[8]State [9]Tier 2, or Tier 1	State Tier 3, or Tier 2 as directed by State
Entry Point Turbidity monthly average (section 5-1.52 tables 4 and 10)	[10]State	State Tier 2	State Tier 3
Entry Point Turbidity two day average (section 5-1.52 tables 4 and 10)	State	State [11]Tier 2, or Tier 1	State Tier 3
Raw Water Turbidity (subdivision 5-1.30(d) and section 5-1.52 table 10A)	State	State [11]Tier 2, or Tier 1	State Tier 3
Filtered Water Turbidity Single exceedance of the maximum allowable Turbidity level (section 5-1.52 tables 4A and 10A)	State	State [11]Tier 2, or Tier 1	State Tier 3
Filtered Water Turbidity Treatment Technique violation (section 5-1.52 tables 4A and 10A)	Not applicable	State Tier 2	State Tier 3

Table 13 (cont.)

Contaminant/Situation (Subpart 5-1 citations)	**Single sample exceeds MCL/MRDL[1]**	**MCL/MRDL/TT[1] violation**	**Failure to meet monitoring requirements and/or failure to use applicable testing procedure**
Distribution Point Turbidity (section 5-1.52 tables 5, 10 and 10A)	Not applicable	State Tier 2	State Tier 3
[12, 13]Treatment Technique violations other than turbidity (subdivisions 5-1.12, 5-1.30 and 5-1.71(d))	Not applicable	State [2, 13]Tier 2, or Tier 1	State [13]Tier 3
[14]Free chlorine residual less than 0.2 mg/L at the entry point (subdivision 5-1.30(d))	Not applicable	State	Not applicable
[15]Free chlorine residual less than required minimum for a ground water system or ground water source required to provide 4-log virus treatment (subdivision 5-1.30(a))	Not applicable	State [9]Tier 2, or Tier 1	Tier 2
Inorganic chemicals and physical characteristics listed in Tables 8A and 8B (section 5-1.52 tables 1, 8A, and 8B)	State	State Tier 2	State Tier 3
Chloride, iron, manganese, silver, sulfate, and zinc (section 5-1.52 tables 1 and 8D)	Not applicable	State Tier 3	State Tier 3
Sodium (section 5-1.52 tables 1 and 8D)	State if the level exceeds 20 mg/L	Tier 2 if the level exceeds 270 mg/L	Tier 3
Nitrate, Nitrite, Total Nitrate and Nitrite (section 5-1.52 tables 2 and 8C)	State	State Tier 1	State [16]Tier 1, or Tier 3
Lead and Copper (sections 5-1.40 to 1.49)	Not applicable	State Tier 2	State Tier 3
Organic Chemicals Group 1 and 2 (section 5-1.52 table 9C)	State	State Tier 2	State Tier 3

Table 13 (cont.)

Contaminant/Situation (Subpart 5-1 citations)	**Single sample exceeds MCL/MRDL1**	**MCL/MRDL/TT1 violation**	**Failure to meet monitoring requirements and/or failure to use applicable testing procedure**
Principal Organic Contaminants Unspecified Organic Contaminants Total POCs and UOCs (section 5-1.52 tables 3, 9B and 9D)	State	State Tier 2	State Tier 3
Radiological Contaminants (section 5-1.52 tables 7 and 12)	State	State Tier 2	State Tier 3
Monitoring and Control of Disinfection Byproduct Precursors (section 5-1.60 to 5-1.64)	Not applicable	State Tier 2	State Tier 3
Disinfectant residuals Chlorine and Chloramine (section 5-1.52 tables 3A and 15)	State	State Tier 2	State Tier 3
Disinfectant residual Chlorine dioxide At entry point (section 5-1.52 tables 3A and 15)	State	State Tier 2	State [17]Tier 3, or Tier 2
Disinfectant residual Chlorine dioxide In distribution system (section 5-1.52 tables 3A and 15)	State	State [18]Tier 1	State [18]Tier 1
Disinfection byproducts Trihalomethanes Haloacetic acids (section 5-1.52 tables 3 and 9A) and Bromate and Chlorite (section 5-1.52 tables 1 and 8B)	Not applicable	State Tier 2	State Tier 3

Table 13 (cont.)

Contaminant/Situation (Subpart 5-1 citations)	**Single sample exceeds MCL/MRDL[1]**	**MCL/MRDL/TT[1] violation**	**Failure to meet monitoring requirements and/or failure to use applicable testing procedure**
Acrylamide and Epichlorohydrin (subdivision 5-1.51(j))	Not applicable	State Tier 2	Not applicable
Operation under a variance or exemption	Not applicable	Tier 3	Not applicable
Violation of conditions of a variance or exemption	Not applicable	State Tier 2	Not applicable
Disruption of water service of four hours or more (subdivision 5-1.23(b))	Not applicable	[19]State	Not applicable

[1]MCL-maximum contaminant level, MRDL-maximum residual disinfectant level, TT-treatment technique

[2]Community systems must describe in their annual water supply statement (5-1.72(e)), prepared in accordance with section 5-1.72(f), any Public Health Hazard that is determined to be a violation, or any uncorrected significant deficiency, and indicate whether corrective action is completed. This notice must be repeated every year until the annual report documents that corrective action is completed in accordance with section 5-1.22 of this Subpart.

[3]State notification must be made by the supplier of water within 24 hours of learning of an ***E. coli*** positive sample.

[4]Public notification normally does not have to be issued for an ***E. coli*** positive sample prior to the results of the repeat samples. However, there may be situations where the State determines that a Tier 1 notification is necessary to protect the public health. The supplier of water must provide the Tier 1 notification no later than 24 hours after learning of the State's determination.

[5]Failure to test for ***E. coli*** requires a Tier 1 notification if testing is not done after any repeat sample tests positive for coliform. All other ***E. coli*** monitoring and testing procedure violations require Tier 3 notification.

[6]At a ground water system, Tier 1 notification is required after initial detection of ***E. coli*** or other fecal indicator in raw source water, if system does not provide 4-log virus treatment and process compliance monitoring. Confirmation of ***E. coli*** or other fecal indicator in the source water requires Tier 1 notification. Failure to take confirmatory samples may be a public health hazard requiring Tier 1 notification.

[7]Notice of the fecal indicator positive raw water sample must be made in the annual water supply statement (5-1.72(e)), until the annual report documents that corrective action is completed.

Table 13 (cont.)

[8]State notification must be made by the supplier of water within 24 hours of learning of the violation.

[9]Tier 2 notification is normally required, however, there may be situations where the State determines that a Tier 1 notification is necessary to protect the public health. The supplier of water must provide the Tier 1 notification no later than 24 hours after learning of the State's determination.

[10]If the daily entry point analysis exceeds one NTU, a repeat sample must be taken as soon as practicable and preferably within one hour. If the repeat sample exceeds one NTU, the supplier of water must make state notification.

[11]Systems must consult with the State within 24 hours after learning of the violation. Based on this consultation, the State may subsequently decide to elevate the violation from a Tier 2 to a Tier 1 notification. If consultation does not take place within the 24-hour period, the water system must distribute a Tier 1 notification no later than 48 hours after the system learns of the violation.

[12]These violations include the following: failure to comply with the treatment technique or monitoring requirements in section 5-1.30(a), (b), (c), and (g) of this Subpart; failure to comply with the avoidance criteria in section 5-1.30(c) of this Subpart; and failure to install filtration or disinfection treatment facilities required by section 5-1.30 of this Subpart; failure to report to the state information required in section 5-1.72(c)(3) of this Subpart; and failure to maintain records required in section 5-1.72(c)(7) of this Subpart.

[13]Any significant deficiency that is not corrected or where correction has not begun according to a State-approved corrective action plan within 120 days, or as directed by the State, is a treatment technique violation and must be addressed in accordance with the requirements in section 5-1.12. If the deficiency is a public health hazard, the deficiency must be addressed as directed by the State and Tier 1 notification is required.

[14]Applies to systems that have surface water or groundwater directly influenced by surface water as a source and use chlorine. The system must make State notification whether the residual was restored to at least 0.2 mg/L within four hours.

[15]Required minimum chlorine residual at point that demonstrates adequate CT for disinfected water from ground water sources at first customer.

[16]Failure to take a confirmation sample within 24 hours for nitrate or nitrite after an initial sample exceeds the MCL requires a Tier 1 notification. Other monitoring violations for nitrate or nitrite require a Tier 3 notification.

[17]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 requires a Tier 2 notification. Other monitoring violations for chlorine dioxide at the entrance to the distribution system require a Tier 3 notification.

[18]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 the day after the MRDL is exceeded at the entry point also triggers Tier 1 notification.

[19]Tier 1 notification is required if the situation meets the definition of a public health hazard.

Table 14A
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 0.5 Degrees Celsius or Lower[1]

Free chlorine residual (mg/L)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	137	163	195	237	277	329	390
0.6	141	168	200	239	286	342	407
0.8	145	172	205	246	295	354	422
1.0	148	176	210	253	304	365	437
1.2	152	180	215	259	313	376	451
1.4	155	184	221	266	321	387	464
1.6	157	189	226	273	329	397	477
1.8	162	193	231	279	338	407	489
2.0	165	197	236	286	346	417	500
2.2	169	201	242	297	353	426	511
2.4	172	205	247	298	361	435	522
2.6	175	209	252	304	368	444	533
2.8	178	213	257	310	375	452	543
3.0	181	217	261	316	382	460	552

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 14B
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 5.0 Degrees Celsius[1]

Free chlorine residual (mg/L)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	97	117	139	166	198	236	279
0.6	100	120	143	171	204	244	291
0.8	103	122	146	175	210	252	301
1.0	105	125	149	179	216	260	312
1.2	107	127	152	183	221	267	320
1.4	109	130	155	187	227	274	329
1.6	111	132	158	192	232	281	337
1.8	114	135	162	196	238	287	345
2.0	116	138	165	200	243	294	353
2.2	118	140	169	204	248	300	361
2.4	120	143	172	209	253	306	368
2.6	122	146	175	213	258	312	375
2.8	124	148	178	217	263	318	382
3.0	126	151	182	221	268	324	389

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 14C
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 10.0 Degrees Celsius[1]

Free chlorine residual (mg/L)	pH						
	≤6.0	**6.5**	**7.0**	**7.5**	**8.0**	**8.5**	**≤9.0**
≤0.4	73	88	104	125	149	177	209
0.6	75	90	107	128	153	183	218
0.8	78	92	110	131	158	189	226
1.0	79	94	112	134	162	195	234
1.2	80	95	114	137	166	200	240
1.4	82	98	116	140	170	206	247
1.6	83	99	119	144	174	211	253
1.8	86	101	122	147	179	215	259
2.0	87	104	124	150	182	221	265
2.2	89	105	127	153	186	225	271
2.4	90	107	129	157	190	230	276
2.6	92	110	131	160	194	234	281
2.8	93	111	134	163	197	239	287
3.0	95	113	137	166	201	243	292

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 14D
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 15.0 Degrees Celsius[1]

Free chlorine residual (mg/L)	pH						
	≤6.0	**6.5**	**7.0**	**7.5**	**8.0**	**8.5**	**≤9.0**
≤0.4	49	59	70	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	64	76	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	60	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 14E
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 20.0 Degrees Celsius[1]

Free chlorine residual (mg/L)	pH						
	≤6.0	**6.5**	**7.0**	**7.5**	**8.0**	**8.5**	**≤9.0**
≤0.4	36	44	52	62	74	89	105
0.6	38	45	54	64	77	92	109
0.8	39	46	55	66	79	95	113
1.0	39	47	56	67	81	98	117
1.2	40	48	57	69	83	100	120
1.4	41	49	58	70	85	103	123
1.6	42	50	59	72	87	105	126
1.8	43	51	61	74	89	108	129
2.0	44	52	62	75	91	110	132
2.2	44	53	63	77	93	113	135
2.4	45	54	65	78	95	115	138
2.6	46	55	66	80	97	117	141
2.8	47	56	67	81	99	119	143
3.0	47	57	68	83	101	122	146

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 14F
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 25.0 Degrees Celsius and Higher[1]

Free chlorine residual (mg/L)	pH						
	≤6.0	**6.5**	**7.0**	**7.5**	**8.0**	**8.5**	**≤9.0**
≤0.4	24	29	35	42	50	59	70
0.6	25	30	36	43	51	61	73
0.8	26	31	37	44	53	63	75
1.0	26	31	37	45	54	65	78
1.2	27	32	38	46	55	67	80
1.4	27	33	39	47	57	69	82
1.6	28	33	40	48	58	70	84
1.8	29	34	41	49	60	72	86
2.0	29	35	41	50	61	74	88
2.2	30	35	42	51	62	75	90
2.4	30	36	43	52	63	77	92
2.6	31	37	44	53	65	78	94
2.8	31	37	45	54	66	80	96
3.0	32	38	46	55	67	81	97

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature, and at the higher pH.

Table 14G
CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Chlorine Dioxide and Ozone[1,2]

	Degrees Celsuis					
	≤1	**5**	**10**	**15**	**20**	**≥25**
Chlorine dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.48

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

[2]The use of these alternative disinfectants shall be approved in accordance with the provisions of section 5-1.22 of this Section.

Table 15 Entry Point Disinfectant Monitoring Frequency for Systems Using Chemical Disinfection[1]

Water System Source Type	Population served	Samples per day[4]
Surface Water or Ground Water under the Direct Influence of Surface Water (GWUDI)[2, 3]	Up to 500	1
	501 - 1,000	2
	1,001 - 2,500	3
	2,501 - 3,300	4
	> 3,300	Continuous monitoring required[5]
Ground Water System or ground water source required to provide 4-log virus treatment and process compliance monitoring [6, 7, 8]	≤ 3,300	1[9]
	> 3,300	Continuous monitoring required[5]
Ground Water System or ground water source with other than 4-log virus treatment	Any	1[9]

[1]See also Table 15A for distribution system disinfectant residual sampling locations and frequency depending on disinfectant used.

[2]If at any time chlorine residual concentration falls below 0.2 mg/L at the entry point for a surface water or GWUDI system, the system must collect and analyze a grab sample every four hours until the chlorine residual concentration is again equal to or greater than 0.2 mg/L.

[3]Entry point samples collected at Surface Water or GWUDI systems

[4]The day's grab samples may not be conducted at the same time.

[5]If there is a failure in the continuous monitoring equipment, grab samples, every four hours, may be conducted in lieu of continuous monitoring, but for no more than five working days (fourteen working days for ground water systems) following the failure of the equipment.

[6]If at any time the disinfectant concentration at a ground water system falls below the minimum required in the process compliance monitoring plan approved by the State, the system must collect and analyze a grab sample every four hours until the disinfectant residual concentration is again at or above minimum required levels, without exceeding other applicable concentration requirements in Table 3A.

[7]Any ground water system required to provide 4-log virus treatment because of fecal contamination of the source or because of significant deficiencies in system operation, and using chemical disinfection, must demonstrate minimum disinfectant residual at a location that demonstrates adequate concentration to provide the required treatment at the first customer during peak flow according to the sampling plan developed for the system. These samples to confirm the minimum disinfection residual are to be collected at the frequency in this table.

[8]Lowest daily concentration must be recorded on operation report.

[9]A minimum of one disinfectant residual concentration must be recorded on operation report every day.

Table 15A
Disinfectant Residual Minimum Distribution System Monitoring Requirements for Systems Using Chemical Disinfection

Disinfectant	Type of Water System	Routine Monitoring
Chlorine Chloramines	Community and Nontransient Noncommunity	Sample at the same time and same points in the distribution system as total coliform sampling[1]
Chlorine Dioxide[2]	Community, Nontransient Noncommunity and Transient Noncommunity	Daily sample at the entrance to the distribution system[3]

[1]Community Water Systems using surface water or ground water under the direct influence of surface water may use heterotrophic plate count results of equal to or less than 500 colonies per milliliter as equivalent to a free chlorine residual as outlined in table 11, footnote 5, in lieu of taking separate samples for disinfection residuals

[2]Monitoring is required if chlorine dioxide is used for either oxidation or disinfection.

[3]If the Maximum Residual Disinfectant Level (MRDL) of 0.8 mg/L is exceeded, the system must take three samples in the distribution system on the following day. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used and there are no rechlorination stations, the system must take 3 samples as close to the first customer as possible, at intervals of at least 6 hours. If chlorine is used and there is a rechlorination station, the system must take one sample as close to the first customer as possible, one sample representing average residence time, and one sample representing maximum residence time.

Table 16. Additional Contaminants for which Reporting is Required Pursuant to 5-1.72 (e)-(h) of this Subpart

Contaminant Name	
2,4-dinitrotoluene	2-methyl-1-phenol
2,6-dinitrotoluene	Alachlor ESA
DCPA monoacid	1,2-diphenylhydrazine
DCPA di acid	Diazinon
4,4'-DDE	Disulfoton
EPTC	Fonofos
Molinate	Terbufos
MTBE	Aeromonas Hydrophilia
Nitrobenzene	Polonium-210
Terbacil	RDX
Acetochlor	Algae and toxins
Perchlorate	Echoviruses
Diuron	Coxsackie viruses
Linuron	Helicobacter pylori
Prometon	Microsporidia
2,4,6-trichlorophenol	Caliciviruses
2,4-dichlorophenol	Adenoviruses
2,4-dinitrophenol	Lead – 210
	Napthalene

Table 17. Information Collection Rule Contaminant Reporting Requirements

Contaminant	Reporting Requirements for Finished Water
Total Trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform)	Report as a group if detected
Haleocetic Acids (mono-, di-, and trichloroacetic acid, and mono- and di-bromoacetic acid)	Report as a group if detected
Haloacetilenitriles (dichloro-, trichloro-, bromochloro-, and dibromoacetonitrile)	Report as a group if detected
Haloketones (1,1-dichloropropanone and 1,1,1-trichloropropanine)	Report as a group if detected
Chloropicrin	Reporting required if detected
Chloral Hydrate	Reporting required if detected
Total Organic Halides	Reporting required if detected
Disinfectant Residual	Reporting required if detected
Cyanogen Chloride	Report if detected and treatment plant uses Chloramines
Chlorate	Report if detected and treatment plant uses Hypochlorite Solutions
Bromate, Aldehydes	Report if detected and treatment plant uses Ozone
Chlorine Dioxide residual, Chlorite, Chlorate, Bromate, Aldehydes	Report if detected and treatment plant uses Chlorine Dioxide
Total Coliforms	Report if detected
Fecal Coliforms or ***Escherichia coli***	Report if detected
Giardia	Report if detected
Total Culturable Viruses	Report if detected

Monitoring and Control of Disinfection Byproduct Precursors

5-1.60 Applicability. (Effective Date: May 26, 2004)

Surface water systems or systems using ground water under the direct influence of surface water that are community or nontransient noncommunity systems and use conventional filtration treatment must operate with enhanced coagulation to achieve the total organic carbon (TOC) percent removal levels specified in section 5-1.63 of this Subpart, unless the system meets the alternative compliance criteria described in section 5-1.62 of this Subpart. Systems serving 10,000 or more people must comply with this requirement beginning January 1, 2002. Systems serving fewer than 10,000 people must comply with this requirement beginning January 1, 2004.

5-1.61 Monitoring requirements for disinfection byproduct precursors. (Effective Date: May 26, 2004)

Surface water systems and systems using ground water under the direct influence of surface water that are community or nontransient noncommunity systems and use conventional filtration treatment must monitor each treatment plant for TOC. Samples to be analyzed for TOC must be collected no further downstream than the point of combined filter effluent turbidity monitoring and representative of the treated water. TOC monitoring shall be conducted in accordance with the system's monitoring plan described in subdivison 5-1.51 (c) of this Subpart. These same systems must also monitor for TOC in the source water prior to any treatment at the same time as they are monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired TOC sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality. Systems monitoring for TOC 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 TOC sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC is greater than or equal to 2.0 mg/L.

5-1.62 Alternative compliance criteria for enhanced coagulation. (Effective Date: May 26, 2004)

Systems may use one of the following alternative compliance criteria instead of enhanced coagulation:

(a) The system's source water TOC level is less than or equal to 2.0 mg/L, calculated quarterly as a running annual average.

(b) The system's treated water TOC level is less than or equal to 2.0 mg/L, calculated quarterly as a running annual average.

(c) The system's source water SUVA, prior to any treatment and measured monthly, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(d) The system's treated water SUVA, measured monthly, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(e) The system's source water TOC level is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity is greater than 60 mg/L (as CaCO3), calculated quarterly as a running annual average; and the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively. Alternatively, the system's source water TOC level is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity is greater than 60 mg/L (as CaCO3), calculated quarterly as a running annual average; and prior to the effective date for compliance, the system has made a clear and irrevocable financial commitment to use technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the State for approval not later than the effective date for compliance in section 5-1.60 of this Subpart. These technologies must be installed and operating not later than June 16, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation.

(f) 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.

Systems using the alternative compliance criteria stated in this section must still comply with the monitoring requirements stated in section 5-1.61 of this Subpart.

5-1.63 Enhanced coagulation performance requirements. (Effective Date: May 26, 2004)

Systems must achieve the percent reduction of TOC specified in subdivision (a) of this section (Step 1) between the source water and the combined filter effluent, unless the State approves a system's request for alternate minimum TOC removal (Step 2) requirements, which are provided in subdivision (d) of this section.

(a) Required (Step 1) TOC reductions, which are provided in the following table, are based upon specified source water TOC and alkalinity levels:

(Step 1) Required Removal of TOC by Enhanced Coagulation for Surface Water Systems or Systems Using Ground Water Under the Direct Influence of Surface Water that Use Conventional Filtration Treatment			
Source Water TOC (mg/L)	Source Water Alkalinity		
	0-60 mg/L as $CaCO_3$(percent removal required)	>60-120 mg/L as $CaCO_3$(percent removal required)	>120 mg/L as $CaCO_3$(percent removal required)
>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

(b) Systems that must comply with the requirements contained in subdivision (a) of this section must calculate compliance using the method provided in either paragraph (1) of this subdivision or the applicable provisions of paragraph (2) of this subdivision.

(1) Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) determine actual monthly TOC percent removal, equal to: (1 - (treated water TOC/source water TOC)) X 100;

(ii) determine the required monthly TOC percent removal from either subdivision (a) or (d) of this section;

(iii) divide the value in subparagraph (i) of this paragraph by the value in subparagraph (ii) of this paragraph;

(iv) add together the results of subparagraph (iii) of this paragraph for the last 12 months and divide by 12;

(v) if the value calculated in subparagraph (iv) of this paragraph is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(2) Systems may use the provisions in subparagraphs (i) through (iii) of this paragraph instead of the calculations in paragraph (1) of this subdivision to determine compliance with TOC percent removal requirements.

(i) In any month that the system's treated or source water TOC level is less than or equal to 2.0 mg/L, the system may assign a monthly value of 1.00 (instead of the value calculated in paragraph (1) of this subdivision) when calculating compliance under the provisions of subdivision (a) of this section.

(ii) In any month that the system's source water SUVA, prior to any treatment, is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.00 (instead of the value calculated in paragraph (1) of this subdivision) when calculating compliance under the provisions of subdivision (a) of this section.

(iii) In any month that the system's finished water SUVA is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.00 (instead of the value calculated in paragraph (1) of this subdivision) when calculating compliance under the provisions of subdivision (a) of this section.

(c) Systems that cannot achieve the (Step 1) TOC removals required by subdivision (a) of this section due to water quality parameters or operational constraints must apply to the State, within three months of failure to achieve the TOC removals required by (Step 1), for approval of alternate minimum TOC removal (Step 2) requirements, described in subdivision (d) of this section. Until the State approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the (Step 1) TOC removals contained in subdivision (a) of this section.

(d) Alternate minimum TOC removal (Step 2) requirements. Applications made to the State by enhanced coagulation systems for approval of alternate minimum TOC removal (Step 2) requirements must include, as a minimum, results of bench- or pilot-scale testing conducted using the methodology prescribed in paragraph (1) of this subdivision to determine the alternate enhanced coagulation level. Applications for alternate minimum TOC (Step 2) requirements must be approved by the State before they can replace the previous (Step 1)

TOC removal requirements. The alternate TOC removal is determined by the method described in paragraphs (1) through (5) of this subdivision.

(1) The alternate minimum TOC removal is the percentage of TOC removed at the point where an incremental addition of 10 mg/L of alum, or equivalent amount of iron coagulant (ferric salt), results in a TOC removal of ≤0.3 mg/L. This TOC removal percentage is then defined as the minimum TOC removal required for the system. Once approved by the State, this minimum TOC removal requirement supersedes the minimum TOC (Step 1) removal required by the table in subdivision (a) of this section. This requirement will be effective until such time as the State approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve State-set alternative minimum TOC removal levels is a violation.

(2) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum, or equivalent amounts of iron coagulant, 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

(3) For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added, or equivalent addition of iron coagulant, is reached.

(4) The system may operate at any coagulant dose or pH necessary (consistent with the State Sanitary Code) to achieve the minimum TOC percent removal approved under paragraph (1) of this section.

(5) If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply for a waiver of enhanced coagulation requirements.

Operation and Quality Control

5-1.70 Applicability. (Effective Date: November 9, 2011)

Sections 5-1.70 through 5-1.79 of this Subpart shall be applicable to all public water systems, provided the systems serve 15 or more service connections or serve 25 or more persons. Subdivisions 5-1.71 (c) and (d), subdivision 5-1.72 (c), and paragraph 5-1.78(a)(4) apply to all public water systems.

5-1.71 Protection and supervision of public water systems. (Effective Date: November 9, 2011)

(a) The supplier of water and the person or persons operating a public water system shall exercise due care and diligence in the maintenance and supervision of all sources of the public water systems to prevent, so far as possible, their pollution and depletion.

(b) The supplier of water and the person or persons operating a water treatment plant or distribution system shall exercise due care and diligence in the operation and maintenance of these facilities and their appurtenances to ensure continued compliance with the provisions of this Subpart. Facilities approved by the State shall be operated in accordance with their design unless otherwise authorized under the provisions of sections 5-1.22, 5-1.23 or 5-1.24 of this Subpart.

(c) If the State notifies the supplier of water that a significant deficiency exists, the supplier of water shall consult with the State within 30 days regarding corrective action. Within 120 days of being notified that a significant deficiency exists (or earlier if the State determines that action is necessary to protect public health), the supplier of water shall correct the significant deficiency or be in compliance with a corrective action plan to correct the deficiency. The corrective action plan must specify appropriate modifications and/or improvements to the existing system or facility as may be necessary to fully conform to the requirements of this Subpart.

(d) Any significant deficiency that is not corrected or where correction has not begun according to a corrective action plan prepared to meet the requirements of this code, within 120 days, or as directed by the State, is a treatment technique violation and must be addressed in accordance with the requirements in section 5-1.12. If the deficiency is a public health hazard, the deficiency must be addressed as directed or approved by the State and Tier 1 notification is required.

5-1.72 Operation of a public water system. (Effective Date: November 9, 2011)

(a) The supplier of water and the person or persons in charge of the operation of a public water system shall operate and maintain the public water system in such a manner to meet the requirements of this Subpart.

(b) The person or persons in charge of operation of a public water system shall be certified pursuant to Subpart 5-4 of this Part.

(c) Complete records shall be kept of the operation of a public water system.

(1) A copy of daily operation records in a format provided or approved by the State shall be sent to the State by the 10th calendar day of the next reporting period. These records shall include the results of all tests, measurements or analysis required to be made by this Subpart or as requested by the State. All operational records shall be available to the State either upon request or in conjunction with periodic sanitary surveys conducted by the State.

(2) Systems using conventional filtration treatment or direct filtration must conduct continuous turbidity monitoring for each individual filter, as described in section 5-1.52 table 10A. Systems must record the results of individual filter monitoring every 15 minutes. Systems must maintain individual filter monitoring results for at least three years. Systems must report to the State that they have conducted individual filter turbidity monitoring within 10 days after the end of each month the system serves water to the public. Systems must report to the State individual filter turbidity measurement results within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the following conditions, except that systems serving fewer than 10,000 persons are not required to comply with subparagraph (ii) of this paragraph:

(i) For any individual filter that has a measured turbidity level of greater than 1.0 Nephelometric Turbidity Units (NTU) in two consecutive measurements taken 15 minutes apart, the system must report the filter identification number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within seven days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and submit the profile to the State, or report the obvious reason for the exceedance.

(ii) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within seven days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and submit the profile to the State, or report the obvious reason for the exceedance.

(iii) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of three consecutive months, the system must report to the State the filter number, the turbidity measurement, and the dates on which the exceedance occurred. In addition, the system must conduct a self-assessment of the filter within 14 days of the exceedance and submit the self-assessment to the State. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(iv) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of two consecutive months, the system must report to the State the filter number, the turbidity measurement, and the dates on which the exceedance occurred. In addition, the system must arrange for the conduct of a comprehensive performance evaluation

(CPE) by the State or a third party approved by the State no later than 30 days following the exceedance, and have the evaluation completed and submitted to the State no later than 90 days following the exceedance.

(3) Systems using conventional filtration treatment or direct filtration treatment must notify the State in writing by December 8, 2003, if the system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the following information:

(i) A plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are reintroduced back into the treatment plant.

(ii) Typical recycle flow in gallons per minute (gpm), the highest observed plant flow experienced in the previous year (gpm), design flow for the treatment plant (gpm), and the State-approved operating capacity for the plant where the State has made such determinations.

(4) Ground water systems and ground water sources that are required to conduct process compliance monitoring to assure the achievement of 4-log virus treatment, must record the lowest treatment performance each day and record the date and duration of any failure to achieve 4-log virus treatment for a period of more than four hours. In the event of failure to achieve required virus treatment, the system shall continue to monitor treatment performance every four hours until the system returns to compliance with minimum performance requirements. The State must be notified of any failure to meet process compliance monitoring requirements as well as any failure to achieve 4-log virus treatment, as soon as possible, but no later than the end of the next business day.

(d) Any supplier of water of a public water system, subject to the provisions of this Subpart, shall retain at a convenient location the following records:

(1) Records of microbiological analyses made pursuant to this Subpart shall be retained for at least five years and records of chemical and turbidity analyses made pursuant to this Subpart shall be retained for at least ten years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, if the following information is included:

(i) the date, place and time of sampling, and the name of the person who collected the sample;

(ii) identification of the sample whether it was a routine distribution point sample, check sample, raw or process water sample or other special purpose sample;

(iii) date of analyses;

(iv) laboratory and person responsible for performing the analysis;

(v) the analytical technique or method used; and

(vi) the results of the analyses.

(2) Records of corrective actions taken by the supplier of water to correct significant deficiencies and/or violations of the requirements of this Subpart shall be retained for at least ten years.

(3) Copies of any written reports, including summaries or communications relating to sanitary surveys of the public water system shall be retained for at least 10 years.

(4) Records concerning a variance or exemption granted to the public water system shall be retained for at least five years following the expiration of such variance or exemption.

(5) Copies of the records or data summaries shall be provided to any consumer of the public water system within 15 days on written request by a consumer. The supplier of water may require prepayment of a fee to cover the cost of handling and reproduction of the records and data summaries requested.

(6) The supplier of water must provide the State with copies of all repeat or special total coliform sample results and all Escherichia coli (E. coli) sample results, within five days of receipt.

(7) Beginning June 8, 2004, systems using conventional filtration treatment or direct filtration that recycle spent backwash water, thickener supernatant or liquids from the de-watering processes must collect the following recycle flow information:

(i) copy of the recycle notification and information submitted to the State in accordance with paragraph (3) of subdivision (c) of this section;

(ii) list of all recycle flows and the frequency with which they are returned;

(iii) average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in minutes;

(iv) typical filter run length and a written summary of how filter run length is determined;

(v) the type of treatment provided for the recycle flow; and

(vi) data on the physical dimensions of the equalization and/or treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used and average dose and frequency of use, and frequency at which solids are removed, if applicable.

(e) Each community water system which serves 15 or more service connections used by year-round residents or regularly serves at least 25 year-round residents shall prepare and provide an annual water supply statement (report) to the customers it serves. The report must contain information on the quality of the water delivered by the system and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner. For the purpose of this subpart, customers are defined as billing units or service connections to which water is delivered by a community water system.

(f) The report shall contain such information as is required in this subdivision and any additional information required by the State, except that paragraph (7) and paragraph (13) subparagraphs (vii) through (xi) of this subdivision shall not apply to systems serving fewer than 1,000 service connections. The information required to be included in the report is described below.

(1) Information on the source of the water delivered. The report must identify the source(s) of the water delivered by the community water system by providing information on:

(i) the type of the water source (e.g., surface water, ground water); and

(ii) the commonly used name (if any) and location of the body (or bodies) of water or aquifer(s).

If the State has completed a source water assessment, the report must notify consumers of the availability of this information and the means to obtain it. The report must include a

brief summary of the system's susceptibility to potential sources of contamination, using language provided by the State.

(2) Definitions for Maximum Contaminant Level, Maximum Contaminant Level Goal, Maximum Residual Disinfectant Level, and Maximum Residual Disinfectant Level Goal. Each report must include the definitions set forth using the following language:

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

(ii) Maximum Contaminant Level (MCL). The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible.

(iii) Maximum Residual Disinfectant Level (MRDL). The highest level of a disinfectant that is allowed in drinking water.

(iv) Maximum Residual Disinfectant Level Goal (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.

(3) Definitions for variances and exemptions. A report for a community water system operating under a variance or an exemption issued under sections 5-1.90-5-1.96 of this Subpart must include the following language: Variances and Exemptions: State permission not to meet an MCL or a treatment technique under certain conditions.

(4) Definitions for action level and treatment technique. A report that includes information on a contaminant that is regulated as a Treatment Technique (i.e., turbidity) or Action Level (i.e., lead, copper) must include one or both of the following statements:

(i) Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

(ii) Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

(5) Information on detected contaminants from sampling used to determine compliance. For the purpose of this subdivision (except ***Cryptosporidium***, ***Giardia***, and radon monitoring), detected means: at or above the contaminant's minimum detection limit (MDL), as specified in Appendix 5-C of this Subpart or as prescribed by the State. Any contaminants specified in sections 5-1.41 (lead and copper) and 5-1.51 of this Subpart and section 5-1.52 tables 8A, 8B, 8C, 8D, 9A, 9B, 9C, 9D, 10, 10A, 11, 11A, 11B, 12, 16 and 17 of this Subpart that are detected during compliance monitoring must be displayed in one table or in several adjacent tables. Additionally, the report shall include detected monitoring results for samples collected and analyzed by the State and/or detected monitoring results of additional samples required by the State. If a system is allowed to monitor for specific contaminants less often than once a year, the table 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. For the contaminants listed in section 5-1.52 tables 8A, 8B, 8C, 8D, 9A, 9B, 9C, 9D, 10, 10A, 11, 11B, 12, 16 and 17 of this Subpart the table(s) must contain:

(i) the State MCL for that contaminant expressed as a number equal to or greater than 1.0;

(ii) the MCLG (as prescribed by the State) for that contaminant expressed in the same units as the MCL;

(iii) if there is no MCL for a detected contaminant, the table must indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the report must include the definitions for treatment technique and/or action level, as appropriate, specified in paragraph 4 of this subdivision;

(iv) for contaminants subject to a MCL, except turbidity and total coliforms, the highest contaminant level used to determine compliance with this Subpart[1] and the range of detected levels, as follows:

(a) 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;

(b) when compliance with the MCL is determined more frequently than annually: the highest average of any of the sampling points used to determine compliance and the range of all sampling points 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: the highest average of any of the sampling points used to determine compliance and the range of all sampling points expressed in the same units as the MCL; and

(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 points the report must include: the average used to determine compliance and the range of detection expressed in the same units as the MCL;

(v) surface water and groundwater under the direct influence systems are required to include information from turbidity monitoring in the report:

(a) turbidity reported pursuant to the requirements of sections 5-1.30 and 5-1.52 table 10 of this Subpart (for systems that must install filtration but have not) include the highest monthly average. The report should include health effects language prescribed by the State;

(b) turbidity reported pursuant to the requirements of subdivision (c) of section 5-1.30 and section 5-1.52 table 10A of this Subpart (for systems that have met the criteria of avoiding filtration) include the highest single measurement found in any one month. The report should include an explanation of the reasons for measuring turbidity; and

(c) turbidity reported pursuant to sections 5-1.30 and 5-1.52 table 10A of this Subpart (for systems that filter and use turbidity as an indicator of filtration performance) include the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in section 5-1.52 table 4A of this Subpart for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity;

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[1]When rounding of results to determine compliance with the MCL is allowed by the regulations, rounding should be done prior to converting the results to the same units presented for the MCL, TT or AL.

(vi) for lead and copper: the 90th percentile value of the most recent round of sampling, the range of detections, and the number of sampling sites exceeding the AL;

(vii) 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;

(viii) for ***E. coli*** detected in the distribution system: the total number of positive samples; and

(ix) the likely source(s) of detected contaminants (as prescribed by the State) shall be reported.

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 report shall include data from each separate distribution system. Alternatively, systems could produce separate reports tailored to include data for each service area. The table(s) must clearly identify any violations of MCLs or TTs and the report must contain a clear and readily understandable explanation of the violation including the duration 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 language prescribed by the State.

(6) Information on non-detected contaminants from sampling used to determine compliance. Analytical test results for the contaminants listed in section 5-1.52 tables 8A, 8B, 8C, 8D, 9A, 9B, 9C, 9D, 10, 10A, 11, 12, 16 and 17 of this Subpart or additional monitoring required by the State which are not detected shall be:

(i) described in the report in a brief narrative; or

(ii) presented in the report as a separate table or list.

(7) Analytical results for source water samples not used to determine compliance. If the analytical results for samples of source(s) of water supply, other than those for ***Cryptosporidium*** or ***Giardia***, used to determine compliance; or listed in section 5-1.52 tables 16 and 17 of this Subpart; are not included in the report, they shall be placed in a supplement to the report.

(8) Information on ***Cryptosporidium***, ***Giardia*** and radon. If the system has performed any monitoring for ***Cryptosporidium***, ***Giardia*** or radon, which indicates that ***Cryptosporidium*** or ***Giardia*** may be present in the source water or the finished water or that radon may be present in finished water, the report must include:

(i) a summary of the following: sampling sites; number of tests per year; testing results; and actions taken in response to those results; and

(ii) an explanation of the significance of the results.

(9) Compliance with the State Sanitary Code. The report must note any violation that occurred during the year covered by the report of a requirement listed below, and include a clear and readily understandable explanation of the violation, any potential adverse health effects related to the violation, and the steps the system has taken to correct the violation:

(i) monitoring and reporting and recordkeeping of compliance data;

(ii) filtration and disinfection prescribed by sections 5-1.30 and 5-1.32 of this Subpart. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report must include language prescribed by the State;

(iii) lead and copper control requirements. The report must include health effects language prescribed by the State for lead, copper, or both for systems which fail to take one or more actions prescribed by sections 5-1.40-5-1.49 of this Subpart;

(iv) the report must include health effects language prescribed by the State for systems which violate the TTs specified in section 5-1.51 of this Subpart for Acrylamide and Epichlorohydrin; and

(v) violation of the terms of a variance, an exemption, or an administrative or judicial order.

(10) Variances and exemptions. If a system is operating under the terms of a variance or an exemption issued under sections 5-1.90-5-1.96 of this subpart the report must contain:

(i) an explanation of the reasons for the variance or exemption;

(ii) the date on which the variance or exemption was issued;

(iii) a brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(iv) a notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

(11) Educational information. The report must contain the language of subparagraph (i) of this paragraph or alternative language approved by the State. The report also must include the language of subparagraphs (ii) through (iv) of this paragraph.

(i) The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include: microbial contaminants; inorganic contaminants; pesticides and herbicides; organic chemical contaminants; and radioactive contaminants.

(ii) In order to ensure that tap water is safe to drink, the State and the EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. The State Health Department's and the FDA’s regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

(iii) Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

(iv) Some people may be more vulnerable to disease causing microorganisms or pathogens in drinking water than the general population. Immuno-compromised

persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care provider about their drinking water. EPA/CDC guidelines on appropriate means to lessen the risk of infection by ***Cryptosporidium***, ***Giardia*** and other microbial pathogens are available from the Safe Drinking Water Hotline (800-426-4791).

(12) Additional health effects statements for arsenic, nitrate, lead, total trihalomethanes, and fluoride:

(i) A system which detects arsenic at levels above 5 ug/l, but less than or equal to the MCL must include in its report a short informational statement about arsenic, using language prescribed by the State.

(ii) A system which detects nitrate at levels above 5 mg/l, but below the MCL must include a short informational statement about the impacts of nitrate on children using language prescribed by the State.

(iii) A system which detects lead above the action level in more than 5%, and up to and including 10% of the sites sampled (or for systems sampling less than 20 sites and even one sample is above the action level) must include a short informational statement about the special impact of lead on children using language prescribed by the State.

(iv) A system using only ground water or using surface water as its source and serving less than 10,000 persons, which detects TTHMs above 80 ug/l, but below 100 ug/l, as an annual average, monitored and calculated as described in Section 5-1.52 Table 3 of this Subpart, must until January 1, 2004, include health effects language prescribed by the State.

(v) A system which detects fluoride at levels above 2 mg/l, but below the MCL must include in its report an informational statement about fluoride, using language prescribed by the State.

(13) Additional information. Each report must also include the items listed below.

(i) the name and address of the community water system and the public water system identification number;

(ii) the name and telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report;

(iii) the telephone number of the county or district health department office which has jurisdiction over the water system;

(iv) information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water;

(v) a brief statement explaining the number of people served by the community water system;

(vi) a brief description of the types of treatment that the water received before entering the distribution system

(vii) for systems that calculate water use of all customers with meters, an accounting of the total annual amount of water withdrawn, delivered, and lost from the system;

(viii) a brief description of any water source restricted, removed from service, or otherwise limited in its use and any actions taken to secure new supplies or replace lost capacity;

(ix) water conservation measures customers can take such as, but not limited to, retrofitting plumbing fixtures, altering irrigation timing, using irrigation sensors, leak detection, proper use of water conserving appliances, daily conscientious use of water, and the estimated savings in water and energy or money from the use of such measures;

(x) a description of any major modification completed by the water system during the reporting period to include a brief description of each and its effect on the water system, and a discussion of capital improvements needed or planned;

(xi) for systems that bill their customers, the report shall include the annual average charge for water, either in annual charge per average resident user or annual charge per one thousand gallons of water delivered; and

(xii) systems may also include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.

(14) Information for non-English speaking residents. In communities with a large proportion of non-English speaking residents, as determined by the State, the report must contain information prescribed by the State in the appropriate language(s) expressing the importance of the report.

(15) Information on unregulated contaminants. If the system was required to monitor for contaminants listed in section 5-1.52 Table 16, the report must identify a person and provide the telephone number to contact for information on the monitoring results.

(16) Water systems are required to include information regarding significant deficiencies as follows:

(i) any significant deficiency that remains uncorrected at the end of the year (December 31) or any other significant deficiency as directed by the State. A description of the significant deficiency must include: the date the significant deficiency was identified by the State; status of corrective action; the completion date if corrective action has been completed; and if corrective action has not been completed, the reason why it has not been completed. Uncorrected significant deficiencies must be reported each year until the annual report documents that corrective action is completed; and

(ii) any failure to take corrective action to correct a significant deficiency in system facilities or operation, including a description of the significant deficiency, the date the significant deficiency was identified by the State, and the reason why corrective action has not been taken.

(17) Ground water systems and systems with ground water sources are also required to include information regarding source sampling and process compliance monitoring as follows:

(i) Report of fecal indicator positive ground water source sample, including: the date the fecal contamination of the source was identified; the likely source of the contamination, if known; the date(s) and status of any corrective action; and potential health effects language prescribed by the State.;

(ii) If required to perform 4-log virus treatment, failure to provide the treatment must be described including date(s) of failure and whether 4-log virus treatment has resumed; and

(iii) If required to perform 4-log virus treatment, failure to meet process compliance monitoring requirements must be described including date(s) of failure and whether the required process compliance monitoring has resumed.

(g) Report delivery and record keeping.

(1) Report distribution to consumers.

(i) Each community water system must mail or otherwise directly deliver one copy of the report to each bill-paying customer by the date specified in subdivision (h).

(ii) The system must make a good faith effort to reach consumers who do not get water bills, using methods prescribed by the State.

(iii) Each community water system serving 100,000 or more people must post the current year's report to a publicly-accessible site on the Internet.

(iv) Each community water system must make its reports available to the public upon request.

(v) If a supplement is prepared in accordance with subdivision (f) paragraph (7) of this section, the report must contain a statement that describes that the analytical results for source water samples not used to determine compliance are contained in a supplement and that the supplement is available to the customer on request. The supplement shall also be:

(a) published in a notice at least one-half page in size, in one newspaper of general circulation within the water district;

(b) made available on the Internet, along with supplements from the two prior years, if such prior supplements exist, and notice of the availability of such information on the Internet shall be clearly provided on the report and on each billing statement; or

(c) made available at all New York State documents information access centers, documents reference centers, documents depository libraries and documents research depository libraries within the water district and if no such libraries exist within the water district at a public library within the water district, and notice of the availability of the supplement at such library or libraries shall be clearly provided on the report and on each billing statement.

Such supplement need not be included in the copy of the report mailed or directly delivered to each bill-paying customer.

(2) Report distribution to state agencies.

(i) No later than the date the system is required to distribute the report to its customers, each community water system must mail one copy of the report and one copy of the supplement, if prepared, to the Commissioner of the State Health Department and the county or district health department office which has jurisdiction over the water system. The system must also deliver (by the first of September) to these two agencies a certification that the report has been distributed to customers, and that the

information is correct and consistent with the compliance monitoring data previously submitted to the state.

(ii) No later than the date the system is required to distribute the report to its customers, each community water system serving 1,000 or more service connections must deliver a copy of the report and a copy of the supplement, if prepared to the Commissioner of Environmental Conservation.

(iii) Investor-owned community water systems regulated by the Public Service Commission (PSC) shall also deliver a copy of the report and a copy of any supplement prepared, to that agency.

(3) Recordkeeping requirements. Any system subject to this Subpart must retain copies of the report for no less than three years.

(h) Applicable dates.

(1) All community water systems must deliver a copy the report, to its bill-paying customers and take good faith efforts to reach consumers who do not get water bills on or before May 31st of each year.

(2) Each community water system serving 100,000 or more people must post their current year's report on a publicly accessible site on the Internet by May 31st of each year.

(3) All community water systems must deliver a copy of the report and a copy of the supplement, if prepared, to the required regulatory agencies on or before May 31st of each year.

(4) A new community water system, must deliver its first report to its customers and a copy of the report and the supplement, if prepared to the required regulatory agencies by May 31st of the year after its first full calendar year in operation and annually thereafter.

(5) A community water system that sells water to another community water system, must deliver the applicable information required in paragraphs (f)(1), (5)-(10) and (13) of this section to the buyer system:

(i) by April 1st of each year; or

(ii) on a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

(6) By September 1st, each community water system must mail a copy of the certification form to the State Health Department and the county or district health department office which has jurisdiction over the water system.

5-1.73 Water treatment plant laboratory. (Effective Date: May 27, 1998)

Every supplier of water shall provide or have available environmental laboratory facilities approved by ELAP. Tests for the control of the operation of such public water system shall be made daily or more frequently as required by the State. The results of such tests shall be recorded on forms pursuant to section 5-1.72(d) of this Subpart.

5-1.74 Approved laboratories. (Effective Date: November 9, 2011)

(a) For determining compliance with the Subpart, results of analyses may be considered only if they have been performed by an environmental laboratory approved in accordance with Subpart 55-2 of this Title of the administrative rules and regulations of the State (10 NYCRR Part 55, Subpart 55-2). However, measurements for pH, temperature, conductivity, turbidity, disinfectant residual, alkalinity, calcium, orthophosphate, bromide, chlorite, total organic carbon (TOC) concentration, dissolved organic carbon concentration, ultraviolet (UV) absorption, and silica may be performed by any person with a demonstrated ability to perform these analyses.

(b) The owner of a water system shall require the approved environmental laboratory performing the analyses to send laboratory results directly to the department and in a manner prescribed by the department.

5-1.75 Additional sampling requirements. (Effective Date: July 3, 1991)

(a) Additional water samples for any contaminant shall be collected and analyzed from any public water system by the supplier of water as may be required by the State, to assure control of the quality of the public water system.

(b) The State may collect and analyze water samples from any public water system at any time, either by its own personnel or by contract with others.

5-1.76 Consecutive public water systems. (Effective Date: November 9, 2011)

(a) When a public water system supplies water to one or more consecutive public water systems, the State may modify the monitoring requirements of this Subpart when the circumstances justify treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule approved by the State, in accordance with the provisions of sections 5-1.51 and 5-1.52 of this Subpart.

(b) Consecutive systems must follow section 5-1.52 Table 11B of this Subpart in the event of a total coliform positive sample from their distribution system. When a consecutive system that receives ground water from a wholesale system is notified of a positive total coliform sample result, the consecutive system must, within 24 hours, notify the State, the wholesale system and any other wholesale system that owns and/or operates ground water sources that provides water used by the consecutive system. If all the water provided by the consecutive system has been subject to 4-log virus treatment and process compliance monitoring, notification by the consecutive system about the total coliform sample is not required.
After notification, the wholesaler must, within 24 hours, test its raw water source(s) for fecal indicator organism(s) in accordance with section 5-1.52 Table 11B of this Subpart at the location(s) specified in the monitoring plan described in section 5-1.51 of this Subpart.

5-1.77 State notification. (Effective Date: November 9, 2011)

(a) The supplier of water shall make State notification within 24 hours of learning of the existence or potential existence of a public health hazard, or within 48 hours for any other violation or situation that may pose a risk to public health. Section 5-1.52 table 13 of this Subpart lists violations and situations that require State notification.

(b) The information provided in a State notification shall include, but not be limited to, the following:

(1) a description of the violation or situation, including the contaminant of concern, and (as applicable) the contaminant level;

(2) when the violation or situation occurred;

(3) what the system is doing to correct the violation or situation; and

(4) when the water system expects to return to compliance.

(c) Ground water systems and ground water sources that complete corrective action to correct significant deficiencies or address fecal contamination of a ground water source must notify the state within 30 days of the completion of the action.

5-1.78 Public Notification (Effective Date: November 9, 2011)

(a) General public notification requirements. Each owner or operator of a public water system must provide public notification for public health hazards, and for all MCL, MRDL, treatment technique, monitoring and testing procedure violations, and for other situations posing a risk to public health. Public notification requirements are divided into three tiers to take into account the seriousness of the violation or situation and any potential adverse health effects that may be involved. The form, manner, frequency, and other requirements for each tier are described in subdivisions (c)-(e) of this section. Section 5-1.52 table 13 of this Subpart lists the required public notification (Tier 1, Tier 2, or Tier 3) for specific violations and other situations posing a risk to public health.

(1) Public water systems that sell or otherwise provide drinking water to other public systems (i.e. to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notification to the persons it serves.

(2) If a public water system can show that a violation in a portion of the distribution system is physically or hydraulically isolated from other parts of the distribution system, then with written permission from the State the system may limit the notice to only persons served by that portion of the system that is out of compliance.

(3) The public water system, within 10 days of completing the public notification requirements under this Subpart for the initial public notification and any repeat notices, must submit to the State a certification that it has fully complied with the public notification regulations. The public water system must include with this certification a representative copy of each type of notice distributed, published, posted, and made available to the persons served by the system and to the media. Copies of public notices and certificates issued pursuant to this paragraph must be kept by the supplier of water for three years after issuance.

(4) Public notification is required when a significant deficiency is identified at a public water system that is not required to prepare an annual water supply statement (report), as directed in sections 5-1.72 (e) and (f) of this subpart. If the water system has been notified by the State of a significant deficiency and it has not been corrected as directed or approved by the State, the system must notify its customers in a format prescribed or

approved by the State. Notice must be provided if any significant deficiency has not been corrected within 12 months of State notification or as otherwise directed by the State. The system must continue to inform the public until the significant deficiency is corrected.

(b) Content, presentation, and standard language requirements for all public notifications.

(1) When a public water system has a violation or a situation posing a risk to public health, other than operating under a variance or exemption, the public notification must include the following elements:

(i) a description of the violation or situation, including the contaminant of concern, and (as applicable) the contaminant level;

(ii) when the violation or situation occurred;

(iii) any potential adverse health effects from the violation or situation, including the standard language under subparagraph (4)(i) or (ii) of this subdivision, whichever is applicable;

(iv) the population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;

(v) whether alternative water supplies should be used;

(vi) what actions consumers should take, including when they should seek medical help, if known;

(vii) what the system is doing to correct the violation or situation;

(viii) when the water system expects to return to compliance;

(ix) the phone number of the water system owner, operator, or designee of the public water system as a source of additional information concerning the notice;

(x) the phone number of the county or district health department which has jurisdiction over the water system; and

(xi) a statement included in notices distributed by mail or direct delivery to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under subparagraph (b)(4)(iii) of this section.

(2) When a public water system operates under a variance or exemption, each public notice must include the following elements:

(i) an explanation of the reasons for the variance or exemption;

(ii) the date on which the variance or exemption was issued;

(iii) a brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(iv) a notice of any opportunity for public input in the review of the variance or exemption.

(3) Notice presentation. Each public notice required by this section:

(i) must be displayed in a conspicuous way (where applicable);

(ii) must not contain overly technical language or very small print;

(iii) must not be formatted in a way that defeats the purpose of the notice;

(iv) must not contain language which nullifies the purpose of the notice; and

(v) must contain information for non-English speaking consumers, where appropriate.

For systems serving a large proportion of non-English speaking consumers, as determined by the State, the notice must contain information prescribed by the State in the appropriate language(s) expressing the importance of the notice.

(4) Standard Language.

(i) Mandatory health effects language must be included in the notification for MCL and MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption. The mandatory health effects language will be developed by the Department and provided to the supplier of water by the State.

(ii) Standard language for monitoring and testing procedure violations. Public water systems must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in section 5-1.52 table 13 of this Subpart: We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During (compliance period), we "did not monitor or test" or "did not complete all monitoring or testing" for (contaminant(s)), and therefore cannot be sure of the quality of your drinking water during that time.

(iii) Standard language to encourage distribution of the public notice to all persons served, when the notice is distributed by mail or direct delivery: Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

(c) Tier 1 notification requirements (public health hazards, as defined in subdivision 5-1.1 (bc) of this Subpart, require Tier 1 notification). The supplier of water must:

(1) provide public notification no later than 24 hours after the system learns of a public health hazard;

(2) initiate consultation with the State no later than 24 hours after the public water system learns of the public health hazard, and comply with any additional notification requirements established as a result of the consultation (including using additional forms of delivery for the initial notification, the duration of the posted notices, or any repeat notices);

(3) notify by telephone the chief administrative or elected official of the city, village or town, wherein the public water system is located, and the local law enforcement department having jurisdiction in the area served by the public water system, that a public health hazard exists. If there is a potential for the public health hazard to cross political boundaries, all potentially impacted chief administrative or elected officials and local law enforcement departments in the political subdivisions, served by the public water system, must also be notified; and

(4) provide the notice in a form and manner reasonably calculated to reach all persons served (including residential, transient, and non-transient users) in the required time period. Water systems are to use one or more of the following forms of delivery:

(i) appropriate broadcast media (such as radio and television);

(ii) posting of the notice in conspicuous locations throughout the area served by the water system;

(iii) hand delivery of the notice to persons served by the water system; or

(iv) another delivery method approved in writing by the State

(d) Tier 2 notification requirements (section 5-1.52 table 13 of this Subpart lists violations and situations that require Tier 2 notification).

(1) The supplier of water must provide public notification no later than 30 days after the system learns of a violation or situation that requires Tier 2 notification. If the public water system corrects the violation within 30 days, the State may allow additional time for the initial notice of up to three months from the date the system learns of the violation.

(2) The supplier of water must repeat the notice every three months as long as the violation or situation persists. If the public notice is posted, the notice must remain in place as long as the violation or situation persists, but in no case less than seven days.

(3) For the turbidity violations or exceedances specified in subparagraphs (i)-(iii) of this paragraph, the supplier of water must consult with the State no later than 24 hours after the public water system learns of the violation or exceedance to determine whether a Tier 1 notification is required to protect public health. When consultation does not take place within the 24 hour period, the water system must distribute a Tier 1 notification no later than 48 hours after the system learns of the violation or exceedance. Consultation with the State is required for:

(i) a violation of the two day average maximum allowable turbidity at the entry point pursuant to section 5-1.52 table 4 of this Subpart;

(ii) a violation resulting from a single exceedance of the maximum allowable turbidity for filter effluent pursuant to section 5-1.52 table 4A of this Subpart; and

(iii) a single raw water turbidity exceedance of 5 NTU for systems operating under the avoidance criteria in subdivision 5-1.30(c) of this Subpart.

(4) Consultation with the State is required within 24 hours after a ground water system or ground water source learns of any of the following:

(i) A fecal indicator positive sample from the source(s) as specified in section 5-1.52 table 6 of this subpart;

(ii) A significant deficiency that is considered to constitute a public health hazard; or

(iii) Failure of 4-log virus treatment by the water system that is not resolved within four hours.

The State will determine whether Tier 1 notification is required to protect public health. When consultation does not take place within the 24-hour period, the water system must distribute Tier 1 notification no later than 48 hours after the system learns of the violation or exceedance.

(5) The supplier of water must provide the notice in a form and manner reasonably calculated to reach all persons served in the required time period.

(i) Unless directed otherwise by the State in writing, community water systems must provide notice by: mail or other direct delivery to each customer receiving a bill, and to other service connections to which water is delivered by the public water system; and by any other method reasonably calculated to reach other persons regularly served by the system if they would not normally be reached by mail or direct delivery.

(ii) Unless directed otherwise by the State in writing, non-community water systems must provide notice by posting the notice in conspicuous locations, and by any other method(s) reasonably calculated to reach other persons served by the system if they would not normally be reached by posting.

(e) Tier 3 notification requirements (section 5-1.52 table 13 of this Subpart lists violations and situations that require Tier 3 notification).

(1) The supplier of water for community and non-transient noncommunity water systems must provide public notification no later than one year after the system learns of a violation or situation that requires Tier 3 notification. The supplier of water for transient noncommunity water systems must provide public notification no later than 30 days after the system learns of a violation or situation that requires Tier 3 notification. If the public water system operates seasonally, the public notification must also be provided before the system closes for the season.

(2) The supplier of water must repeat the notice annually for as long as the violation or situation persists. If the public notice is posted, the notice must remain in place as long as the violation or situation persists, but in no case less than seven days.

(3) The supplier of water may use a single public notice for multiple violations or situations that require Tier 3 notification, as long as the timing requirements of paragraph (1) of this subdivision are met. Community water systems may use the annual water supply statement (report) (see subdivisions 5-1.72(e) - (h) of this Subpart) to provide Tier 3 notification.

(4) The supplier of water must provide the initial notice and any repeat notices in a form and manner reasonably calculated to reach all persons served in the required time period.

(i) Unless directed otherwise by the State in writing, community water systems must provide notice by: mail or other direct delivery to each customer receiving a bill, and to other service connections to which water is delivered by the public water system; and by any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by mail or direct delivery.

(ii) Unless directed otherwise by the State in writing, non-community water systems must provide notice by posting the notice in conspicuous locations, and by any other method(s) reasonably calculated to reach other persons served by the system if they would not normally be reached by posting.

(f) Notice to new billing units or new customers. Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

(g) Information on unregulated contaminants. Nontransient noncommunity water systems that are required to monitor for contaminants listed in section 5-1.52 table 16, must post a notice that identifies a person and telephone number to contact for information on the monitoring results. The notice must be posted in conspicuous locations and no later than 12 months after the results are known.

(h) Notice by the State on behalf of the public water system. The State may make public notification if the State determines that the public's interest will be best served, or if the State determines that the supplier of water is not acting or cannot act in a timely manner. The State may charge and collect from the supplier of water the cost of making such notification. However, the supplier of water remains legally responsible for ensuring that the requirements of this section are met.

5-1.79 Multiple distribution systems. (Effective Date: January 6, 1993)

A water supply system or facility with multiple distribution systems on separate sources of water supply shall be considered a single public water system if all the following conditions are met:

(a) the separate sources are the same source type, with:

(1) the ground water sources located in the same aquifer area; or

(2) the surface water intakes located in the same water body and the intakes at the same approximate depth and location;

(b) the water supply system or facility is owned and operated by the same person(s);

(c) the water supply system or facility is operated for the same purposes and for the same time period; and

(d) the water supply system or facility serves 25 or more people or 15 or more service connections.

Variances and Exemptions

5-1.90 Variance from a maximum contaminant level. (Effective Date: May 27, 1998)

(a) The supplier of water may request, and the department may grant, one or more variances from an MCL contained in sections 5-1.51 and 5-1.52 tables 1, 3, 5 and 7 of this Subpart to any public water system based on a finding that:

(1) because of characteristics of the raw water sources which are reasonably available to it, the public water system cannot meet the requirements respecting such MCL despite application of the best available technology, treatment techniques or other means which are generally available, taking costs into consideration; and

(2) the granting of a variance will not result in an unreasonable risk to health.

(b) At the time of the granting of the variance, the department shall prescribe, and the supplier of water shall follow, a schedule for:

(1) compliance, including increments of progress, to meet each MCL covered by the variance; and

(2) implementation of such control measures as the department may require.

(c) The supplier of water may request and the department may grant a variance from the MCL for total coliform if the supplier of water demonstrates that the violation of the total coliform MCL is the result of a persistent growth of total coliform in the distribution system and not the result of fecal or pathogenic contamination, a treatment lapse or deficiency or a problem in the operation and maintenance of the distribution system.

5-1.91 Variance from required use of any specified treatment technique. (Effective Date: November 1, 2006)

(a) The supplier of water may request, and the department may grant, one or more variances from any treatment technique requirement, except filtration and disinfection, in accordance with section 5-1.30(b), (c) and (g) of this Subpart on a finding that such treatment technique is not necessary to protect the health of persons served by the public water system because of the raw water source or sources of such system.

(b) As a condition to the grant of a variance under subdivision (a) of this section, the supplier of water shall perform monitoring and other requirements as prescribed by the department.

(c) Notwithstanding subdivisions (a) and (b) of this section, section 5-1.30 of this Subpart shall govern the conditions under, and the manner which, a waiver of mandatory disinfection treatment for a ground water source may be granted.

(d) The technologies listed in this section are the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for organic chemicals listed in section 5-1.52 table 3 of this Subpart:

BEST AVAILABLE TECHNOLOGIES (BATs)

Contaminant	Best Available Technologies		
	PTA[1]	GAC[2]	OX[3]
Benzene	x	x	
Carbon tetrachloride	x	x	
1,2-Dichloroethane	x	x	
Trichloroethylene	x	x	
para-Dichlorobenzene	x	x	
1,1-Dichloroethylene	x	x	
1,1,1-Trichloroethane	x	x	
Vinyl chloride	x		
cis-1,2-Dichloroethylene	x	x	
1,2-Dichloropropane	x	x	
Ethylbenzene	x	x	
Monochlorobenzene	x	x	
o-Dichlorobenzene	x	x	
Styrene	x	x	
Tetrachloroethylene	x	x	
Toluene	x	x	
trans-1,2-Dichloroethylene	x	x	
Xylenes (total)	x	x	
Alachlor		x	
Aldicarb		x	
Aldicarb sulfoxide		x	
Aldicarb sulfone		x	
Atrazine		x	
Carbofuran		x	
Chlordane		x	
Dibromochloropropane	x	x	
2,4-D		x	
Ethylene dibromide	x	x	
Heptachlor		x	
Heptachlor epoxide		x	
Lindane		x	
Methoxychlor		x	
PCBs		x	
Pentachlorophenol		x	
Toxaphene		x	
2,4,5-TPBenzo(a)pyrene		x	
Dalapon		x	
Dichloromethane	x		
Di(2-ethylhexyl)adipate	x	x	
Di(2-ethylhexyl)phthalate		x	
Dinsoeb		x	
Endothal		x	
Endrin		x	

Glyphosate			x
Hexachlorobenzene		x	
Hexachlorocyclopentadiene	x	x	
Oxamyl (Vydate)		x	
Picloram		x	
Simazine		x	
1,2,4-Trichlorobenzene	x	x	
1,1,2-Trichloroethane	x	x	
2,3,7,8-TCDD (Dioxin)		x	
TTHMs		x[4]	
HAAs		x[4]	

[1]Packed Tower Aeration
[2]Granular Activated Carbon
[3]Oxidation (Chlorination or Ozonation)
[4]GAC10, as defined in section 5-1.1 of this Subpart. The other best available technology for TTHM and HAA MCL compliance is enhanced coagulation for TTHM and HAA precursor removal, as described in section 5-1.60 of this Subpart.

(e) The following are the best technologies, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the inorganic chemicals and radionuclides listed in section 5-1.52 table 1 and 7 of this Subpart:

Chemical Name	**Best Available Technologies**
Antimony	2,7
Arsenic[5]	1,2,5,6,7,9,13[6]
Asbestos	2,3,8
Barium	5,6,7,9
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,6[2],7
Cyanide	5,7,10
Fluoride	1,7
Mercury	2[1],4,6[1],7[1]
Nickel	5,6,7
Nitrite	5,6,9
Nitrate	5,7
Selenium	1,2[3],6,7,9
Thallium	1,5
Gross alpha	7
Combined radium (226 and 228)	5,6,7
Uranium	5,6,7,12[4]
Beta particle and photon activity	5,7

[1]BAT only if influent Hg concentrations $\leq$10 ug/L.
[2]BAT for Chromium III only.
[3]BAT for Selenium IV only.
[4]Assumes that the system already has coagulation/filtration in place.
[5]BATs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.
[6]To obtain high removals, iron to arsenic ratio must be at least 20:1.

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

(f) The following are the affordable technologies, treatment techniques, or other means available to systems serving 10,000 persons or fewer for achieving compliance with the MCL for arsenic as listed in section 5-1.52 table 1 of this Subpart:

Small system compliance technology[1]	**Affordable for listed small system categories[2]**
Activated Alumina (centralized)	All size categories
Activated Alumina (Point-of-Use)[3]	All size categories
Coagulation/Filtration[4]	501-3,300, 3,301-10,000
Coagulation-assisted Microfiltration	501-3,300, 3,301-10,000
Electrodialysis reversal[5]	501-3,300, 3,301-10,000
Enhanced coagulation/filtration	All size categories
Enhanced lime softening (pH > 10.5)	All size categories
Ion Exchange	All size categories
Lime Softening[4]	501-3,300, 3,301-10,000
Oxidation/Filtration[6]	All size categories
Reverse Osmosis (centralized)[5]	501-3,300, 3,301-10,000
Reverse Osmosis (Point-of-Use)[3]	All size categories

[1]Small System Compliance Technologies for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.
[2]The Act (ibid.) specifies three categories of small systems: (i) those serving 25 or more, but fewer than 501, (ii) those serving more than 500, but fewer than 3,301, and (iii) those serving more than 3,300, but fewer than 10,001.
[3]When point-of-use or point-of-entry devices are used for compliance, programs to ensure proper long-term operation, maintenance, and monitoring must be provided by the water system to ensure adequate performance.
[4]Unlikely to be installed solely for arsenic removal. May require pH adjustment to optimal range if high removals are needed.
[5]May not be appropriate for areas where water quantity may be an issue.
[6]To obtain high removals, iron to arsenic ratio must be at least 20:1.

(g) The community water systems and nontransient noncommunity water systems must install and/or use any treatment method identified in subdivisions (d) and (e) of this section as a condition for granting a variance except as provided in subdivision (h) of this section. If after

the system's installation of the treatment method, the system cannot meet the MCL, that system shall be eligible for a variance.

(h) If a system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment methods identified in subdivisions (d) and (e) of this section would only achieve a de minimis reduction in contaminants, the State may issue a schedule of compliance that requires the system being granted the variance to examine other treatment methods as a condition of obtaining the variance.

(i) If the State determines that a treatment method identified in subdivision (g) of this section is technically feasible, the State may require the stem to install and/or use that treatment method in connection with a compliance schedule. The State's determination shall be based upon studies by the system and other relevant information.

5-1.92 Exemption from a maximum contaminant level or any treatment technique requirement. (Effective Date: May 27, 1998)

(a) The supplier of water may request, and the department may grant, one or more exemptions from any treatment technique requirement, except for disinfection of a surface water source, and/or any MCL, except for total coliform or Escherichia coli (E. coli). Exemptions may be granted to any public water system based on a finding that:

(1) because of compelling factors which may include economic factors, the public water system is unable to comply with such MCL or treatment technique requirement;

(2) the public water system was in operation on the effective date of such MCL or treatment technique requirement; and

(3) the granting of an exemption will not result in an unreasonable risk to health.

(b) Exemptions, if granted, will be issued with a mandatory compliance strategy to include but not be limited to the following:

(1) a specific time which to achieve compliance, including increments of progress to meet the MCL or treatment technique covered by the exemption;

(2) control measures as the department may require to ensure the public health; and

(3) appropriate modifications and/or improvements to the existing system or facility as may be necessary for the system or facility to fully conform to the requirements of this Subpart.

(c) Such schedule prescribed by the department pursuant to subdivision (b) of this section shall require compliance with each MCL or treatment technique requirement no later than twelve months after the issuance of the exemption.

(d) The final date for compliance provided in any schedule in the case of any exemption may be extended by the State for a period not to exceed three years after the date of the issuance of the exemption if the public water system establishes that:

(1) the system cannot meet the standard without capital improvements which cannot be completed within the period of such exemption;

(2) in the case of a system which needs financial assistance for the necessary improvements, the system has entered into an agreement to obtain such financial assistance; or

(3) the system has entered into an enforceable agreement to become a part of a regional public water system and the system is taking all practical steps to meet the standard.

(e) In the case of a system which does not serve more than 500 service connections and which needs financial assistance for the necessary improvements, an exemption granted under paragraph (a)(1) or (2) of this section may be renewed for one or more additional two-year periods if the system establishes that it is taking all practical steps to meet the requirements of subdivision (a) of this section.

5-1.93 Variance or exemption requests. (Effective Date: March 11, 1992)

(a) All requests for a variance or an exemption shall be in a form prescribed by and submitted in writing to the department. Suppliers of water may submit a joint request for variances or exemptions when they seek similar variances or exemptions under similar circumstances. The department shall act on any request for a variance or an exemption submitted pursuant to section 5-1.90, 5-1.91 or 5-1.92 of this Subpart within 90 days of receipt of the request.

(b) Requests for exemptions to the filtration requirements outlined in section 5-1.30(b) of this Subpart must be made by June 29, 1992, except for systems with ground water sources determined to be directly influenced by surface water. For systems with ground water sources directly influenced by surface water the request for an exemption must be submitted no later than six months after notification of the determination of direct influence. Before an exemption to a filtration requirement can be granted, the supplier of water must demonstrate to the department that the granting of the exemption will not pose an unreasonable risk to public health and that the system is in compliance with sections 5-1.30(c)(5), (c)(8), (g) and 5-1.52 tables 3, 6, 9, and 11 of this Subpart.

(c) Systems with unfiltered surface water sources or ground water sources directly influenced by surface water must have a disinfection capability that achieves at least 99 percent inactivation of ***Giardia lamblia*** cysts before an exemption to a filtration requirement can be granted.

5-1.94 Notice and opportunity for public hearing. (Effective Date: May 27, 1998)

(a) Before a variance proposed to be granted by the department under section 5-1.90 or 5-1.91 of this Subpart may take effect, the department shall provide notice and opportunity for public hearing on the proposed variance. A notice given pursuant to the preceding sentence may cover the granting of more than one variance and a hearing held pursuant to such notice shall include each of the variances covered by the notice.

(b) Before a compliance or implementation schedule prescribed by the department pursuant to the granting of a variance under section 5-1.90 of this Subpart or an exemption under section 5-1.92 of this Subpart may take effect, the department shall provide notice and opportunity for public hearing on the proposed compliance or implementation schedule, or both. A notice given pursuant to the preceding sentence may cover the proposal of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(c) Public notice of an opportunity for hearing pursuant to subdivision (a) or (b) of this section shall be circulated in a manner designated to inform potentially interested persons of the proposed action. Requests for hearing must be submitted to the department within 15 days after issuance of such public notice.

(d) Notice of public hearings to be held pursuant to request submitted by an interested person or on the department's own motion shall be given not less than 15 days before the time scheduled for the hearing, in a form and manner to be prescribed by the department. Notices of public hearing shall be circulated in a manner designed to inform interested persons of the hearing.

(e) If no timely request for hearing is submitted and the department does not determine to hold a public hearing on his own motion, the proposed variance or schedule prescribed pursuant to the granting of a variance or exemption shall become effective 30 days after notice of opportunity for hearing is given pursuant to subdivision (c) of this section. If a public hearing is held, the department shall take an action with respect to such proposed variance or schedule within 30 days after the end of the public hearing.

5-1.96 Enforceability of final schedule prescribed pursuant to granting of variance or exemption. (Effective Date: May 27, 1998)

Once a schedule prescribed pursuant to the granting of a variance under section 5-1.90 of this Subpart or an exemption under section 5-1.92 of this Subpart has become final pursuant to section 5-1.94(e) of this Subpart, the conditions or requirements of any such schedule shall be enforceable, on the application of the Commissioner, by any court of competent jurisdiction in the same manner as an order of the Commissioner under section 1107 of the Public Health Law.

Separability

5-1.100 Separability. (Effective Date: June 24, 1977)

If any provisions of this Part are held invalid, such invalidity shall not affect other provisions which can be given effect without the invalid provisions.

APPENDIX 5-A

RECOMMENDED STANDARDS FOR WATER WORKS, 2007 EDITION

(effective November 9, 2011)

"Recommended Standards for Water Works, 2007 edition", published by Health Research Inc., Health Education Services Division, P.O. Box 7126, Albany, NY 12224, (518) 439-7286, www.hes.org and reported by the Water Supply Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. Available from Health Research Inc., at the address above, for a nominal fee. Also available online at http://10statesstandards.com/waterstandards.html and is available for viewing at the Department of State, One Commerce Plaza, 99 Washington Avenue, Albany, NY 12231 and the Bureau of Water Supply Protection, Department of Health, Flanigan Square, 547 River Street, Troy, NY 12180.

APPENDIX 5-B STANDARDS FOR WATER WELLS

(Statutory Authority: Public Health Law 206(18))

Sec.
5-B.1 Application and Definitions
5-B.2 Water Well Location and Protection
5-B.3 Water Well Construction
5-B.4 Well Yield and Water Flow
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5-B.6 Water Well Capping and Abandonment
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Table 1 Required Minimum Separation Distances to Protect Water Wells From Contamination
Table 2 Standards for Well Casing, Grouting, Diameter, and Screens

Section 5-B.1 Application and Definitions.

(a) Applicability

(1) This regulation applies to water wells used for drinking, culinary and/or food processing purposes and is the minimum standard for construction, renovation, development and abandonment of such water wells. Additional requirements may need to be met for certain water wells that serve a public water system as defined in Subpart 5-1 of this Title.

(2) Installation of new and replacement water wells shall meet all of the applicable provisions of this Appendix. Deviations may only be allowed at the discretion of the Department or local health department in accordance with: a waiver issued pursuant to Part 75 of this Title; or a variance issued pursuant to Subpart 5-2 of this Title; or a written approval issued by the Department or local health department prior to December 1, 2005; or a written approval granted by a local health department pursuant to a local sanitary code.

(3) Other state agencies, regional authorities, and local health departments with authority to regulate water wells may establish additional requirements for water wells within their respective jurisdictions.

(b) Definitions - As used in this regulation, the following words and terms shall have the indicated meaning:

(1) Adequate means sufficient to accomplish the purpose for which something is intended, and to such a degree that no unreasonable risk to health or safety is presented. An item installed, maintained, designed and assembled, an activity conducted, or act performed, in accordance with generally accepted standards, principles or practices applicable to a particular trade, business, occupation or profession, is adequate within the meaning of this Appendix.

(2) Air lift test means a method of performing a water well yield test by pumping air through an inductor pipe to force water out of an eductor pipe. The inductor pipe is submerged to a depth generally about 60 percent below the static water level to allow for successful

completion of the test. The drill pipe is utilized as the inductor pipe/air delivery mechanism and the casing and/or borehole as the eductor. The flow rate of water in gallons per minute (gpm) is determined as the water exits the top of the well. The drop of air pressure in the inductor pipe can be used to estimate the drawdown in the well.

(3) API means American Petroleum Institute.

(4) ASTM means American Society for Testing and Materials.

(5) Bailing test means a method of estimating well yield by bailing a known quantity of water from static water level and maintaining a stabilized water level over a measured period of time.

(6) Contaminant includes but is not limited to any physical, chemical, microbiological or radiological substance or matter in water that can be present at levels of public health concern.

(7) Decommissioning means the act of filling, sealing and plugging water wells in accordance with the requirements of Section 5-B.6(a) of this regulation such that the continued existence of the well will neither pose a health or safety hazard nor serve as a conduit for contaminant migration to or within the aquifer.

(8) Department means the New York State Department of Health.

(9) Drive shoe means a beveled cutting edge attachment to the bottom of the first section of permanent steel casing to protect the casing as it is being driven and to provide firm seating in consolidated geologic materials.

(10) gpm means gallons per minute.

(11) Grout means a material that has a low permeability, such as neat cement, bentonite slurry, bentonite chips, bentonite pellets, granular bentonite, or other materials that have equivalent sealing properties.

(12) Hydrofracturing means the procedure of pumping water and/or sand and/or small particles of high-strength plastic into a geologic formation to induce fracture and increase yield.

(13) Local health department means a city, county, or part-county department of health.

(14) NSF means the National Sanitation Foundation International, formerly known as National Sanitation Foundation.

(15) Person means an individual, corporation, company, association, partnership, State agency, or municipality, including a county.

(16) Pitless adapter means an assembly of parts that will permit water from a well to flow through the wall of the well casing, or extension thereof, into a pipe leading to a building or

other point of water use, and that shall be constructed and installed in a manner to prevent the entrance of contaminants into the well and the water produced.

(17) Pitless unit means a factory produced assembly that is threaded or welded to the casing below grade which provides access to the well for maintenance and repair and shall be constructed and installed in a manner to prevent the entrance of contaminants into the well and the water produced.

(18) Potable water means water which meets the water quality requirements established in Subpart 5-1 of the State Sanitary Code.

(19) Public water supply well means a water well used or intended for use for a public water system as defined in Subpart 5-1 of the State Sanitary Code.

(20) SDR means “standard dimension ratio” which means the ratio of average outside pipe diameter to minimum pipe wall thickness.

(21) Stabilized water level occurs when water in a well has achieved steady state during a period of constant rate withdrawal of groundwater (i.e. stabilized drawdown).

(22) Static water level is the natural water level in a well not being pumped or in a well fully recovered after pumping, as measured from the top of the well casing or the ground surface.

(23) UL means Underwriters Laboratories.

(24) USDA means the United States Department of Agriculture.

(25) USFDA means the United States Food and Drug Administration.

(26) Water well (well) shall mean any excavation for the purpose of obtaining ground water for drinking, culinary and/or food processing purposes, with installed components (including well casing, screen, grout, adapters, et. al.).

(27) Water well drilling or water well drilling activities shall mean the construction or reconstruction of water wells, the establishment or repair of a connection through the well casing and the repair of water wells including repairs which require the opening of the well casing.

(28) Well casing means watertight, non-porous material used to maintain a well opening and provide access to the interior of the well.

(29) Well development or redevelopment of a water well means actions to remove clay, silt, fine sand and/or organic/inorganic deposits from the aquifer and/or gravel packing to increase porosity and permeability of the aquifer formation and to minimize continued pumping of clay, silt and fine sand while obtaining water without changing the physical construction of the well. Such actions include bailing, jetting, air lifting, pumping, surging, hydrofracturing and/or chemical treatment.

(30) Well renovation means changes or repairs to water well.

(31) Well yield means a sustainable quantity of water per unit of time that may flow from or be pumped continuously from a well and is usually expressed as gallons per minute (gpm).

Section 5-B.2 Water Well Location and Protection.

(a) A well shall be located so that adequate access to the well for inspection, maintenance, repair, renovation, treatment, and testing is provided.

(b) A well shall be located where it is not subject to seasonal flooding or surface water contamination, or it shall be constructed in such a manner that seasonal floodwater cannot enter the well.

(c) A well shall be located upgradient of any potential or known source of contamination unless property boundaries, site topography, location of structures and accessibility require a different location. The minimum horizontal separation distances from potential sources of contamination listed in Table 1 shall be maintained.

(d) The ground surface immediately surrounding a well casing shall be graded to divert surface water away from the well. Concrete shall not be used for grading purposes.

Section 5-B.3 Water Well Construction.

(a) Acceptable water well construction methods include well drilling, driving, boring, jetting and excavating into an aquifer to obtain groundwater for a source of water supply. Acceptable water well drilling methods include cable–tool drilling, percussion drilling, air or mud/direct or reverse rotary drilling, sonic drilling, driving water well casing, and boring with earth augers to obtain groundwater.

(b) All of the following provisions apply to water well construction.

(1) Wells shall be constructed according to the requirements of Table 2.

(2) A well shall be constructed to maintain existing natural protection against contamination of aquifers and other geologic materials penetrated during well drilling and installation.

(3) A well shall be constructed to preclude and prevent entry of all known sources of contamination into the well.

(4) A well shall have a minimum casing length extending from one foot above finished grade to nineteen feet below finished grade upon completion of well drilling, with the following exceptions:

(i) The required total length of casing may exceed twenty feet depending upon geologic conditions and shall be in accord with the standards for the construction of wells listed in Table 2; and

(ii) Where the only viable source of groundwater available is from a shallow aquifer where the well must be completed at a depth less than nineteen feet below grade, the

Department or local health department having jurisdiction may allow use of well casing of less than twenty feet total length along with such additional measures as needed, including but not limited to increased separation distances per Table 1, Note 1, to ensure provision of potable water.

(5) If a well is located in a well house, the floor of the well house shall be at least six inches above grade and the permanent casing shall extend at least six inches above the floor.

(6) Upon completion of well drilling and until such time as the well is equipped with a pump, the top of the casing shall be secured with a watertight and vermin proof well cap.

(7) Casing and joints must be of sufficient strength and construction to ensure that integrity, shape, and ability to properly function are maintained during and after installation.

(8) Steel pipe that is used as permanent well casing shall be new pipe that contains a label or imprint indicating compliance with ASTM specification A53, A106, A500 or A589 or API specification 5L.

(9) A driven steel permanent casing terminating in bedrock shall be fitted with a drive shoe that is firmly seated in the bedrock.

(10) PVC pipe that is used as permanent casing shall be new pipe that contains a label or imprint indicating compliance with ASTM specification F 480 and NSF or UL standards and shall be Schedule 80 or SDR 21 or heavier. PVC pipe that is installed at depths of more than 200 feet shall be SDR 17 or heavier.

(11) Casing pipe that is manufactured from thermoplastic materials other than PVC shall be new pipe that contains a label or imprint indicating compliance with ASTM specification F 480 (i.e., SDR water pipe) and NSF or UL standards for use with drinking water.

(12) PVC and other thermoplastic materials may be used as casing in bedrock if not driven and if sealed with grout, provided such use complies with other requirements in this Appendix.

(13) Steel, PVC and other materials used as temporary casing in well construction shall be clean and free of contaminants. PVC and thermoplastic materials other than PVC used as temporary casing shall contain a label or imprint indicating compliance with NSF or UL standards for use with drinking water.

(14) A well shall be sufficiently straight and vertical to allow normal installation and operation of the pump.

(15) The upper twenty feet of a water well casing shall not be used as a suction line unless the well casing is protected by a standard weight or heavier outer casing.

(16) Where bedrock is present within 19 feet of the ground surface, an oversized borehole shall be drilled and the permanent casing in the oversized borehole shall be sealed with

grout to a minimum depth of 19 feet below grade, or five feet into the competent bedrock, whichever is deeper.

(17) Annular space between the well casing and borehole shall be grouted in accordance with Table 2. Where inner and outer well casings are used, the annular space between these casings shall be sealed with grout.

(18) An artesian well that overflows at land surface shall be constructed, equipped, and operated to provide for controlling the rate of discharges to conserve groundwater and to prevent the loss of artesian head by minimizing uncontrolled continuous waste discharges. Discharges to waste pipe, where installed, shall not be directly connected to a sewer or other source of contamination and shall be equipped with an air gap or backflow prevention device. Discharge pipes shall be properly screened to prevent entry of vermin.

(19) Wells completed in unconsolidated material or at the unconsolidated-consolidated material interface shall be screened if necessary and sufficiently developed to produce sand-free water and to minimize the entrance of fine materials into the well.

(20) Lead packers, lead plugs, or lead wool shall not be used as a well component.

(21) No solder containing more than 0.2 percent lead shall be used in making joints and fittings in any drinking water supply system or any water user's water lines.

(22) Wells shall be developed by air lift, bailing, surging, jetting, hydrofracturing and/or chemical treatment until sand free. Rock cuttings produced during water well drilling and well development shall be cleaned out of the well. As a final stage, the well may be pumped to waste at a pumping rate which equals or exceeds that of a permanent pump, until the water is clear as reasonably possible considering the groundwater conditions of the area. The permanent pump shall not be used to develop the well without the owner's consent.

(23) Water that is used for well construction and development purposes or is otherwise introduced into the well, other than water from the well itself, shall be obtained from a public water system or, if necessary, from a non-public drinking water source provided such non-public source is not surface water nor otherwise known or suspected to be contaminated.

(24) A connection to a water well casing that is made below the ground shall be protected by a pitless adapter or by a pitless unit (threaded or welded joints). A below ground connection shall not be submerged in water during installation. Pitless adapters or pitless units to be used shall contain a label or imprint indicating compliance with the Water Systems Council Pitless Adapter Standard (PAS -97).

(25) A pitless adapter or pitless unit shall provide adequate clearance within the internal diameter of a water well to permit insertion or withdrawal of water system components from within the well through the top of the well casing and be constructed and installed to exclude dirt or other foreign matter from the interior of the well casing.

(26) Extensions of existing water well casings to at least 12 inches above grade shall be constructed of the same material as the existing casing.

(27) Any chemicals or other additives, including disinfectants, used during construction shall be of a specification acceptable for use in water wells and any excess not required for operation of the well shall be cleaned out of the well.

(28) A water well shall be designed, operated, and maintained in a manner that will preclude cross-connections or any other piping connections which may introduce contaminants into the water supply or aquifer. A physical connection between a water supply that is in compliance with the requirements of these rules and another water supply that is not in compliance with the requirements of these rules is prohibited unless acceptable cross connection control is provided.

(29) All drilling fluids used for drilling operations shall be of food grade quality or NSF or UL approved or shall be water that complies with paragraph 5-B.3(b)(23) of this Appendix.

Section 5-B.4 Well Yield and Water Flow.

(a) The purpose of the water well yield test is to provide evidence that a water well will produce a sustainable flow rate for an extended period of time and to quantify that flow rate. Before being put into use, new and redeveloped wells shall be tested for well yield. The yield test for water well flow rates shall meet the following performance requirements:

(1) water well yield tests shall be performed for a period of time adequate to quantify well yield.

(2) water level and flow rate observations shall be made and recorded, at a minimum, before the start of the yield test, immediately upon the cessation of water withdrawal, and periodically during drawdown, and recovery periods. Frequency of measurements shall be made as necessary for the test method.

(3) water discharged during a yield test shall be discharged in a manner that avoids short circuiting of the water back into the aquifer.

(4) for wells that have been subjected to hydrofracturing the yield test shall not commence until redevelopment has been completed and, as a minimum, until the volume of water pumped/discharged into the aquifer has been removed from the well.

(5) the well yield determined for new wells shall be recorded on the Well Completion Report form submitted for that well to the New York State Department of Environmental Conservation. Data generated during the yield test shall be provided to the owner of the well, and provided upon request to the State or local agency(ies) having jurisdiction.

(b) The standard well yield test should include:

(1) A minimum four-hour period of stabilized drawdown while pumping at a constant flow rate.

(2) During the period of stabilized drawdown the stabilized water level shall not fluctuate more than plus or minus 0.5 foot (i.e., within a vertical tolerance of one foot) for each 100 feet of water in the well (i.e., initial water level to bottom of well) over the duration of constant flow rate of pumping. Water level measurement may be determined by steel tape, calibrated pressure gauge attached to an air line terminating at least five feet above the pump intake, electric sounder, or pressure transducer.

(3) The recovery period shall include observation of the water level in the well after cessation of pumping from the drawdown level back to at least 90 percent of the initial water level or for a period of 24 hours, whichever occurs first. If the water level does not recover to 90 percent after 24 hours, the tested flow rate may not be sustainable for an extended period of time.

(c) The well yield test requirements set forth in subdivision 5-B.4(b) may be modified, or an alternative yield test that meets the minimum performance requirements set forth in subdivision 5-B.4(a) may be used as follows:

(1) where the local health department having jurisdiction has determined that adequate hydrogeologic information and uniform conditions exist; or

(2) when an experienced hydrogeologist or licensed professional engineer directs and certifies the test; or

(3) for facilities planned for well water use of less than 500 gallons per day, pumping, bailing or air lift test methods may be used.

(4) the well yield of a flowing artesian well may be determined by direct flow measurement if the artesian flow rate equals or exceeds the desired water use rate.

Section 5-B.5 Water Well Pumps: Construction, Installation, Repair and Maintenance.

All of the following provisions apply to water well pumps, construction, installation, repair, and maintenance:

(a) All water supply system equipment shall be easily accessible for maintenance or repair.

(b) A pump shall be installed so that there are no unprotected openings into the interior of the pump or the well casing.

(c) Drop pipe shall be: a continuous unspliced length, except where spliced and adequately joined to accommodate use of a check valve or where spliced and adequately joined to support a depth extension on an existing well pump, of plastic pipe approved for use with drinking water with a minimum working pressure of 160 pounds per square inch containing a label or imprint indicating compliance with NSF or UL; or threaded and coupled schedule 80 or heavier PVC pipe containing a label or imprint indicating compliance with NSF or UL; or threaded and coupled galvanized steel, stainless steel or copper pipe. In addition, drop pipe should be sufficiently sized and installed to accommodate potential working stresses considering well depth, pumping level, pump size, and pump setting.

(d) A hand pump shall have a closed, downward facing, screened spout and a sealed pump rod packing assembly. A weep hole shall be installed in a hand pump discharge riser pipe below the frost line to protect the riser pipe and pump head from freezing.

(e) A casing vent shall be provided on all well caps and seals, except for those used on double pipe-packer jet installations. A vent shall be screened, downward facing, and terminate at least 12 inches above grade or six inches above the floor of a well house.

(f) Vent screening shall be 20 to 30 mesh per inch screen, shall not reduce the vent open area by more than 50 percent, and shall be stainless steel or other non-corrodible material.

(g) Well caps and seals shall be tightly secured to the well casing, watertight, vermin- proof, and provide venting as noted in this section. Split caps shall not be used.

(h) Only lubricants with a label indicating compliance as USDA, USFDA, or NSF approved food contact grade formulations shall be used as submersible pump motor and vertical turbine shaft lubricants.

(i) After a new well has been constructed or an existing well has been repaired or serviced in a manner that requires the opening of the well casing, the well shall be pumped to waste until the pumped water is reasonably clear. After pumping to waste, the well, pumping equipment, and building plumbing shall be disinfected before being put into use.

Section 5-B.6 Water Well Capping and Abandonment.

(a) All water well capping, abandonment and decommissioning shall be in accord with requirements in Appendix 5-A of this title.

Section 5-B.7 Separability.

If any provisions of this Appendix are held invalid, such invalidity shall not affect other provisions which can be given effect without the invalid provisions.

Table 1
Required Minimum Separation Distances to Protect Water Wells from Contamination

Contaminant Source	Distance (Feet)[1]
Chemical storage sites not protected from the elements (e.g., salt and sand/salt storage)[2]	300
Landfill waste disposal area, or hazardous or radiological waste disposal area[2]	300
Land surface application or subsurface injection of effluent or digested sludge from a Municipal or public wastewater treatment facility	200
Land surface application or subsurface injection of septage waste	200
Land surface spreading or subsurface injection of liquid or solid manure [3]	200
Storage Areas for Manure piles [4]	200
Barnyard, silo, barn gutters and animal pens [5, 6]	100
Cesspools (i.e. pits with no septic tank pretreatment)	200
Wastewater treatment absorption systems located in coarse gravel or in the Direct path of drainage to a well	200
Fertilizer and/or pesticide mixing and/or clean up areas	150
Seepage pit (following septic tank) [5]	150
Underground single walled chemical or petroleum storage vessels	150
Absorption field or bed [5]	100
Contained chemical storage sites protected from the elements (e.g. salt and sand/salt storage within covered structures) [7]	100
Septic system components (non-watertight) [5]	100
Intermittent sand filter without a watertight liner [5]	100
Sanitary Privy pit [5]	100
Surface wastewater recharge absorption system constructed to discharge storm water from parking lots, roadways or driveways [5]	100
Cemeteries	100
Sanitary privy with a watertight vault	50
Septic tank, aerobic unit, watertight effluent line to distribution box	50
Sanitary sewer or combined sewer	50
Surface water recharge absorption system with no automotive -related Wastes (e.g., clear-water basin, clear-water dry well)	50
Stream, lake, watercourse, drainage ditch, or wetland	25
All known sources of contamination otherwise not shown above	100

Notes for Table 1:

[1] The listed water well separation distances from contaminant sources shall be increased by 50% whenever aquifer water enters the water well at less than 50 feet below grade. If a 50% increase in separation distances can not be achieved, then the greatest possible increase in separation distance shall be provided with such additional measures as needed to prevent contamination. See also Note 6 to Table 2.

[2] Water wells shall not be located in a direct line of flow from these items, nor in any contaminant plume created by these items, except with such additional measures (e.g., sentinel groundwater monitoring, hydraulic containment, source water treatment) as needed to prevent contamination.

[3] Based upon on-site evaluations of agricultural properties done per agricultural environmental management (AEM) or comprehensive nutrient management plan (CNMP) programs by a certified nutrient management planner or soil and water conservation district (SWCD) official, water wells may be located a minimum of 100 feet from areas subject to land spreading of manure.

[4] Water wells may be located 100 feet from temporary (30 days or less) manure piles/staging areas that are controlled to preclude contamination of surface or groundwater or 100 feet from otherwise managed manure piles that are controlled pursuant to regulation in a manner that prevents contamination of surface or groundwater.

[5] When these contamination sources are located in coarse gravel or are located upgrade and in the direct path of drainage to a water well, the water well shall be located at least 200 feet away from the closest part of these sources.

[6] Animal pen does not include small pet shelters or kennels housing 3 or fewer adult pets.

[7] Chemical storage sites as used in this entry do not include properly maintained storage areas of chemicals used for water treatment nor areas of household quantities of commonly used domestic chemical.

Table 2. Standards for Well Casing, Grouting, Diameter, and Screens

Water-bearing Formation	Overlying Material	Minimum Casing Length or Depth [1]	Oversize Drillhole For Grout, Diameter [1]	Casing and Grout Placement[1]	Well Diameter		
					Cased Portion	Uncased Portion	Well Screen Diameter [2] (where applicable)
1. Sand or gravel	Unconsolidated caving material; sand or sand and gravel	19′ minimum; but 5′ below pumping level [3]	None required	Grouting not required.	2″ minimum	Does not apply	2″ minimum
2. Sand or gravel	Clay, hardpan, till, silt, or similar material to depth of more than 15′	5′ below pumping level [3]	Casing size plus 2″ if pressure placement of grout is used, Casing size plus 4″ if gravity placement of grout is used. [4,5,6]	Upper drillhole shall be kept at least one-third filled with clay slurry while driving permanent casing; after casing is in the permanent position, annular space shall be filled with grout [5]	2″ minimum	Does not apply	2″ minimum
3. Sand or gravel	Clay, hardpan, till, silt, or similar material containing layers of sand or gravel within 15′ of ground surface.	5′ below pumping level [4]	Casing size plus 2″ if pressure placement of grout is used, Casing size plus 4″ if gravity placement of grout is used. [4,5,6]	Annular space around casing shall be filled with grout.	2″ minimum	Does not apply	2″ minimum

Table 2. Standards for Well Casing, Grouting, Diameter, and Screens (Continued)

Water-bearing Formation	Overlying Material	Minimum Casing Length or Depth [1]	Oversize Drillhole For Grout, Diameter [1]	Casing and Grout Placement[1]	Well Diameter		
					Cased Portion	Uncased Portion	Well Screen Diameter [2] (where applicable)
4. Creviced, shattered or otherwise fractured shale, limestone, igneous, metamorphic or similar rock types or sandstone	Unconsolidated caving material, chiefly sand or sand and gravel to a depth of 19′ or more.	Through caving overburden	None required	Casing shall be firmly seated in rock. Grouting not required.	6″ minimum	6″ preferred	Does not apply
5. Creviced, shattered or otherwise fractured shale, limestone, igneous, metamorphic or similar rock types or sandstone	Clay, hardpan, till, shale, or similar material to a depth of 19′ or more	Through overburden	Casing size plus 2″ if pressure placement of grout is used, Casing size plus 4″ if gravity placement of grout is used. [4, 5,6]	Casing shall be firmly seated in rock. Annular space around casing shall be grouted.	6″ minimum	6″ preferred	Does not apply
6. Creviced, shattered or otherwise fractured shale, limestone, igneous, metamorphic or similar rock types or sandstone	Unconsolidated materials to a depth of less than 19′	19′ minimum	Casing size plus 2″ if pressure placement of grout is used, Casing size plus 4″ if gravity placement of grout is used. [4,6]	Casing shall be firmly seated in rock. Annular space around casing shall be grouted.	6″ minimum	6″ preferred	Does not apply

Notes for Table 2:

[1] In the case of a flowing artesian well, attempts should be made to install and seal the well in a manner that protects the artesian aquifer, prevents erosion of overlying geologic materials, and confines the flow to within the well casing, giving due consideration to practicality, cost, and safety.

[2] These diameters shall also be applicable in circumstances where the use of perforated casing is deemed practicable. Well points commonly designated on the trade as 1 1/4" pipe shall be considered as being 2" nominal diameter well screens for purposes of these regulations.

[3] As used in this table, the term "pumping level" shall refer to the lowest elevation of the water in a well during pumping, determined to the best knowledge of the water well contractor taking into consideration usual seasonal fluctuations and drawdown.

[4] Pressure placement includes methods of grout placement using pumps and tremie tubes or using grout displacement through the casing, or otherwise from the bottom up around the casing, with one or more drillable plugs. When pressure placement is used with a borehole diameter of only 2" greater than the casing diameter, casing shall be assembled without couplings unless installed per the "Casing and Grout Placement" technique described on Line "2" of this Table. Gravity placement includes any method that relies on gravity to draw grout, either dry or as a slurry, down into the annular space between the casing and borehole or between an inner casing and outer casing.

[5] For wells constructed by cable tool, hollow rod, jetting, or other drilling method where the permanent casing is driven, and where neither temporary casing nor an oversize borehole are used, dry driven grout methods using granular bentonite may be used. These methods use continuous feeding of granular bentonite into a starter hole or continuous mounding around the casing as the casing is driven. Collar flared joints or weld beads extending beyond the outside diameter of the permanent casing shall be used with sufficient spacing to ensure that the grout seal is continuous and extends downward into the saturated zone (i.e., beneath the water table).

[6] The oversized borehole for grout placement should be as deep as necessary, based upon local hydrogeologic conditions and potential contaminant sources, to prevent contamination from entering the well. Grout should be placed along the full length of casing, particularly where the presence of non-caving unconsolidated materials, coarse gravel, or creviced, shattered, or fractured rock may result in pathways of contamination to a well water system. Where this is not feasible because of practicality, cost or safety, grout shall be placed at least to a minimum depth of 19 feet. See also Note 1 to Table 1.

APPENDIX 5-C.

ACCEPTABLE METHODS FOR THE ANALYSIS OF CONTAMINANTS IN DRINKING WATER

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VII. General References

I. INORGANIC CHEMICALS AND PHYSICAL CHARACTERISTICS (Table 1 and 2, Subpart 5-1)

A. (1) Laboratory Certification - to receive approval to conduct analyses for Inorganic Chemicals in public drinking water, the laboratory must:

(a) Analyze Performance Evaluation samples which include those substances provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the State.

(b) Achieve quantitative results on the analyses that are within the following acceptance limits:

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

B. Approved Methods for the analysis of INORGANIC CHEMICALS

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
Alkalinity	Electrometric Titration				I-1030-85[6]
	Titrimetric		D1067-92B	2320B	
Aluminum	Atomic Absorption; Direct Aspiration			3111B	
	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	
	ICP-Mass Spectrometry	200.8[5]			
Ammonia	Colorimetric: Automated Phenate	350.1[7]			
Antimony[22]	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	Hydride-Atomic Absorption		D3697-92		
	ICP-Mass Spectrometry	200.8[5]			
Arsenic[8, 22]	Atomic Absorption; Furnace		D2972-93C	3113B	
	Atomic Absorption; Platform	200.9[5]			
	Hydride-Atomic Absorption		D2972-93B	3114B	
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5, 23]		3120B[23]	
Asbestos	Transmission Electron Microscopy	100.1[9]			
	Transmission Electron Microscopy	100.2[10]			
Barium	Atomic Absorption; Direct Aspiration			3111D	
	Atomic Absorption; Furnace			3113B	
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	

B. <u>Approved Methods</u> - for the analysis of INORGANIC CHEMICALS (continued):

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
Beryllium	Atomic Absorption; Furnace		D3645-93B	3113B	
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	
Bromate	Ion Chromatography	300.1[11]			
Bromide	Ion Chromatography	300.0[7]			
	Ion Chromatography	300.1[11]			
Cadmium	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5]			
Calcium[12]	Atomic Absorption; Direct Aspiration		D511-93B	3111B	
	EDTA Titrimetric		D511-93A	3500-Ca-D	
	Inductively-Coupled Plasma	200.7[5]		3120B	
Chloride	Ion Chromatography	300.0[7]	D4327-91	4110B	
	Potentiometric Method			4500-Cl^--D	
Chlorite	Amperometric Titration[13]			4500-ClO_2-E[14]	
	Ion Chromatography	300.0[7]			
	Ion Chromatography	300.1[11]			
Chromium	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	

B. <u>Approved Methods</u> - for the analysis of INORGANIC CHEMICALS (continued):

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
Color	Visual Comparison Method			2120B	
Conductivity	Conductance		D1125-91A	2510B	
Copper[12]	Atomic Absorption; Direct Aspiration		D1688-90A	3111B	
	Atomic Absorption; Furnace		D1688-90C	3113B	
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	
Cyanide	Manual Distillation followed by			4500-CN-C	
	Spectrophotometric, Amenable		D2036-91B	4500-CN-G	
	Spectrophotometric: Manual		D2036-91A	4500-CN-E	I-3300-85[6]
	Spectrophotometric: Semi-automated	335.4[7]		4500-CN-E	
	Selective Electrode			4500-CN-F	
Fluoride	Automated Alizarin			4500F-E	129-71W[15]
	Automated Electrode				380-75WE[15]
	Ion Chromatography	300.0[7]	D4327-91	4110B	
	Manual Distillation; Colormetric SPADNS Manual Electrode		 D1179-93B	 4500F-B,D 4500F-C	
Foaming Agents	Surfactants			5540C	

B. <u>Approved Methods</u> - for the analysis of INORGANIC CHEMICALS (continued):

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
Iron	Atomic Absorption; Direct Aspiration			3111B	
	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[3]		3113B	
	Inductively-Coupled Plasma	200.7[3]		3120B	
Lead[12, 22]	Atomic Absorption; Furnace		D3559-90D	3113B	
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
	Differential Pulse Anodic Stripping Voltammetry				1001[16]
Magnesium	Atomic Absorption		D511-93B	3111B	
	Inductively Coupled Plasma	200.7[5]		3120B	
	Complexation Titrimetric Methods		D511-93A	3500-Mg-E	
Manganese	Atomic Absorption; Direct Aspiration			3111B	
	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	
	ICP-Mass Spectrometry	200.8[5]			
Mercury[22]	Automated, Cold Vapor	245.2[17]			
	Manual, Cold Vapor	245.1[5]	D3223-91	3112B	
	ICP-Mass Spectrometry	200.8[5]			

B. <u>Approved Methods</u> - for the analysis of INORGANIC CHEMICALS (continued):

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
Nickel	Atomic Absorption; Direct Aspiration			3111B	
	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	
Nitrate	Automated Cadmium Reduction	353.2[7]	D3867-90A	4500-NO_3-F	
	Ion Chromatography	300.0[7]	D4327-91	4110B	B-1011[18]
	Ion Selective Electrode			4500-NO_3-D	601[19]
	Manual Cadmium Reduction		D3867-90B	4500-NO_3-E	
Nitrite	Automated Cadmium Reduction	353.2[7]	D3867-90A	4500-NO_3-F	
	Ion Chromatography	300.0[7]	D4327-91	4110B	B-1011[18]
	Manual Cadmium Reduction		D3867-90B	4500-NO_3-E	
	Spectrophotometric			4500-NO_2-B	
Odor				2150B	
Orthophosphate[20]	Colorimetric, Ascorbic Acid, Single Reagent		D515-88A	4500-P-E	
	Colorimetric, Ascorbic Acid, Two Reagent				
	Colorimetric, Automated, Ascorbic Acid	365.1[7]		4500-P-F	
	Colorimetric, Phosphomolybdate; Automated Discrete; Automated-Segmented Flow				I-1601-85[6] I-2598-85[6] I-2601-90[6]
	Ion Chromotography	300.0[7]	D4327-91	4110-B	

B. <u>Approved Methods</u> - for the analysis of INORGANIC CHEMICALS (continued):

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
PH	Electrometric	150.1[17]	D1293-84B	4500-H^+-B	
	Electrometric	150.2[17]			
Selenium[22]	Atomic Absorption; Furnace		D3859-93B	3113B	
	Atomic Absorption; Platform	200.9[5]			
	Hydride-Atomic Absorption		D3859-93A	3114B	
	ICP-Mass Spectrometry	200.8[5]			
Silica	Automated Method for Molybdate-Reactive Silica			4500-Si-F	
	Colorimetric		D859-88		
	Colorimetric, Molybdate Blue; Automated-Segmented Flow				I-1700-85[6] I-2700-85[6]
	Heteropoly Blue			4500-Si-E	
	Inductively-Coupled Plasma[4]	200.7[5]		3120B	
	Molybdosilicate			4500-Si-D	
Silver	Atomic Absorption; Direct Aspiration			3111B	
	Atomic Absorption; Furnace			3113B	
	Atomic Absorption; Platform	200.9[5]			
	Inductively-Coupled Plasma	200.7[5]		3120B	I-3720-85[21]
	ICP-Mass Spectrometry	200.8[5]			
Sodium	Atomic Absorption; Direct Aspiration			3111B	
	Inductively-Coupled Plasma[4]	200.7[5]			

B. <u>Approved Methods</u> - for the analysis of INORGANIC CHEMICALS (continued):

Contaminant	Methodology[1]	EPA Methods	Reference Method Number		
			ASTM Methods[2]	Standard Methods[3]	Other Methods[4]
Sulfate	Automated Chloranilate				
	Automated Methylthymol Blue	375.2[7]	D516-90	4500-SO_4^{2-}-F	
	Gravimetric			4500-SO_4^{2-}-C,D	
	Ion Chromotography	300.0[7]	D4327-91	4110B	
	Turbidimetric			4500-SO_4^{2-}-E	
TDS	Solids – TDS Dried at 180°C			2540C	
Temperature	Thermometric			2550	
Thallium	Atomic Absorption; Furnace				
	Atomic Absorption; Platform	200.9[5]			
	ICP-Mass Spectrometry	200.8[5]			
Zinc	Atomic Absorption; Direct Aspiration			3111B	
	Inductively-Coupled Plasma	200.7[5]		3120B	
	ICP-Mass Spectrometry	200.8[5]			

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, 410 M Street, SW., Washington, DC 20460 (Telephone: 202-2603027); or at the Office of Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

[1]Because MDLs reported in EPA Methods 200.7 and 200.9 were determined using a 2X preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (i.e., no sample digestion) will be higher. For direct analysis of cadmium and arsenic by Method 200.7, and arsenic by Method 3120 B samples preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis or antimony, lead, and thallium by Method 200.9
; antimony and lead by Method 3113 B; and lead by Method D3559-90D unless multiple in-furnace depositions are made.

[2]"Annual Book of ASTM Standards", 1994 and 1996, 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), D1125-91A (conductivity) and D859-88, respectively are located in the "Annual Book of ASTM Standards", 1994, Vol. 11.01. Copies may be obtained from the American Society of Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

[3]"18th , and 19th editions of "Standard Methods for the Examination of Water and Wastewater", 1992 and 1995, respectively, American Public Health Association; any edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

[4]"Other" draws reference to other consensus organizations, such as USGS, or private sector company that has developed an approved analytical method.

[5]"Methods for the Determination of Metals in Environmental Samples – Supplement I", EPA-600/R-94/111, May 1994. Available at NTIS, PB95-125472.

[6]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 Resource 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.

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

[8] If ultrasonic nebulization is used in the determination of arsenic by Methods 200.7, 200.8, or SM 3120B, 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 L of 30% hydrogen peroxide per 100 ml of solution. For direct analysis of arsenic with Method 200.8 using ultrasonic nebulization, samples and standards must contain one mg/L of sodium hypochlorite.

[9]Method 100.1, "Analytical Method for Determination of Asbestos Fibers in Water", EPA-600/4-83-043, September 1983. Available at NTIS, PB83-260471.

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

[11] EPA Method 300.1 is titled "USEPA Method 300.1, Determination of Inorganic Anions in Drinking Water by Ion Chromotography", Revision 1.0, USEPA, 1997, EPA/600R-98/118 (available through NTIS, PB98-169196; also available from: Chemical Exposure Research Branch, Microbiological and 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.

[12]Samples may not be filtered. Samples that contain less than 1 NTU (nephelometric turbidity unit) and are properly preserved (concentrated nitric acid to pH<2) may be analyzed directly (without digestion) for total metals, otherwise, digestion is required. Turbidity must be measured on the preserved samples just prior to the initiation of metal analysis. When digestion is required, the total recoverable technique as defined in the method must be used.

[13]Amperometric titration may be used for routine daily monitoring of chlorite at the entrance to the distribution system. Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system.

[14]For the analysis of chlorite using SM 4500-ClO_2-E , the version contained in the 19th Edition of "Standard Method for the Examination of Water and Wastewater", 1995, must be used.

[15]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.

[16] The description for Method Number 1001 for lead is available from Palintest, LTC, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018 or from Hach Company, P.O. Box 389, Loveland, CO 8053.

[17] "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79/020, March 1983. Available at NTIS, PB-95-125472.

[18] Method B-1011, "Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography", Millipore Corporation, Waters Chromatography Division, 34 Maple Street, Milford, MA 01757.

[19] 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.

[20] Unfiltered, no digestion or hydrolysis.

[21] Method I-3720-85, "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.

[22] There are three technologies for which compliance determinations of total metals require an acid digestion of the sample even if the turbidity of the sample is less than 1 NTU. The three technologies and the applicable metals are cold vapor AA (mercury), DPASV (lead), and gaseous hydride AA (antimony, arsenic and selenium).

[23] 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 0.01mg/L. However, prior to 2005 systems may have compliance samples analyzed with these less sensitive methods

C. Sample Collection and Preservation Requirements for Inorganic Chemicals

Sample collection for the inorganic chemicals under this section shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the following table:

Parameter	Preservative[1]	Sample Holding Time[2]	Sample Container Size	Type of Container
Alkalinity	4^oC	14 days	100 mL	Plastic or Glass
Aluminum	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Ammonia	4^oC, H_2SO_4 to pH < 2	28 days	100 mL	Plastic or Glass
Antimony	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Arsenic	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Asbestos[3]	4^oC	48 hours	800 mL in duplicate	Plastic or Glass
Barium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Beryllium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Bromate	50 mg/L EDA	28 days	100 mL	Plastic or Glass
Bromide	None	28 days	100 mL	Plastic or Glass
Cadmium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Calcium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Chloride	None	28 days	50 mL	Plastic or Glass
Chlorite	4^oC, 50 mg/L EDA	14 days	100 mL	Plastic or Glass
Chromium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Color	4^oC	48 hours	50 mL	Plastic or Glass
Conductivity	4^oC	28 days	100 mL	Plastic or Glass
Copper	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Cyanide	4^oC, NaOH to pH >12, Ascorbic Acid[4]	14 days	1 L	Plastic or Glass
Fluoride	None	1 month	300 mL	Plastic or Glass
Foaming Agents	4^oC	48 hours	500 mL	Plastic or Glass
Iron	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Lead	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Magnesium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Manganese	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Mercury[4]	HNO_3 to pH < 2	28 days	100 mL	Plastic or Glass
Nickel	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Nitrate	4^oC	48 hours[5]	100 mL	Plastic or Glass
Nitrate-Nitrite[6]	4^oC, H_2SO_4 to pH < 2	28 days	100 mL	Plastic or Glass
Nitrite	4^oC	48 hours	50 mL	Plastic or Glass
Odor	4^oC	24 hours	200 mL	Glass
Orthophosphate	Filter immediately, 4^oC	48 hours	50 mL	Plastic or Glass

Parameter	Preservative[1]	Sample Holding Time[2]	Sample Container Size	Type of Container
pH	None	Immediately	25 mL	Plastic or Glass
Selenium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Silica	4^oC	28 days	50 mL	Plastic
Silver	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Sodium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Sulfate	4^oC	28 days	50 mL	Plastic or Glass
TDS	None	7 days	100 mL	Plastic or Glass
Temperature	None	Immediately	1 L	Plastic or Glass
Thallium	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass
Zinc	HNO_3 to pH < 2	6 months	1 L	Plastic or Glass

[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^oC or less. Acidification of nitrate or metals samples may be with a concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EPA Methods 200.7 or 200.8 or 200.9 are followed.

[2]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.

[3]Instructions for containers, preservation procedures and holding times as specified in Method 100.2 must be adhered to for all compliance analyses including those conducted with Method 100.1.

[4]If the sample container is plastic, the holding time is 14 days.

[5]If the sample is chlorinated, the holding time for an unacidified samples kept at 4^oC is extended to 14 days.

[6]Nitrate-Nitrite refers to a measurement of total nitrate.

(1) Compositing Requirements

The State may reduce the total number of samples which must be analyzed by allowing the use of compositing. Composite samples from a maximum of five samples are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory.

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 taken within 14 days at 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.

D. Detection Limits for Analytical Methods for Selected Inorganic Chemicals

Contaminant	Methodology	Detection Limit (mg/L)
Antimony	Atomic Absorption; Furnace	0.003
	Atomic Absorption; Platform	0.0008[1]
	Hydride-Atomic Absorption	0.001
	ICP-Mass Spectrometry	0.0004
Arsenic	Atomic Absorption; Furnace	0.001
	Atomic Absorption; Platform	0.0005[3]
	Atomic Absorption; Gaseous Hydride	0.001
	ICP-Mass Spectrometry	0.0014[4]
Asbestos	Transmission Electron Microscopy	0.01 MFL
Barium	Atomic Absorption; Direct Aspiration	0.1
	Atomic Absorption; Furnace	0.002
	ICP-Mass Spectrometry	
	Inductively-Coupled Plasma	0.002 (0.001)
Beryllium	Atomic Absorption; Furnace	0.0002
	Atomic Absorption; Platform	0.00002[1]
	ICP-Mass Spectrometry	0.0003
	Inductively-Coupled Plasma[5]	0.0003
Cadmium	Atomic Absorption; Furnace	0.0001
	Inductively-Coupled Plasma	0.001
Chromium	Atomic Absorption; Furnace	0.001
	Inductively-Coupled Plasma	0.007 (0.001)
Cyanide	Distillation, Spectrophotometric[6]	0.02
	Distillation, Automated, Spectrophotometric[6]	0.005
	Distillation, Selective Electrode[6]	0.05
	Distillation, Amenable, Spectrophotometric[7]	0.02
Mercury	Automated, Cold Vapor	0.0002
	Manual, Cold Vapor	0.0002
Nickel	Atomic Absorption; Furnace	0.001
	Atomic Absorption; Platform	0.0006[1]
	ICP-Mass Spectrometry	0.0005
	Inductively-Coupled Plasma[5]	0.005
Nitrate	Automated Cadmium Reduction	0.05
	Ion Chromatography	0.01
	Ion Selective Electrode	1
	Manual Cadmium Reduction	0.01

Contaminant	Methodology	Detection Limit (mg/L)
Nitrite	Automated Cadmium Reduction	0.05
	Ion Chromatography	0.004
	Manual Cadmium Reduction	0.01
	Spectrophotometric	0.01
Selenium	Atomic Absorption; Furnace	0.002
	Hydride-Atomic Absorption	0.002
Thallium	Atomic Absorption; Furnace	0.001
	Atomic Absorption; Platform	0.00007[1]
	ICP-Mass Spectrometry	0.0003

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

[2]The value in parentheses "( )" is effective January 23, 2006.

[3]The MDL reported for EPA Method 200.9 (Atomic Absorption; Platform) 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 depositions, EPA 200.9 is capable of obtaining a MDL of 0.0001 mg/L.

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

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

[6]Screening method for total cyanides.

[7]Measures "free" cyanides.

E. Lead and Copper

(1) Laboratory Certification - to obtain certification to conduct analyses for lead and copper, environmental laboratories must:

(a) Analyze performance evaluation samples which include lead and copper provided by EPA Environmental Monitoring and Support Laboratory or equivalent samples provided by the State; and

(b) Achieve quantitative acceptance limits as follows:

(i) For lead: ± 30 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.005 mg/L. The Practical Quantitation Level, or PQL for lead is 0.005 mg/L.

(ii) For copper: ± 10 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.050 mg/L. The Practical Quantitation Level, or PQL for copper is 0.050 mg/L.

(c) Achieve method detection limits as follows:
(i) Lead: 0.001 mg/L; and
(ii) Copper: 0.001 mg/L or 0.020 mg/L when atomic absorption direct aspiration is used.

(d) The State has the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected and analyzed in accordance with the requirements of this Appendix.

(e) All lead and copper levels measured between the PQL and MDL must be either reported as measured or they can be reported as one-half the PQL and MDL specified for lead and copper in subparagraph (b) of paragraph (1) of this section. All levels below the lead and copper MDLs must be reported as zero.

II. ORGANIC CHEMICALS

A. Principal Organic Contaminants (Table 9D)

(1) Laboratory Certification - the analysis of Principal Organic Contaminants (POCs) shall only be conducted by laboratories that have received approval of the State Environmental Laboratory Approval Program (ELAP) according to the following approval conditions:

a. Analyze Performance Evaluation samples which include those substances provided by EPA Environmental and Support Laboratory or proficiency samples provided by the State ELAP system.

b. Achieve the quantitative acceptance limits under the following paragraphs (c) and (d) for at least 80 percent of the regulated organic chemicals listed in II.A.(2).

c. Achieve quantitative results on the analyses performed under (a) above that are within ± 20 percent to the actual amount of the substances in the performance evaluation sample when the actual amount is greater than or equal to 0.010 mg/l.

d. Achieve quantitative results on the analyses performed under paragraph (a) above that are within ± 40 percent of the actual amount of the substances in the performance evaluation sample when the actual amount is less than 0.010 mg/l.

e. Achieve a method detection limit of 0.0005 mg/L.

(2) Approved Methods - the analysis of Principal Organic Contaminants and vinyl chloride shall be conducted using the following methods:

Contaminant	CAS No.[1]	EPA Analytical Method[2]
Benzene	71-43-2	502.2, 524.2
Bromobenzene	108-86-1	502.2, 524.2
Bromochloromethane	74-97-5	502.2, 524.2
Bromomethane	74-83-9	502.2, 524.2
n-Butylbenzene	104-51-8	502.2, 524.2
sec-Butylbenzene	135-98-8	502.2, 524.2
tert-Butylbenzene	98-06-6	502.2, 524.2
Carbon tetrachloride	56-23-5	502.2, 524.2, 551.1
Chlorobenzene	108-90-7	502.2, 524.2
Chloroethane	75-00-3	502.2, 524.2
Chloromethane	74-87-3	502.2, 524.2
2-Chlorotoluene	95-49-8	502.2, 524.2
4-Chlorotoluene	106-43-4	502.2, 524.2
Dibromomethane	74-95-3	502.2, 524.2
1,2-Dichlorobenzene	95-50-1	502.2, 524.2
1,3-Dichlorobenzene	541-73-1	502.2, 524.2
1,4-Dichlorobenzene	106-46-7	502.2, 524.2
Dichlorodifluoromethane	75-71-8	502.2, 524.2
1,1-Dichloroethane	75-34-3	502.2, 524.2
1,2-Dichloroethane	107-06-2	502.2, 524.2
1,1-Dichloroethene	75-35-4	502.2, 524.2
cis-1,2-Dichloroethene	156-59-4	502.2, 524.2
trans-1,2-Dichloroethene	156-60-5	502.2, 524.2
1,2-Dichloropropane	78-87-5	502.2, 524.2
1,3-Dichloropropane	142-28-9	502.2, 524.2
2,2-Dichloropropane	590-20-7	502.2, 524.2
1,1-Dichloropropene	563-58-6	502.2, 524.2
cis-1,3-Dichloropropene	10061-01-5	502.2, 524.2
trans-1,3-Dichloropropene	10061-02-6	502.2, 524.2
Ethylbenzene	100-41-4	502.2, 524.2
Hexachlorobutadiene	87-68-3	502.2, 524.2
Isopropylbenzene	98-82-8	502.2, 524.2
4-Isopropyltoluene	99-87-6	502.2, 524.2
Methylene chloride	75-09-2	502.2, 524.2
n-Propylbenzene	103-65-1	502.2, 524.2
Styrene	100-42-5	502.2, 524.2
1,1,1,2-Tetrachloroethane	630-20-6	502.2, 524.2
1,1,2,2-Tetrachloroethane	79-34-5	502.2, 524.2
Tetrachloroethene	127-18-4	502.2, 524.2, 551.1
Toluene	108-88-3	502.2, 524.2

Contaminant	CAS No.[1]	EPA Analytical Method[2]
1,2,3-Trichlorobenzene	87-61-6	502.2, 524.2
1,2,4-Trichlorobenzene	120-82-1	502.2, 524.2
1,1,1-Trichloroethane	71-55-6	502.2, 524.2, 551.1
1,1,2-Trichloroethane	79-00-5	502.2, 524.2, 551.1
Trichloroethene	79-01-6	502.2, 524.2, 551.1
Trichlorofluoromethane	75-69-4	502.2, 524.2
1,2,3-Trichloropropane	96-18-4	502.2, 524.2
1,2,4-Trimethylbenzene	95-63-6	502.2, 524.2
1,3,5-Trimethylbenzene	108-67-8	502.2, 524.2
Vinyl chloride	75-01-4	502.2, 524.2
m-Xylene	95-47-6	502.2, 524.2
o-Xylene	108-38-3	502.2, 524.2
p-Xylene	106-42-3	502.2, 524.2

[1]CAS No. – Chemical Abstract Service Registry Number
[2]Method Detection Limit – 0.0005 mg/l

B. Pesticides, Dioxin, and PCBs (Table 9C)

(1) Laboratory Certification - Analysis for Pesticides, Dioxin, and PCBs shall only be conducted by laboratories that have received approval of the State Environmental Laboratory Approval Program (ELAP) according to the following approval conditions:

a. Analyze Performance Evaluation samples that include those substances provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the State.

b. Laboratories must achieve quantitative results within the acceptance limits on 80% of the analytes included in the PT sample. Acceptance is defined as within the 95% confidence interval around the mean of the PT study data.

c. Achieve quantitative results on the analyses that are within the following acceptance limits:

Contaminant	Acceptance Limit
Alachlor	±45%
Aldicarb	2 standard deviations
Aldicarb sulfone	2 standard deviations
Aldicarb sulfoxide	2 standard deviations
Atrazine	±45%
Benzo(a)pyrene	2 standard deviations
Carbofuran	±45%
Chlordane	±45%
2,4-D (as acid salts and esters)	±50%
Dalapon	2 standard deviations
Dibromochloropropane	±40%
Di(2-ethylhexyl)adipate	2 standard deviations
Di(2-ethylhexyl)phthalate	2 standard deviations
Dinoseb	2 standard deviations
Diquat	2 standard deviations
Endothall	2 standard deviations
Endrin	±30%
Ethylene dibromide (EDB)	±40%
Glyphosate	2 standard deviations
Heptachlor	±45%
Heptachlor epoxide	±45%
Hexachlorobenzene	2 standard deviations
Hexachlorocyclopentadiene	2 standard deviations
Lindane	±45%
Methoxychlor	±45%
Oxamyl (Vydate)	2 standard deviations
PCBs (as Aroclors) (as decachlorobiphenyl)	0 – 200%
Pentachlorophenol	±50%
Picloram	2 standard deviations
Simazine	2 standard deviations
2,4,5-TP (Silvex)	±50%
Toxaphene	±45%
2,3,7,8-TCDD (Dioxin)	standard deviations

(2) Approved Methods - the analysis of Pesticides, Dioxin, and PCBs shall be conducted using the following methods:

Contaminant	CAS No.[1]	Detection Limit (mg/l)[2,3]	Analytical Method
Alachlor[4]	15972-60-8	0.0002	505, 507, 508.1, 525.2, 551.1
Aldicarb	116-06-3	0.0005	531.1, SM-6610
Aldicarb sulfone	1646-87-4	0.0008	531.1, SM-6610
Aldicarb sulfoxide	1646-87-3	0.0005	531.1, SM-6610
Aldrin	309-00-2	0.075	505, 508, 508.1, 525.2
Atrazine[4]	1912-24-9	0.0001	505, 507, 508.1, 525.2, 551.1
Benzo(a)pyrene	50-32-8	0.00002	525.2, 550, 550.1
Butachlor	23184-66-9	0.38	507, 525.2
Carbaryl	63-25-2	2.0	531.1, SM-6610
Carbofuran	1563-66-2	0.0009	531.1, SM-6610
Chlordane (Technical)	57-74-9	0.0002	505, 508, 508.1,525.2
Dalapon	75-99-0	0.001	515.1, 515.3, 552.1, 552.2
Di(2-ethylhexyl)adipate	103-23-1	0.0006	506, 525.2
Di(2-ethylhexyl)phthalate	117-81-7	0.0006	506, 525.2
Dibromochloropropane (DBCP)	96-12-8	0.00002	504.1, 551.1
Dicamba	1918-00-9	0.081	515.1, 515.2, 555
2,4-D (as acid, salts and esters)	94-75-7	0.0001	515.1, 515.2, 515.3, 555, ASTM-D5317-93
Dieldrin	60-57-1	0.02	505, 508, 508.1, 525.2
Dinoseb[5]	88-85-7	0.0002	515.1, 515.2, 515.3 555
Diquat	2764-72-9	0.0004	549.2
Endothall	145-73-3	0.009	548.1
Endrin	72-20-8	0.00001	505, 508, 508.1, 525.2, 551.1
Ethylene dibromide (EDB)	106-93-4	0.00001	504.1, 551.1
Glyphosate	1071-83-6	0.006	547, SM-6651
Heptachlor	76-44-8	0.00004	505, 508, 508.1, 525.2, 551.1
Heptachlor epoxide	1024-57-3	0.00002	505, 508, 508.1, 525.2, 551.1
Hexachlorobenzene	118-74-1	0.0001	505, 508, 508.1, 525.2, 551.1
Hexachlorocyclopentadiene	77-47-4	0.0001	505, 508, 508.1, 525.2, 551.1
3-Hydroxycarbofuran	16655-82-6	2.0	531.1, SM-6610
Lindane	58-89-9	0.00002	505, 508, 508.1, 525.2, 551.1
Methomyl	16752-77-5	0.5	531.1, SM-6610
Methoxychlor	72-43-5	0.0001	505, 508, 508.1, 525.2, 551.1
Metolachlor	51218-45-2	0.75	507, 508.1, 525.2
Metribuzin	21087-64-9	0.75	507, 508.1, 525.2
Oxamyl (vydate)	23135-22-0	0.002	531.1, SM-6610

Contaminant	CAS No.[1]	Detection Limit (mg/l)[2,3]	Analytical Method
Pentachlorophenol (PCP)	87-86-5	0.00004	515.1, 515.2, 515.3, 525.2, 555, ASTM-D5317-93
Picloram[5]	1918-02-1	0.0001	515.1, 515.2, 515.3, 555, ASTM-D5317-93
Polychlorinated biphenyls (PCBs)[6] (as decachlorobiphenyl)	1336-36-3	0.0001	508A
Aroclor 1016	12674-11-2	0.00008	505, 508, 508.1, 525.2
Aroclor 1221	11104-28-2	0.02	505, 508, 508.1, 525.2
Aroclor 1232	11141-16-5	0.0005	505, 508, 508.1, 525.2
Aroclor 1242	53469-21-9	0.0003	505, 508, 508.1, 525.2
Aroclor 1248	12672-29-6	0.0001	505, 508, 508.1, 525.2
Aroclor 1254	11097-69-1	0.0001	505, 508, 508.1, 525.2
Aroclor 1260	11096-82-5	0.0002	505, 508, 508.1, 525.2
Propachlor	1918-16-7	0.5	508, 508.1, 525.2
Simazine[4]	122-34-9	0.0007	505[8], 507, 508.1,525.2, 551.1
(2,4,5-TP) (Silvex)[7]	93-72-1	0.0002	515.1, 515.2, 515.3, 555, ASTM-D5317-93
Toxaphene (Technical)	8001-35-2	0.001	505, 508, 508.1, 525.2
2,3,7,8-TCDD (Dioxin)[8,9]	1746-01-6	0.000000005	1613

[1]CAS No. – Chemical Abstract Services Registry Number
[2]The EDL or Estimated Detection Limit is given with the EPA Analytical Method cited.
[3]Detection limit as used in this context shall be defined as, greater than or equal to the concentration cited in this table for the individual contaminant.
[4]Substitution of the detector specified in Method 505, 507, 508 or 508.1 for the purpose of achieving lower detection limits is allowed as follows: either an electron capture or nitrogen phosphorous detector may be used provided all regulatory requirements and quality control criteria are met.
[5]Accurate determination of the chlorinated esters requires hydrolysis of the sample as described in EPA Methods 515.1, 515.2 , 515.3 and 555, and ASTM.
[6]If PCBs (as one of seven Aroclors) are detected in any sample analyzed using Methods 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl). Compliance with the PCB MCL shall be determined based on the quantitative results of analyses using method 508A.
[7]2-(2,4,5-Trichlorophenoxyl) propionic acid
[8]2,3,7,8-Tetrachlorodibenzo-p-dioxin
[9]A nitrogen-phosphorous detector should be substituted for the electron capture detector in Method 505 (or another approved method should be used) to determine alachlor, atrazine and simazine, if lower detection limits are required.

(3) Water Sample Compositing Requirements for Pesticides, Dioxin and PCBs

The State may reduce the total number of samples collected and analyzed in accordance with Table 9C by allowing the use of compositing. Equal size samples from a maximum of five separate sampling points are allowed. The number of samples included in the composite must also be less than the ratio of the Maximum Contaminant Level divided by the detection level for the contaminant as reported by the State certified laboratory. Compositing of samples must be done in the laboratory.

(a) If the concentration in the composite sample is greater than or equal to the detection limit of any organic chemicals listed under paragraph (4) of this section, then a separate follow-up

sample must be taken within 14 days at each sampling point included in the composite. These samples must be analyzed for the contaminants which were detected in the composite sample.

(b) If duplicates or residual portions of the original sample taken from each sampling point used in the composites are available, the system may use these instead of resampling. This additional sample must be analyzed and the results reported to the State within 14 days of collection.

(c) In systems serving fewer than 3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained. In systems serving 3,300 or more persons, the State may permit compositing of samples from up to five sampling locations within the system, provided the reporting limit is maintained.

C. Propylene Glycol

(1) Approved Methods - Analysis for glycol shall be conducted using the following methods:

Contaminant	CAS No.[1]	Method Detection Limit (mg/L)[2]	Analytical Method[3]
Total glycol	---	0.05	APC-44
Propylene glycol	57-55-6	0.01	Westchester County FID Method
Ethylene glycol	107-21-1	0.01	Westchester County FID Method

[1]CAS No. – Chemical Abstract Services Registry Number
[2]The State certified laboratory must report a detection level equal to or less than those listed in order for the analytical result to be indicative of a contaminant being "not detected".
[3]If glycol is detected by Method APC-44 at 0.1 mg/L or greater, the State will require laboratory verification that the total glycol consists of less than 0.05 mg/L of ethylene glycol using the Westchester County FID method. The Westchester County FID method can distinguish between propylene glycol and ethylene glycol.

(2) Analytical Method Number and Reference.

REFERENCE: Procedure for Method APC-44 – "Tentative Method for the Determination of Ethylene Glycol in Water" – Revision 1/91 may be obtained from the New York State Department of Health's Wadsworth Laboratories and Research – Division of Environmental Sciences, Albany, New York. The telephone number is (518) 474-4170.

REFERENCE: Procedure for the Westchester County FID Method – "Analyzing Ethylene Glycol and Propylene Glycol in Water Supplies" may be obtained from Westchester County Department of Laboratories and Research Environmental Services, 2 Dana Road, Valhalla, New York, 10595. The telephone number is (914) 595-5575.

D. Methyl-tertiary-butyl-ether (MTBE)

(1) Approved Methods - Analysis for MTBE shall be conducted using the following methods:

Contaminant	CAS No. [1]	Method Detection Limit (ug/L)[2]	Analytical Method
MTBE	1634-04-4	2.5	EPA 502.2 [3]
MTBE	1634-04-4	2.5	EPA 524.2 [3]

[1]CAS No. – Chemical Abstract Services Registry Number
[2]The State certified laboratory must report a detection level equal to or less than those listed in order for the analytical result to be indicative of a contaminant being not detected.
[3]EPA Method 502.2 and 524.2 as set forth in the New York State Environmental Laboratory Approval Program (ELAP) manual, modified on May 15, 2000.

E. Disinfectants, Disinfection Byproduct Precursors, and Disinfection Byproducts (Table 9A/9B in Subpart 5-1)

(1) Approved Methods – the analysis of disinfection byproducts and disinfection byproduct precursors shall be conducted using the following methods (for approved methods for bromate, bromide and chlorite, see section I. A. (1) of this appendix):

Parameter	Methodology[1]	Reference Method
Total Trihalomethanes (TTHMs)	P&T/GC/EICD & PID	EPA method 502.2[2]
	P&T/GC/MS	EPA Method 524.2
	LLE/GC/ECD	EPA Method 551.1
Haloacetic Acids (HAA5)	LLE/GC/ECD	Standard Method 6251 B
	SPE/GC/ECD	EPA Method 552.1
	LLE/GC/ECD	EPA Method 552.2
Total Organic Carbon (TOC)	High-Temperature Combustion	Standard Method 5310 B
	Persulfate-Ultraviolet or Heated-Persulfate Oxidation	Standard Method 5310 C
	Wet-Oxidation	Standard Method 5310 D
Dissolved Organic Carbon (DOC)[3,4]	High-Temperature Combustion	Standard Method 5310 B
	Persulfate-Ultraviolet or Heated-Persulfate Oxidation	Standard Method 5310 C
	Wet-Oxidation	Standard Method 5310 D
UV_{254}[3,4]	Ultraviolet Absorption Method	Standard Method 5910 B

[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.

[2]If TTHMs are the only parameter being measured in the sample, then a PID is not required.
[3]DOC and UV_{254} values are used to calculate Specific Ultraviolet Absorbance (SUVA). SUVA is equal to the UV_{254} divided by the DOC concentration. SUVA must be measured on water before the addition of disinfectants or oxidants to the system. DOC and UV_{254} samples used to determine a SUVA value must be taken at the same time and at the same location.
[4]Prior to analysis, DOC and UV_{254} samples must be filtered through a 0.45 m pore-diameter filter. Water passed through the 0.45 m pore-diameter filter prior to filtration of the sample must serve as the filtered blank.

F. Sample Preservation and Holding Time Requirements

Method	Preservative	Sample Holding Time	Extract Holding Time	Suggested Sample Size	Type of Container
502.2	Sodium Thiosulfate or Ascorbic Acid, 4°C, HCl pH<2	14 days		40-120 mL	Glass with PFTE lined septum
504.1	Sodium Thiosulfate Cool, 4°C	14 days	4°C, 24 hours	40 mL	Glass with PFTE lined septum
505	Sodium Thiosulfate Cool, 4°C	14 days (7 days for Heptachlor)	°4C, 24 hours	40 mL	Glass with PFTE lined septum
506	Sodium Thiosulfate Cool, 4°C, Dark	14 days	4°C, dark 14 days	1 L	Amber Glass with PFTE lined cap
507	Sodium Thiosulfate Cool, 4°C, Dark	14 days (see method for exceptions)	4°C, dark 14 days	1 L	Amber Glass with PFTE lined cap
508	Sodium Thiosulfate Cool, 4°C, Dark	7 days (see method for exceptions)	4°C, dark 14 days	1 L	Glass with PFTE lined cap
508A	Cool, 4°C	14 days	30 days	1 L	Glass with PFTE lined cap
508.1	Sodium Sulfite, HCl pH<2 Cool, 4°C	14 days (see method for exceptions)	30 days	1 L	Glass with PFTE lined cap
515.1	Sodium Thiosulfate Cool, 4°C, Dark	14 days	4°C, dark 28 days	1 L	Amber Glass with PFTE lined cap
515.2	Sodium Thiosulfate, HCl pH<2 Cool,4°C,Dark	14 days	less than of equal to 4°C, dark,14 days	1 L	Amber Glass with PFTE lined cap
524.2	Ascorbic Acid, HCl pH<2, Cool 4°C	14 days		40-120 mL	Glass with PFTE lined septum

Method	Preservative	Sample Holding Time	Extract Holding Time	Suggested Sample Size	Type of Container
525.2	Sodium Sulfite, Dark, Cool 4°C, HCl pH<2	14 days (see method for exceptions)	30 days from collection	1 L	Amber Glass with PFTE lined cap
531.1, 6610	Sodium Thiosulfate, monochloroacetic acid, pH<3, Cool 4°C	Cool 4C 28 days		60 mL	Glass with PFTE lined Septum
547	Sodium Thiosulfate Cool, 4°C	14 days (18 months frozen)		60 mL	Glass with PFTE lined septum
548.1	Sodium Thiosulfate (HCl pH 1.5-2 if high biological activity) Cool 4°C, Dark	7 days	14 days less than or equal to 4°C	greater than or equal to 250 mL	Amber Glass with PFTE lined septum
549.1	Sodium Thiosulfate, (H_2SO_4 pH<2 if biologically active) Cool 4°C, Dark	7 days	21 days	greater than or equal to 250 mL	High Density Amber Plastic or Silanized Amber Glass
550, 550.1	Sodium Thiosulfate, Cool 4°C, HCl pH<2	7 days	550 – 30 days 550.1 – 40 days Dark, 4°C	1 L	Amber Glass with PFTE lined cap
551	Sodium Thiosulfate, Sodium Sulfite, Ammonium Chloride, or Ascorbic Acid, HCl pH 4.5-5.0 Cool 4°C	14 days		greater than or equal to 40 mL	Glass with PFTE lined septum
555	Sodium Sulfite HCl, pH less than or equal to 2, Dark, Cool 4°C	14 days		greater than or equal to 100 mL	Glass with PFTE lined cap
1613B	Sodium Thiosulfate Cool 0-4°C, Dark		Recommended 40 days	1 L	Amber Glass with PFTE lined cap

* PTFE – polytetrafluoroethylene (teflon)

G. METHOD REFERENCES

Procedures for analysis of trihalomethanes and haloacetic acids using Methods 502.2, 524.2, 551.1, and 552.2 may be found in "Methods for the Determination of Organic Compounds in Drinking Water – Supplement III", EPA/600/R-95/131, August 1995.

Procedures for Methods 502.2, 505, 507, 508, 508A, 515.1, and 531.1 may be found in "Methods for the Determination of Organic Compounds in Drinking Water", EPA-600/4-88-039, December 1988, Revised, July 1991.

Procedures for Methods 506, 547, 550, 550.1, and 551.1 may be found in "Methods for the Determination of Organic Compounds in Drinking Water – Supplement I", EPA/600-4-90-020, July 1990.

Procedures for Methods 515.2, 524.2, 548.1, 552.1, 552.2 and 555 may be found in "Methods for the Determination of Organic Compounds in Drinking Water – Supplement II", EPA/600/R-92/129, August 1992.

Method 1613 is titled, "Tetra-Through Octa-chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS", EPA 821-B-94-005, October 1994.

These documents are available from the National Technical Information Service (NTIS) PB91-231480, PB91-146027, PB92-207703 and PB95-104774, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847.

EPA Methods 504.1, 508.1 and 525.2 are available from US EPA EMSL-Cincinnati, OH 45268. The phone number is (513)-569-7586.

Procedure for Method 6651 may be found in "Standard Methods for the Examination of Water and Wastewater", 18th Edition, American Public Health Association, American Water Works Association, Water Environment Federation, 1992.

Procedure for Method 6610 may be found in "Supplement to the 18th Edition of Standard Methods for the Examination of Water and Wastewater", 1994, American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005.

Procedures for Methods 5310B, 5310C, and 5310D may be found in "Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater", American Public Health Association, 1996.

Procedure for Method 5910B may be found in "Standard Methods for the Examination of Water and Wastewater, 19th Edition", American Public Health Association, 1995.

ASTM Method D5317-93 can be obtained from the "Annual Book of ASTM Standards", 1994 and 1996, Vol. 11.01 and 11.02, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

III. RADIONUCLIDES (Table 7 in Subpart 5-1)

A. <u>Laboratory Certification</u> – the analysis of Radionuclides shall only be conducted by laboratories that have received approval of the State Environmental Laboratory Approval Program (ELAP) according to the following approval conditions:

(a) Analyze Performance Evaluation samples that include those substances provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the State.

(b) Laboratories must achieve quantitative results within the acceptance limits on 80% of the analytes included in the PT sample. Acceptance is defined as within the 95% confidence interval around the mean of the PT study data.

(c) Achieve quantitative results on the analyses that are within the following acceptance limits:

Contaminant	Acceptance Limit
Gross alpha	±50%
Gross beta	±30%
Cesium-134	±30%
Iodine-131	±30%
Strontium-89, 90	±30%
Tritium	±20%
Gamma emitters	
Radium-226	±30%
Radium-228	±50%
Uranium	±30%

(d) Achieve the following detection limits:

Contaminant	Detection Limit (pCi/L)
Gross alpha	3
Gross beta	4
Radium-226	1
Radium-228	1
Cesium-134	10
Strontium-89	10
Strontium-90	2
Iodine-131	1
Tritium	1,000
Other Radionuclides and Photon/Gamma Emitters	$1/10^{th}$ of the MCL

B. (1) <u>Approved Methods</u> – the analysis of Radionuclides shall be conducted using the following methods:

Contaminant	Methodology	Reference (method or page number)								
		EPA[1] Methods	EPA[2] Methods	EPA[3] Methods	EPA[4] Methods	Standard Methods[5]	ASTM Methods[6]	USGS Methods[7]	DOE Methods[8]	Other Methods
Naturally occurring										
Gross alpha[11] and beta	Evaporation	900.0	p. 1	00-01	p. 1	302, 7110 B		R-1120-76		
Gross alpha[11]	Co-precipitation			00-02		7110 C				
Radium-226	Radon emanation	903.1	p. 16	Ra-04	p. 19	7500-Ra C	D 3454-91	R-1141-76	Ra-05	N.Y.[9]
	Radiochemical	903.0	p. 13	Ra-03		304, 305, 7500-Ra B	D 2460-90	R-1140-76		
Radium-228	Radiochemical	904.0	p. 24	Ra-05	p. 19	304, 7500-Ra D		R-1142-76		N.Y.[9] N. J.[10]
Uranium[12]	Radiochemical	908.0				7500-U B				
	Fluorometric	908.1				7500-U C (17th Ed.)	D 2907-91	R-1180-76, R-1181-76	U-04	
	Alpha spectrometry			00-07	p. 33	7500-U C (18th or 19th Ed.)	D 3972-90	R-1182-76	U-02	
	Laser Phosphorimetry						D 5174-91			
Man-made										
Cesium-134	Radiochemical	901.0	p. 4			7500-Cs B	D-2459-72	R-1111-76		
	Gamma ray spectrometry	901.1			p. 92	7120 (19th Ed.)	D 3649-91	R-1110-76	4.5.2.3	
Iodine-131	Radiochemical	902.0	p. 6 p. 9			7500-1 B 7500-1 C 7500-1 D	D 3649-91			
	Gamma ray spectrometry	901.1			p. 92	7120 (19th Ed.)	D 4785-88		4.5.2.3	
Strontium-89, 90	Radiochemical	905.0	p. 29	Sr-4	p. 65	303, 7500-Sr B		R-1160-76	Sr-01 Sr-02	
Tritium	Liquid scintillation	906.0	p. 34	H-2	p. 87	306, 7500-3H B	D 4107-91	R-1171-76		
Gamma emitters	Gamma ray spectrometry	901.1 902.0 901.0			p. 92	7120 (19th Ed.), 7500-Cs B, 7500-I B	D 3649-91 D 4785-88	R-1110-76	4.5.2.3	

[1]"Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA 600/4-80-032, August 1980. Available at U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847), PB 80-224744.

[2]"Interim Radiochemical Methodology for Drinking Water", EPA 600/4-75-008(revised), March 1976. Available at NTIS, ibid. PB 253258.

[3]"Radiochemistry Procedures Manual", EPA 520/5-84-006, December 1987. Available at NTIS, ibid. PB 84 - 215581.

[4]"Radiochemical Analytical Procedures for Analysis of Environmental Samples", March 1979. Available at NTIS, ibid. EMSL LV 053917.

[5]"Standard Methods for the Examination of Water and Wastewater", 13th, 17th, 18th, 19th Editions, 1971, 1989, 1992, 1995. Available at American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005. All methods are in the 17th, 18th and 19th editions except 7500-U C Fluorometric Uranium was discontinued after the 17th Edition, 7120 Gamma Emitters is only in the 19th Edition, and 302, 303, 304, 305 and 306 are only in the 13th Edition.

[6]"Annual Book of ASTM Standards", Vol. 11.02, 1994; any year containing the cited version of the method may be used. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

[7]"Methods for Determination of Radioactive Substances in Water and Fluvial Sediments", Chapter A5 in Book 5 of "Techniques of Water-Resources Investigations of the United States Geological Survey", 1977. Available at U.S. Geological Survey (USGS) Information Services, Box 25286, Federal Center, Denver, CO 80225-0425.

[8]"EML Procedures Manual", 27th Edition, Volume 1, 1990. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.

[9]"Determination of Ra-226 and Ra-228 (Ra-02)", January 1980, Revised June 1982. Available at Radiological Sciences Institute Center for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

[10]"Determination of Radium 228 in Drinking Water", August 1980. Available at State of New Jersey, Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analytical Services, 9 Ewing Street, Trenton, NJ 08625.

[11]Natural uranium and thorium-230 are approved as gross alpha-particle activity calibration standards for 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/µg of 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.

C. Sample Collection, Preservation and Instrumentation Requirements

Sample collection for Radionuclides shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the following table:

Parameter	Preservative[1]	Sample Holding Time[2]	Type of Container	Instrumentation[3]
Gross alpha	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	A, B, or G
Gross beta	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	A or G
Strontium-89	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	A or G
Strontium-90	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	A or G
Radium-226	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	A,B,D or G
Radium-228	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	A or G
Cesium-134	Conc. HCl to pH <2[4]	6 months	Plastic or Glass	A, C or G
Iodine-131	None	8 days	Plastic or Glass	A, C or G
Tritium	None	6 months	Glass	E
Uranium	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	F
Photon emitters	Conc. HCl or HNO_3 to pH <2[4]	6 months	Plastic or Glass	C

[1]It is recommended that the preservative be added to the sample at the time of collection unless suspended solids activity is to be measured. It is also recommended that samples be filtered, if suspended or settleable solids are present, prior to adding preservative, at the time of collection. However, if the sample has to be shipped to a laboratory or storage area, acidification of the sample (in its original container) may be delayed for a period not to exceed 5 days. A minimum of 16 hours must elapse between acidification and analysis.

[2]Holding time is defined as the period from time of sampling to time of analysis. In all cases, samples should be analyzed as soon after collection as possible. If a composite sample is prepared, a holding time cannot exceed 12 months.

[3]A = Low background proportional system; B = Alpha and beta scintillation system; C = Gamma spectrometer [Ge(Hp) or Ge(Li)]; D = Scintillation cell system; E = Liquid scintillation system; F = Fluorometer; G = Low background alpha and beta counting system other than gas-flow proportional.

[4]If HCl is used to acidify samples which are to be analyzed for gross alpha or gross beta activities, the acid salts must be converted to nitrate salts before transfer of the samples to planchets.

IV. MICROBIOLOGICAL CONTAMINANTS (Tables 6, 11, 11A and 11B)

(effective November 9, 2011)

A. <u>Laboratory Certification</u> - Measurement of total coliforms, fecal coliforms, ***E.coli.,*** enterococci, coliphage and heterotrophic plate count (HPC) must be conducted by a laboratory certified by the Department's Environmental Laboratory Approval Program (ELAP) for the method used.

B. <u>Approved Methods</u> – the following analytical methods are acceptable for measurement of microbiological contaminants:

Approved Methods[1,2]	Media	Reference Method[3,4]
Total Coliforms[5]		
Fermentation broth method[6,7,8]	LTB BGLB Broth	SM 9221 B
	P-A Broth BGLB Broth[8,10]	SM 9221 D
Enzyme substrate method	Colilert, Colilert-18[11]	SM 9223
	Colisure[12,13]	SM 9223
	E*colite Test[14]	
Membrane filter method	mEndo or LES-Endo	SM 9222 B
	MI Agar[9]	
	m-ColiBlue 24[15]	
Fecal Coliforms[5]		
Fermentation broth method	EC broth	SM 9221 E
	A-1 broth[17]	SM 9221 E
Membrane filter method	MFC	SM 9222 D
Escherichia coli		
Enzyme substrate method	Colilert or Colilert-18	SM 9223
	Colisure[12,13]	SM 9223
	E*Colite[14]	
	LTB or P/A broth then EC-MUG[16]	SM 9221 F[16]

Approved Methods[1,2]	Media	Reference Method[3,4]
Membrane filter method	MI Medium[9]	
	m-ColiBlue24[15]	
	mEndo or LES Endo[16] then NA-MUG[16]	SM 9222 G[16]
Heterotrophic Bacteria[5]		
Pour plate method		SM 9215 B
Enterococci		
	Multiple-Tube Technique	9230 B[18]
	Membrane Filter Technique	EPA Method 1600[19]
	Enterolert[20]	
Coliphage		
	Two-Step Enrichment Presence-Absence Procedure	EPA Method 1601[21]
	Single Agar Layer Procedure	EPA Method 1602[22]

[1]It is strongly recommended that laboratories evaluate the false-positive and negative rates for the method(s) they use for monitoring total coliforms. Laboratories are also encouraged to establish false-positive rates within their own laboratory and sample matrix (drinking water or source water) with the intent that if the method they choose has an unacceptable false-positive or negative rate, another method can be used. When one of the approved methods does not include confirmatory samples, it is recommended that confirmatory analysis is performed on a minimum of 5% of all total coliform-positive samples. Methods for establishing rates of false-positive and negative may be established based on: lactose fermentation; the rapid test for -galactosidase and cytochrome oxidase; multi-test identification systems; or equivalent confirmation tests. False-positive and false negative information is often available in published studies and/or from the manufacturer(s).

[2]Preparation of EC medium is described in Method 9221 E (paragraph 1a) and preparation of Nutrient Agar is described in Method 9221 B (paragraph 3). Both methods are in "Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998, and 21st Edition, 2005; either edition may be used.

[3]SM = "Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998, or 21st Edition, 2005, American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 2005; either edition may be used.

[4]Methods 9221 A, B; 9222 A, B, C; 9221 D and 9223 are contained in “Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998, or 21st Edition, 2005, American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 2005; either edition may be used.

[5] The time from sample collection of a drinking water sample to initiation of total coliform analysis may not exceed 30 hours. The time from sample collection of a drinking water sample to initiation of heterotrophic bacteria analysis may not exceed 8 hours. Raw water samples may not exceed 8 hours. Systems are encouraged, but not required to hold samples below 10°C during transit.

[6]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 for total coliforms, using lactose broth, is less than 10 percent.

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

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

[9]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 Resources Center (RC-4100), 1200 Pennsylvania Avenue, SW, Washington, D.C. 20460, EPA 600/J-99/225.

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

[11]The Chromogenic Substrate Coliform Test or ONPG-MUG Test is also known as the Autoanalysis Colilert System.

[12]A description of the Colisure Test, Feb. 28, 1994, may be obtained from the IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092.

[13]The Colisure test may be read after an incubation time of 24 hours.

[14]A description of the E*Colite® Test, "Presence/Absence for Coliforms and ***E. coli*** in Water", Dec. 21, 1997, is available from Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843–1032 or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

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

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

[17]A-1 Broth may be held up to 3 months in a tightly closed screwcap tube at 4°C.

[18]Methods are described in Standard Methods for the Examination of Water and Wastewater 20th edition, 1998 or 21st edition, 2005; copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005–2605.

[19]EPA Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl–b–D–Glucoside Agar (mEI) EPA 821–R–02–022 (September 2002) is an approved variation of Standard Method 9230C. The method is available at http://www.epa.gov/nerlcwww/ 1600sp02.pdf or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW, Washington, DC 20460. The holding time and temperature for ground water samples are specified in footnote 2 above, rather than as specified in Section 8 of EPA Method 1600.

[20]Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. Preparation and use of the medium is set forth in the article ''Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters,'' by Budnick, G.E., Howard, R.T., and Mayo, D.R., 1996, Applied and Environmental Microbiology, 62:3881–3884.

[21]EPA Method 1601: Male-specific (F+) and Somatic Coliphage in Water by Two-step Enrichment Procedure; April 2001, EPA 821–R–01–030. Method is available at http://www.epa.gov/nerlcwww/1601ap01.pdf or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

[22]EPA Method 1602: Male-specific (F+) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure; April 2001, EPA 821–R–01– 029. Method is available at http://www.epa.gov/nerlcwww/1602ap01.pdf or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

V. TURBIDITY (Table 4)

A. **Approved Methods** – Turbidity shall be conducted using the following methods:

Parameter	Methodology	Reference Methods[1]
Turbidity	Nephelometric Method	2130 B
	Nephelometric method	180.1[2]
	Great Lakes Instruments	Method 2[3]

[1]"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992, and 19th Edition, 1995, American Public Health Association, American Water Works Association, Water Environment Federation.

[2]"Methods for the Determination of Inorganic Substances in Environmental Samples", EPA-600/R-93-100, August 1993. Available at NTIS, PB94-121811.

[3]GLI Method 2, "Turbidity" November 2, 1992 Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, Wisconsin 53223.

VI. RESIDUAL DISINFECTANTS

A. Approved Methods – The analysis of residual disinfectants shall be conducted using one of the following analytical methods:

Disinfectant	Reference Methodology	Reference Methods[1]
Free and Combined Chlorine[2]	Amperometric Titration Method	4500-C1 D
	Low Level Amperometric Titration	4500-Cl E
	DPD Ferrous Titrimetric Method	4500-C1 F
	DPD Colorimetric Method[3]	4500-C1 G
	Syringaldazine (FACTS) Method	4500-C1 H
Ozone	Indigo Colorimetric Method	4500-O_3 B
Chlorine Dioxide	DPD Method	4500-C1O_2 D
	Amperometric Method II	4500-C1O_2 E

[1]"Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998, or 21st Edition, 2005, American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 2005; either edition may be used.

[2]Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision of the measurement remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every 5 days, or with a protocol approved by the State.

[3]The Hach Company Method No. 8167 (Version no. 1, dated April 24, 1995) as found in Hach Method 8021 in the "Water Quality Analysis Handbook", 3rd edition, by Hach Company, Loveland, Colorado, 1997, pg. 335, for determining total chlorine is an acceptable version of the spectrophotometric, DPD, Standard Method 4500-C1-G in "Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998, or 21st Edition 2005, American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 2005; either edition may be used.

VII. GENERAL REFERENCES

More information about the regulations pertaining to the parameters listed in this appendix can be found in 40CFR parts 141.23, 141.24, National Primary and Secondary Drinking Water Regulations.

Copies of documents referenced in this appendix may be obtained from the National Technical Information Services, U.S. Department of Commerce, 5285 Pont Royal Road, Springfield, Virginia 22161 or online at: http://www.ntis.gov/.

Copies of cited references are available for review and inspection from Records Access Officer, Department of Health, Corning Tower, Room 2364, Albany, New York 12237-0044 and New York State Department of State, Office of Information Services, 99 Washington Ave., Albany, New York 12231.

Copies of “Standard Methods for the Examination of Water and Wastewater", 21st Edition, 2005, American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 2005, are available for review and inspection from the Department of Health, Bureau of Water Supply Protection, 547 River Street, Room 400, Troy, NY 12180.

U.S. EPA. “Technical Notes on Drinking Water Methods”, Office of Research and Development, Washington, DC 20460. EPA/600/R-94/173, October 1994 (EPA, 1994).

Copies of EPA analytical methods may be obtained online at http://water.epa.gov/scitech/drinkingwater/labcert/analyticalmethods_ogwdw.cfm, by contacting EPA’s Safe Drinking Water Hotline at 1-800-426-4791, or by contacting the EPA using one of the contact options listed at http://water.epa.gov/drink/contact.cfm.

APPENDIX 5-D

Special Requirements for Wells Serving Public Water Systems

(Statutory authority: Public Health Law, §§206[18], 225)

Sec.

5-D.l Application and Definitions
5-D.2 Water Well Location and Protection
5-D.3 Water Well Construction
5-D.4 Well Yield and Water Flow
5-D.5 Well Pumps and Components
5-D.6 Water Well Capping and Abandonment
5-D.7 Separability

Table 1 - Required Minimum Separation Distances to Protect Public Water Supply Wells From Contamination
Table 2 - Yield Test and GWUDI Determination Requirements for Wells Serving Public Water Systems

Section 5-D.1 Application and Definitions.

(a) (1) This Appendix applies to water wells that serve a public water system as defined in Subpart 5-1 of the State Sanitary Code. Additional requirements for these wells are contained in Appendix 5-A (***Recommended Standards for Water Works***) and Appendix 5-B (***Standards for Water Wells***) of this Part. Other state agencies, regional authorities, and local agencies with authority to regulate water wells may also have additional requirements.

(2) The Department or local health department may allow deviations from a standard on a case by case basis in accordance with procedures and criteria established by the Department. Such deviations may only be allowed upon approval in writing by the Department or local health department.

(b) Definitions used in Appendix 5-B shall apply within this Appendix.

Section 5-D.2 Water Well Location and Protection.

(a) Wells serving public water systems shall be located such that the owner of the water system possesses legal title to lands within 100’ of the well and the owner controls by ownership, lease, easement or other legally enforceable arrangement the land use activities within 200’ of the well. Hydrogeologic evaluations and source water assessments should be used to determine appropriate separation from potential contaminant sources. Where no evaluations are available, the minimum separation distances shall be those specified for public water system wells in Table 1.

(b) Where the ownership/control distances or separation distances specified in subdivision (a) of this Section cannot be achieved, including but not limited to the installation of in-kind replacement wells at existing well fields, and alternative water sources have been considered, use of such well location may be allowed by the Department or local health department having jurisdiction along with such additional measures as needed to prevent contamination

of the water well and/or to otherwise provide potable water. Additional measures may include evaluation of local hydrogeology, including consideration of available water and soil quality information and historic water quality trends, and may include consideration of available source water assessments.

Section 5-D.3 Water Well Construction.

(a) A well shall be constructed to preclude and prevent entry of all known sources of contamination into the well to the extent reasonably achievable. Where the only viable source of water supply available is contaminated and alternative water sources have been considered, the local health department having jurisdiction may allow construction and use of a well in contaminated ground water with such additional measures (e.g., treatment and monitoring) as needed to ensure provision of potable water.

(b) Well casing shall extend a minimum of 18 inches above finished grade. If a well is located in a well house, the floor of the well house shall be at least six inches above grade and the permanent casing shall extend at least twelve inches above the floor.

Section 5-D.4 Well Yield and Water Flow.

Before being put into use, new and redeveloped public water supply wells shall be tested for yield as specified in this section. Where adequate hydrogeologic information and uniform conditions exist, or when an experienced hydrogeologist or licensed professional engineer directs and certifies the test, yield testing requirements may be modified by the local health department having jurisdiction. Additional yield test requirements may need to be met for other agencies having jurisdiction.

(a) Pumping yield tests shall be done for the minimum duration of time specified in Table 2. For wells completed in unconsolidated deposits, constant flow rate testing may be used. For wells completed in rock, a minimum of six hours of stabilized drawdown should be observed either at the end of the test or as a second test except as allowed under subdivision (d) of this section or except where the Department or local health department allows constant rate testing.

(b) Where water wells use ground water sources potentially influenced by surface water as indicated in Table 2, water quality shall be tested and/or monitored during the pumping yield test in accordance with Department guidance for the determination of ground waters under the direct influence of surface water.

(c) Periodic water level observations shall be made and recorded during initial drawdown, stabilized drawdown, and recovery periods. The recorded data shall be provided in tabular form to the local agency(ies) having jurisdiction. During the period of stabilized drawdown the stabilized water level shall not fluctuate more than plus or minus 0.5 foot (i.e., within a vertical tolerance of one foot) for each 100 feet of water in the well (i.e., initial water level to bottom of well) over the duration of constant flow rate of pumping. The water level at the endpoint of the stabilized drawdown period shall not be lower than the water level at the beginning point of that period. Water level measurement may be determined by steel tape, calibrated pressure gauge attached to an air line terminating at least five feet above the pump intake, electric sounder, or pressure transducer.

(d) If a stabilized pumping level is not achieved during the required test period or if the well does not recover to 90% of the initial water level within 24 hours after cessation of pumping, a thorough evaluation of the expected sustained performance of the well during seasonal or multi-year dry periods shall be prepared. This evaluation may involve additional hydrogeologic investigation. Such evaluation may be used in lieu of satisfying the objectives of subdivision (c) of this section only at the discretion of the reviewing agency(ies) having jurisdiction.

(e) The test shall be conducted at a pumping rate at least equal to the design pumping rate based on system demand.

(f) Water discharged during a yield test shall be discharged in a manner that avoids short circuiting of the pumped water back into the aquifer.

(g) For wells that have been subjected to hydrofracturing, the yield test shall not commence until redevelopment has been completed and, as a minimum, until the volume of water pumped/discharged into the aquifer has been removed from the well. After pumping, the hydrofractured well shall receive a water well yield test as outlined in this section.

Section 5-D.5 Well Pumps and Components.

Well caps and seals shall be tightly secured to the well casing, watertight, vermin- proof, and provide venting as noted in this section. Split caps shall not be used. Well caps shall be lockable and secured with sturdy, weatherproof locks or otherwise secured to prevent tampering.

Section 5-D.6 Water Well Capping and Abandonment.

All water well capping, abandonment and decommissioning shall be in accord with requirements in Appendix 5-A of this title.

Section 5-D.7 Separability.

If any provisions of this Appendix are held invalid, such invalidity shall not affect other provisions which can be given effect without the invalid provisions.

Table 1 Required Minimum Separation Distances to Protect Public Water Supply Wells From Contamination

Contaminant Source	Distance (Feet)[1]
Chemical storage sites not protected from the elements (e.g., salt and sand/salt storage)[2]	300
Landfill waste disposal area, or hazardous or radiological waste disposal area[2]	300
Land surface application or subsurface injection of effluent or digested sludge from a Municipal or public wastewater treatment facility	300
Land surface application or subsurface injection of septage waste	300
Land surface spreading or subsurface injection of liquid or solid manure	200
Storage Areas for Manure piles [3]	200
Barnyard, silo, barn gutters and animal pens [3]	200
Cesspools (i.e. pits with no septic tank pretreatment)	200
Wastewater treatment absorption systems located in coarse gravel or in the direct path of drainage to a well	200
Fertilizer and/or pesticide mixing and/or clean up areas	200
Seepage pit (following septic tank)	200
Underground single walled chemical or petroleum storage vessels	200
Absorption field or bed	200
Contained chemical storage sites protected from the elements (e.g., salt and sand/salt storage within covered structures) [4]	200
Septic system components (non-watertight)	200
Intermittent sand filter without a watertight liner	200
Sanitary Privy pit	200
Surface wastewater recharge absorption system for storm water from parking lots, roadways or driveways	200
Cemeteries	200
Sanitary privy with a watertight vault	200
Septic tank, aerobic unit, watertight effluent line to distribution box	100
Sanitary sewer or combined sewer	50
Surface water recharge absorption system with no automotive -related Wastes (e.g., clear-water basin, clear-water dry well)	None [5]
Stream, lake, watercourse, drainage ditch, or wetland	None [5]
All known sources of contamination otherwise not shown above	200

Notes for Table 1:

[1] The listed water well separation distances from contaminant sources shall be increased by 50% whenever aquifer water enters the water well at less than 50 feet below grade. If a 50% increase in separation distances can not be achieved, then the greatest possible increase in separation distance shall be provided with such additional measures as needed to prevent contamination.

[2] Water wells shall not be located in a direct line of flow from these items, nor in any contaminant plume created by these items, except with such additional measures (e.g., sentinel groundwater monitoring, hydraulic containment, source water treatment) as needed to prevent contamination.

[3] Water wells may be located 100 feet from temporary (30 days or less) manure piles/staging areas that are controlled to preclude contamination of surface or groundwater or 100 feet from otherwise managed manure piles that are controlled pursuant to regulation in a manner that prevents contamination of surface or groundwater. Wells serving public water systems may be located 100 feet from temporary barnyards, silos, barn gutters, or animal pens that are similarly controlled to prevent contamination of surface or ground water.

[4] Chemical storage sites as used in this entry do not include properly maintained storage areas of chemicals used for water treatment.

[5] Wells serving public water systems may be located near water bodies or surface water recharge systems but are subject to monitoring to determine if groundwater at the point of withdrawal is directly influenced by surface water and corresponding treatment requirements. Such wells must also be protected from floodwater pursuant to subdivision 5-B.2(b) of this Part.

Table 2. Yield Test and GWUDI [1] Determination Requirements for Wells Serving Public Water Systems

Well Geologic Formation And Casing Depth	Type of Public Water System (see Subpart 5-1) [2]			
	CWS, NTNCWS		TNCWS	
	Duration (hrs) [3]	GWUDI Testing	Duration (hrs)	GWUDI Testing
For Wells Located 200 feet or less from Surface Water				
All Geology and Casing Depths	72	Yes	Per 5-B.4 if allowed by LHD [4]	Yes
For Wells Located greater than 200 feet from Surface Water				
Sand and gravel; ≤ 50 feet casing	24	Yes	Per 5-B.4(b) if allowed by LHD [4]	Yes
Sand and gravel; > 50 feet casing	24	No	Per 5-B.4(b) if allowed by LHD [4]	No
Non-Carbonate Rock; ≤ 50 feet casing	72	Yes	Per 5-B.4(b) if allowed by LHD [4]	Yes
Non-Carbonate Rock; > 50 feet casing	72	No	Per 5-B.4(b) if allowed by LHD [4]	No
Carbonate Rock; All Casing Depths [5]	72	Yes	Per 5-B.4(b) if allowed by LHD [4]	Yes

Notes for Table 2:

[1] GWUDI means ground water source directly influenced by surface water source. Where well water sources may be potentially influenced by surface water, appropriate water quality testing shall be done in accordance with Department guidance to determine if the well water source is directly influenced by surface water.

[2] CWS means community water system as defined in 10 NYCRR Subpart 5-1. NTNCWS means nontransient noncommunity water system as defined in 10 NYCRR Subpart 5-1. TNCWS means a public water system that is neither a CWS nor a NTNCWS.

[3] Specified duration is the minimum required pumping period and must include a minimum of six hours of stabilized drawdown at the end of the test except as allowed under subdivision 5-D.4(d) of this Appendix.

[4] LHD means local health department as defined in Appendix 5-B.

[5] For wells located in areas that have the potential to draw water from carbonate aquifers, the local health department may determine based upon a hydrogeologic assessment, records of well logs, and/or other local geologic data that the aquifer is unlikely to show a surface water influence associated with karst topography. Where such determination is made, GWUDI testing need not be done.