Rhode Island Department of Health

PUBLIC NOTICE

The Director of the Rhode Island Department of Health has determined to amend the rules and regulations listed below to remove the specific dollar value of all fees for licensing, laboratory and administrative services provided by the Department of Health from the individual regulations and reference all such fees to a new consolidated fee regulation (to be promulgated separately). These amendments are proposed pursuant to the authority contained in Public Law 2012-241, enacted by the General Assembly on 15 June 2012, and the relevant sections of the respective professional practice and licensure acts.

The following seventy-five (75) regulations are proposed to be amended:

1. Food Code
2. Rules and Regulations Establishing Educational and Experience Requirements for Registration as a Sanitarian
3. Rules and Regulations for Asbestos Control
4. Rules and Regulations for Bottled Water
5. Rules and Regulations for Certifying Analytical Laboratories
6. Rules and Regulations for Determination of Need for New Health Care Equipment and New Institutional Health Services
7. Rules and Regulations for Lead Poisoning Prevention
8. Rules and Regulations for Licensing Assisted Living Residences
9. Rules and Regulations for Licensing Athletic Trainers
10. Rules and Regulations for Licensing Birth Centers
11. Rules and Regulations for Licensing Chemical Dependency Professionals
12. Rules and Regulations for Licensing Clinical Laboratories and Stations
13. Rules and Regulations for Licensing Clinical Social Workers and Independent Clinical Social Workers
14. Rules and Regulations for Licensing Doctors of Acupuncture and Acupuncture Assistants
15. Rules and Regulations for Licensing Home Nursing Care Providers and Home Care Providers
16. Rules and Regulations for Licensing Hospice Care
17. Rules and Regulations for Licensing Interpreters for the Deaf
18. Rules and Regulations for Licensing Kidney Disease Treatment Centers
19. Rules and Regulations for Licensing Massage Therapists
20. Rules and Regulations for Licensing Mental Health Counselors and Marriage and Family Therapists
21. Rules and Regulations for Licensing Occupational Therapists and Occupational Therapy Assistants
22. Rules and Regulations for Licensing of Hospitals
23. Rules and Regulations for Licensing of Midwives
24. Rules and Regulations for Licensing of Nursing Facilities
25. Rules and Regulations for Licensing of Nursing Home Administrators
26. Rules and Regulations for Licensing Physical Therapists and Physical Therapist Assistants
27. Rules and Regulations for Licensing Psychologists
28. Rules and Regulations for Licensing Rehabilitation Hospital Centers

29. Rules and Regulations for Licensing Respiratory Care Practitioners
30. Rules and Regulations for Licensing Speech Pathologists and Audiologists
31. Rules and Regulations for Licensing Swimming and Wading Pools, Hot Tubs, and Spas
32. Rules and Regulations for Licensure and Discipline of Chiropractic Physicians
33. Rules and Regulations for Limited Medical Registration
34. Rules and Regulations for Radon Control
35. Rules and Regulations for the Certification of Administrators of Assisted Living Residences
36. Rules and Regulations for the Certification of Health Plans
37. Rules and Regulations for the Control of Radiation
38. Rules and Regulations for the Licensing of Freestanding Ambulatory Surgical Centers
39. Rules and Regulations for the Licensing of Freestanding Emergency Care Facilities
40. Rules and Regulations for the Licensing of Nurses and Standards for the Approval of Basic Nursing Education Programs
41. Rules and Regulations for the Licensing of Nursing Service Agencies
42. Rules and Regulations for the Licensing of Organized Ambulatory Care Facilities
43. Rules and Regulations for the Licensing of Podiatrists
44. Rules and Regulations for the Licensing of Radiographers, Nuclear Medicine Technologists, Radiation Therapists and Radiologist Assistants
45. Rules and Regulations for the Licensure and Discipline of Physicians
46. Rules and Regulations for the Licensure of Barbers, Hairdressers/Cosmeticians, Manicurists, Estheticians, and Instructors
47. Rules and Regulations for the Licensure of Clinical Laboratory Science Practitioners
48. Rules and Regulations for the Licensure of Physician Ambulatory Surgery Centers and Podiatry Ambulatory Surgery Centers
49. Rules and Regulations for the Licensure of Physician Assistants
50. Rules and Regulations for the Licensure of Veterinarians
51. Rules and Regulations for the Registration of Body Piercing Technicians and Body Piercing Establishments
52. Rules and Regulations for the Registration of Distributors of Controlled Substances in Rhode Island
53. Rules and Regulations for the Registration of Tanning Facilities
54. Rules and Regulations for the Registration of Tattoo Artists and Tattoo Parlors
55. Rules and Regulations for the Utilization Review of Health Care Services
56. Rules and Regulations Governing Vital Statistics
57. Rules and Regulations Pertaining to Certification of Managers in Food Safety
58. Rules and Regulations Pertaining to Dentists, Dental Hygienists, and Dental Assistants
59. Rules and Regulations Pertaining to Embalmers, Funeral Directors, and Funeral Service Establishments
60. Rules and Regulations Pertaining to Opticians
61. Rules and Regulations Pertaining to Optometrists
62. Rules and Regulations Pertaining to Permits for Screening Programs
63. Rules and Regulations Pertaining to Pharmacists, Pharmacies and Manufacturers, Wholesalers, and Distributors
64. Rules and Regulations Pertaining to Public Drinking Water
65. Rules and Regulations Pertaining to Rhode Island Certificates of Registration for Nursing Assistants, Medication Aides, and the Approval of Nursing Assistant and Medication Aide Training Programs
66. Rules and Regulations Pertaining to the Certification of Public Drinking Water Supply Treatment and Public Water Supply Transmission and Distribution Operators

67. Rules and Regulations Pertaining to the Licensing of Dietitians/Nutritionists
68. Rules and Regulations Pertaining to the Medical Examiner System
69. Rules and Regulations Pertaining to the Newborn Metabolic, Endocrine, and Hemoglobinopathy Screening Program and the Newborn Hearing Loss Screening Program
70. Rules and Regulations Pertaining to the Processing and Distribution of Shellfish
71. Rules and Regulations Prescribing Minimum Standards for Processing, Storage and Transportation of Fish and Fishery Products
72. Rules and Regulations Related to the Licensure of Hearing Aid Dealers and Fitters
73. Rules and Regulations Related to the Medical Marijuana Program
74. Rules and Regulations Related to the Practice of Electrolysis
75. Rules and Regulations Relating to Emergency Medical Services

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Notice is hereby given in accordance with the provisions of §42-35-3(a)(2) of the Rhode Island General Laws, as amended, that the Director is affording all interested persons the opportunity to submit data, views, or arguments in writing on this matter. Opportunity for public hearing shall be granted if requested by twenty-five (25) persons, by a government subdivision or agency, or by an association having not less than twenty-five (25) members. *Otherwise, no hearing shall be convened*. Should a hearing be requested by twenty-five (25) persons, by a government subdivision or agency, or by an association having not less than twenty-five (25) members, *a hearing shall be scheduled only for the regulation(s) for which the request for hearing was received*. All regulations for which a public hearing is not requested will be filed with the Rhode Island Secretary of State pursuant to Chapter 42-35 of the Rhode Island General Laws, as amended, shortly after the 10 September 2012 deadline (as below).

Such input or requests for public hearing must be received in writing **no later than Monday, 10 September 2012**. Such input or requests should be addressed to: Michael Fine, M.D., Director, Rhode Island Department of Health, Three Capitol Hill, Room #401, Providence, Rhode Island 02908-5097.

In the development of these amendments, consideration was given to the following: (1) alternative approaches; and (2) overlap or duplication with other statutory and regulatory provisions. No alternative approach, duplication, or overlap was identified based upon available information.

Copies of all regulations are available for public inspection in the Cannon Building, Room #201, Rhode Island Department of Health, Three Capitol Hill, Providence, Rhode Island 02908-5097, on the Secretary of State's website: http://www.sos.ri.gov/rules/, by calling 401-222-7767, or by e-mail to Bill.Dundulis@health.ri.gov.

Signed this 3rd day of August 2012

Original signed by Michael Fine, MD

Michael Fine, M.D., Director of Health

RULES AND REGULATIONS PERTAINING TO PUBLIC DRINKING WATER

[R46-13-DWQ]

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF HEALTH

September 1977

AS AMENDED:

January 1983
September 1989 (E)
December 1990
May 1991 (E)
July 1991
August 1991 (E)
November 1991 (E)
February 1992
February 1992 (E)
July 1992 (E)
December 1992 (E)
March 1993 (T)
April 1993 (E)
June 1993
September 1993
March 1994
July 1994
January 1995
February 1996 (E)
June 1996 (E)
August 1996
September 1999
April 2000 (T)
June 2001
January 2002 (re-filing in accordance with the provisions of section 42-35-4.1 of the Rhode Island General Laws, as amended)
January 2003
January 2005
January 2007 (re-filing in accordance with the provisions of section 42-35-4.1 of the Rhode Island General Laws, as amended)
May 2008
May 2009
January 2012 (re-filing in accordance with the provisions of section 42-35-4.1 of the Rhode Island General Laws, as amended)
August 2012 (Proposed)

COMPILER'S NOTES:
Proposed Additions: Underlined
Proposed Deletions: ~~Strikeouts~~

INTRODUCTION

These amendments to *Rules and Regulations Pertaining To Public Drinking Water* (R46-13-DWQ) are promulgated pursuant to the authority conferred under Section 46-13-18 of the General Laws of Rhode Island, as amended, for the purpose of adopting standards compatible with the 2008 National Primary Drinking Water Regulations [40 CFR 141] promulgated by the United States Environmental Protection Agency (EPA).

Pursuant to the provisions of Section 42-35-3(c) of the General Laws of Rhode Island, as amended, the following were given consideration in arriving at the amended regulations: (1) alternative approaches to the regulations; and (2) duplication or overlap with other state regulations. No alternative approach, duplication, or overlap was identified based on available information.

These amended regulations shall supersede all previous *Rules and Regulations Pertaining to Public Drinking Water* promulgated by the Department of Health and filed with the Secretary of State.

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SECTION 1.0 - DEFINITIONS

Wherever used in these rules and regulations the following terms shall be construed as follows:

1.1 "Act" - means Chapter 46-13 of the General Laws of Rhode Island.

1.2 "Action level" - is the concentration of lead or copper in water specified in §6.80(c) which determines, in some cases, the treatment requirements contained in §6.0 of these Regulations that a water system is required to complete.

1.3 "Administrative penalty" - "Penalty" shall mean a monetary sum assessed by the Director pursuant to these Regulations in response to a violation of, or a failure to comply with, 46-13 or any rule, regulation, license, permit or order adopted pursuant to the Director's authority thereunder.

1.4 "Bag filters" - means pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed of a non-rigid, fabric filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to outside.

1.5 "Bank filtration" - means a water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water through a river bed or bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

1.6 "Best available technology" - means the best technology, treatment techniques, or other means which the EPA Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available for a specific contaminant or category of contaminants.

1.7 "Cartridge filters" – means pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed as rigid or semi-rigid, self-supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.

1.8 "Certified laboratory" - means an analytical laboratory licensed by the Rhode Island Department of Health under Chapter 16.2 "Laboratories", to perform biological, microbiological, chemical or radiochemical examination of potable water or a laboratory exempt from this law as provided for in 23-16.2-3 but which shall be certified by the State Certification official in accordance with 40 CFR 1422.10b.

1.9 "Change of use" - means a different or expanded activity at an existing PWS which significantly uses more or less water, or changes the duration of consumption between transient and non-transient, than previously approved through application or documented historical use.

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

1.11 "Combined distribution system" - means the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

1.12 "Community water system" - means the PWS which serves at least fifteen (15) service connections used by year-round residents or regularly serves at least twenty-five (25) year-round residents.

1.13 "Compliance cycle" - means the nine-year calendar year cycle during which PWSs must monitor. Each compliance cycle consists of three-year compliance periods. The first calendar

year cycle begins January 1, 1993 and ends December 31, 2001; the second begins January 1, 2002 and ends December 31, 2010; the third begins January 1, 2011 and ends December 31, 2019.

1.14 "Compliance period" - means a three-year calendar year period within a compliance cycle. Each compliance cycle has three (3), three-year compliance periods. Within the first compliance cycle, the first compliance period runs from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; and the third from January 1, 1999 to December 31, 2001.

1.15 "Comprehensive performance evaluation (CPE)" - means a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. For purposes of compliance with §5.0 of these Regulations, the comprehensive performance evaluation must consist of at least the following components: Assessment of plant performance; evaluation of major unit processes; identification and prioritization of performance limiting factors; assessment of the applicability of comprehensive technical assistance; and preparation of a CPE report.

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

1.17 "Connection" - means the water service line connecting a structure to the water distribution line. In the absence of data on the number of service connections, the population served divided by 2.5 shall be used as the default value.

(a) The following are excluded from the "connection" component of the PWS definition:

A connection to a system that delivers water through constructed conveyances other than pipes is excluded from consideration as a "connection" under three (3) circumstances:

(1) Where the water is used exclusively for purposes other than residential uses (consisting of drinking, bathing, and cooking, or other similar uses);

(2) Where the Director determines that alternative water to achieve the equivalent level of public health protection provided by the applicable national primary drinking water regulations is provided for drinking and cooking;

(3) Where the Director determines that the water provided for drinking, cooking, and bathing is treated (centrally or by point of entry) by the provider, a pass-through entity, or the user to achieve the equivalent level of protection provided by the applicable national primary drinking water regulations.

If the application of one (1) or more of these exclusions reduces the "connections" of a system providing water for human consumption (through construction conveyances other than pipes) to fewer than fifteen (15) service connections that serve fewer than twenty-five (25) individuals, the supplier's water system is not a PWS.

However, if the supplier's remaining connections number fifteen (15) or more, or if its remaining connections [even if they number fewer than fifteen (15)] regularly serve at least twenty-five (25) individuals, then the system is a PWS although the excluded connections are not considered part of the PWS for as long as the exclusions apply and the system complies with any conditions governing their applicability.

(b) An irrigation district in existence prior to May 18, 1994 that provides primarily agricultural service through a piped water system with only incidental residential or similar use shall not be considered to be a PWS if the system or the residential or similar users of the system comply with subsections (a)(2) and (3) of this definition.

1.18 "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.

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

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

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

1.22 "CT" or "CT_{calc}" - is the product of "residual disinfectant concentration" C in mg/L determined before or at the first customer, and the corresponding disinfectant contact time (T) in minutes, i.e., "C" x "T". "$CT_{99.9}$" is the CT value required for 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts. $CT_{99.9}$ for a variety of disinfectants and conditions appear in Tables 1.1-1.6, 2.1, and 3.1 of Section 5.6. $CT_{calc}/CT_{99.9}$, is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as the sum of $(CT_{calc})/(CT_{99.9})$, is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3-log inactivation of *Giardia lamblia* cysts.

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

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

1.25 "Director" - means the Director of the Rhode Island Department of Health or his duly authorized agent.

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

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

1.28 "Disinfection" - means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

1.29 "Disinfection profile" - is a summary of daily *Giardia lamblia* inactivation through the treatment plant. The procedure for developing a disinfection profile is contained in Section 5.

1.30 "Domestic or other non-distribution system plumbing problem" - means a coliform contamination problem in a PWS with more than one (1) service connection that is limited to the specific service connection from which the coliform-positive sample was taken.

1.31 "Dose equivalent" – means the absorbed dose from ionizing radiation expressed in terms of Rads multiplied by such a factor as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

1.32 "Dual sample set" - means a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purposes of conducting an IDSE under §7.9 and determining compliance with the TTHM and HAA5 MCLs under §7.10.

1.33 "Effective corrosion inhibitor residual" - for the purpose of §6.0, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

1.34 "Enhanced coagulation" - means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

1.35 "Enhanced softening" - means the improved removal of disinfection byproduct precursors by precipitative softening.

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

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

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

1.39 "First draw sample" - means a one-liter sample of tap water, collected in accordance with §6.86(b)(2), that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.

1.40 "Flocculation" - means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

1.41 "Flowing stream" - means a course of running water flowing in a definite channel.

1.42 "GAC10" - means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with §7.1 MCLs under §7.1(c) shall be 120 days..

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

1.44 “Gross alpha particle activity” – means the total radioactivity due to alpha particle emission as determined from measurements on a dry sample.

1.45 “Gross beta particle activity” – means the total radioactivity due to beta particle emission as determined from measurements on a dry sample.

1.46 “Ground water under the direct influence of surface water” - means any water beneath the surface of the ground with (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium* or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the Director. The Director's determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation.

1.47 “Haloacetic acids (five) (HAA5)” - means the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid and dibromoacetic acid), rounded to two (2) significant figures after addition.

1.48 “Halogen” - means one of the chemical elements chlorine, bromine or iodine.

1.49 “Initial compliance period” - means the first full three-year compliance period which begins at least 18 months after promulgation, except for dichloromethane, 1,2,4 trichlorobenzene, 1,1,2-trichloroethane, benzo[a]pyrene, dalapon, di(2-ethylhexyl)adipate, di(2-ethylhexyl)phthalate, dinoseb, diquat, endothall, endrin, glyphosate, hexachlorbenzene, hexachlorocyclopentadiene, oxamyl(Vydate), picloram, simazine, 2,3,7,8-TCDD (Dioxin), antimony, beryllium, cyanide, nickle, and thallium, initial compliance period means January 1993-December 1995 for systems with 150 or more service connections and January 1996-December 1998 for systems having fewer than 150 service connections.

1.50 “Lake/reservoir” - means a natural or man made basin or hollow on the Earth's surface in which water collects or is stored that may or may not have a current or single direction of flow.

1.51 “Large water system” - for the purpose of Section 6, means a water system that serves more than 50,000 persons.

1.52 “Lead service line” - means a service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line.

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

1.54 “License” - means approval as specified in Section 46-13-2.1 of the General Laws of Rhode Island, 1956 as amended.

1.55 “Locational running annual average (LRAA)” - means the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

1.56 “Manmade beta particle and photon emitters” - means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

1.57 “Maximum contaminant level” - means the maximum permissible level of a contaminant in water which is delivered to any user of a PWS.

1.58 “Maximum contaminant level goal (MCLG)” - means the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are nonenforceable health goals.

1.59 “Maximum residual disinfectant level (MRDL)” - means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a PWS is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two (2) consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels under Section 1412 of the Safe Drinking Water Act. There is convincing evidence that the addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in Section 7.2(a) herein, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

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

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

1.62 “Medium-size water system” - for the purpose of Section 6 only, means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

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

1.64 “Near the first service connection” - means at one (1) of the 20 percent of all service connections in the entire system that are nearest the water supply treatment facility, as measured by water transport time within the distribution system.

1.65 “Non-community water system” - means a PWS that is not a community water system. A non-community water system is either a “transient non-community water system (TWS)” or a “non-transient non-community water system (NTNCWS).

1.66 “Noncompliance” - “Nonconformance” - “Failure to comply” - “Violation” - each mean any act or failure to act which constitutes or results in or from:

(i) engaging in any activity prohibited by, or not in compliance with the Act or any rule, regulation, permit, approval or order adopted pursuant to the Director's authority thereunder;

(ii) engaging in any business or other activity without a necessary permit, or approval that is required by law or regulation;

(iii) the failure to perform, or the failure to perform in a timely fashion, anything required by the Act, by a rule, regulation, permit, approval or order adopted pursuant to the Director's authority.

1.67 "Non-transient non-community water system" - means a non-community water system that regularly services at least twenty-five (25) of the same persons over six (6) months per year.

1.68 "Optimal corrosion control treatment" - for the purpose of Section 6, means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any other regulations herein (*Rules and Regulations Pertaining to Public Drinking Water*).

1.69 "Order" - means the whole or a part of a final disposition by the Department, whether affirmative, negative, injunctive, consent or declaratory in form, other than rulemaking but including notices of violation, compliance orders, permits, and approvals issued pursuant to the Director's authority.

1.70 "Performance evaluation sample" - means a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance specified by the Director. The true value of the concentration of the reference material is unknown to the laboratory at the time of the analysis.

1.71 "Permit" - means an authorization, or equivalent control document issued by the Department to implement the requirements of 46-13.

1.72 "Person" - shall include an individual, partnership, association, or corporation, or any town or city or any agency thereof, or the state or any agency thereof, or any other legal entity.

1.73 "Picocurie (pCi)" - means a unit of radioactivity equal to 2.22 nuclear transformations per minute.

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

1.75 "Point of disinfectant application" - means the point where the disinfectant is applied and water downstream of that point is not subject to recontamination by surface water runoff.

1.76 "Point-of-entry treatment device (POE)" - means a treatment device applied to the drinking water entering a house or building for the purpose of reducing contaminants in the drinking water distributed throughout the house or building.

1.77 "Point-of-use treatment device (POU)" - means a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water.

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

1.79 "Public water system (PWS)" - means a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least

fifteen (15) service connections or regularly serves at least twenty-five (25) individuals daily at least sixty (60) days out of the year. Such term includes:

(i) any collection, treatment, storage and distribution facilities under control of the operator of such system and used primarily in connection with such system, and

(ii) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system.

1.80 "Rad" - means a unit of absorbed dose equal to 100 ergs per gram in any medium. (100 rad = 1 gray)

1.81 "Rem" - means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. (100 rem = 1 sievert)

1.82 "Repeat compliance period" - means any subsequent compliance period after the initial compliance period.

1.83 "Requirement" - means any provision of the Act, or any rule, regulation, permit, approval or order adopted pursuant to the Director's authority.

1.84 "Residual disinfectant concentration" ("C" in CT calculations) - means the concentration of disinfectant measured in mg/1 in a representative sample of water.

1.85 "Sanitary survey" – means an on-site review of the water source (identifying sources of contamination by using the results of source water assessments where available), facilities, equipment, operation, maintenance and monitoring compliance of a PWS for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

1.86 "Sedimentation" - means a process for removal of solids before filtration by gravity or separation.

1.87 "Service line sample" - means a one-liter sample of water, collected in accordance with §6.86(b)(3), that has been standing for at least 6 hours in a service line.

1.88 "Single family structure" - for the purpose of §6.0 only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

1.89 "Slow sand filtration" - means a process involving passage of raw water through a bed of sand at low velocity (generally less than 0.4 m/h or 1 gal./ft2/h resulting in substantial particulate removal by physical and biological mechanisms.

1.90 "Small water system" - for the purpose of §6.0 only, means a water system that serves 3,300 persons or fewer.

1.91 "Special irrigation district" - means an irrigation district in existence prior to May 18, 1994 that provides primarily agricultural service through a piped water system with only incidental residential or similar use where the system or the residential or similar users of the system if the Director determines that:

(i) alternative water to achieve the equivalent level of public health protection provided by the applicable national primary drinking water regulation is provided for residential or similar uses for drinking and cooking; or

(ii) the water provided for residential or similar uses for drinking, cooking and bathing is centrally treated or treated at the point of entry by the provider, a pass-through entity or the

user to achieve the equivalent level of protection provided by the applicable national primary drinking water regulations.

1.92 "Standard sample" - means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

1.93 "Subpart H systems" - means PWSs using surface water or ground water under the direct influence of surface water as a source that are subject to the requirements of §5.0 of these Regulations. These systems are also called Section 5 (§5.0) systems.

1.94 "Surface water" - means all water which is open to the atmosphere and subject to surface runoff.

1.95 "SUVA" - means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV 254) (in m^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/L).

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

1.97 "These Regulations" mean all parts of Rhode Island *Rules and Regulations Pertaining To Public Drinking Water*.

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

1.99 "Total Organic Carbon (TOC)" - means total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two (2) significant figures.

1.100 "Total trihalomethanes (TTHM)" - means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

1.101 "Transient non-community water system or TWS" - means a non-community water system that does not regularly serve at least twenty-five (25) of the same persons over six (6) months per year.

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

1.103 "Two-stage lime softening" - means a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration.

1.104 "Uncovered finished water storage facility" - means a tank, reservoir, or other facility used to store water that will undergo no further treatment to reduce microbial pathogens except residual disinfection and is directly open to the atmosphere.

1.105 "Virus" - means a virus of fecal origin which is infectious to humans by waterborne transmission.

1.106 "Waterborne disease outbreak" - means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a PWS which is deficient in treatment, as determined by the appropriate local or State agency.

1.107 "Water purveyor" - means any person who owns or operates a PWS. This person may also be designated in some US EPA documents as a "supplier of water"

1.108 “Wellhead Protection Area (WHPA)” – means the land area contributing water to a public drinking water supply well.

1.109 “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.

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SECTION 2.0 - COVERAGE

2.1 These regulations apply to any PWS unless a PWS meets all of the following conditions:

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

(b) The system obtains all of its water from a PWS to which these Regulations apply; and

(c) The system does not sell water to any person.

2.2 **General Requirements**

(a) No person shall develop, maintain, or operate a public water supply system unless said system is approved by the Director. Further, all public water supply systems must be developed, operated and maintained in accordance with the requirements and provisions of these Regulations in order for a public water supply system to maintain approval by the Director.

(b) Should the Director find that a public water supply system is not developed, maintained, or operated in compliance with regulatory provisions, s/he may revoke, suspend or otherwise limit the approval previously granted.

(c) The Director is authorized to enter at all reasonable times in or upon any private or public property for the purpose of carrying out the provisions of these Regulations or making an inspection or investigation of a condition which the Director believes may be hazardous to the health of the consumers serviced by any public water supply system or in violation of the regulations or orders promulgated under Chapter 46-13.

2.3 **Licensing Requirement**

(a) **Applicability**

Pursuant to the provisions of Section 46-13-2.1 of the General Laws of Rhode Island, as amended, no person shall operate or maintain a public water supply system unless the system is licensed by the Director under the provisions of this subsection.

Persons subject to licensure shall be assessed initial and annual renewal licensure fees in accordance with the fee schedule listed for each category of PWS in §2.3(c)(2).

(b) **License Application**

(1) To apply for a license, a PWS shall submit a completed application to the Director on forms provided for this purpose. The application shall include all information required by these Regulations, as well as by the form and the accompanying instructions. Applications for a new community or nontransient non-community PWS shall include a water system management plan that demonstrates the financial, managerial, and technical capacity to comply with statutory and regulatory requirements.

(2) The Director may at any time after filing of the original application require further information in order to determine whether the application should be approved or denied.

(3) Each application for a PWS license shall be signed by the applicant or a person duly authorized to act on behalf of the applicant.

(4) No new PWS shall be licensed until: the application has been approved, the PWS has been constructed in accordance with the approved plans and the water has been sampled and found to be in compliance with the requirements of these Regulations.

(c) **License Fees**

~~(1)~~ Pursuant to the provisions of Section 46-13-2.1 of the General Laws of Rhode Island, as amended, the Director shall grant a license to a PWS that meets the licensure requirements set forth in these Regulations and upon submission of the license fee as ~~listed in §2.3(c)(2) of these Regulations made payable by check to the General Treasurer, State of Rhode Island.~~ set forth in the *Rules and Regulations Pertaining to the Fee Structure for Licensing, Laboratory and Administrative Services Provided by the Department of Health.* Said license, unless sooner suspended or revoked, shall expire on the 30th day of June following its issuance and must be renewed from year-to-year.

~~(2) Effective July 1, 2009 the annual fee for licensure shall be as follows:~~

~~Transient non-community water system: two hundred dollars ($200.00).~~

~~Nontransient non-community water system: three hundred and thirty dollars ($330.00).~~

~~Community water system: one dollar and fifty cents ($1.50) per connection:~~

~~minimum fee = three hundred and thirty dollars ($330.00).~~

~~maximum fee = thirty two thousand-five hundred dollars ($32,500.00).~~

(d) **Denial of License**

(1) The Director may deny an application for a license if s/he determines that the applicant has not demonstrated the ability to comply fully with the applicable requirements established by the Act and/or by these Regulations.

(2) An applicant whose application is denied may request a hearing in accordance with the Administrative Procedures of the Rhode Island Department of Health.

(e) **Suspension or Revocation of a License**

The Director may, for cause or for violation of these Regulations, suspend or revoke any license issued under this subsection. The Director may also review the current status of any license with regard to current use of the water supply and any change of use of the PWS.

(f) **Renewal of License**

(1) All licenses shall expire on the 30th day of June following its issuance except as provided in §2.3(f)(5).

(2) A renewal application must be filed with the Director by the 31st day of May of each year on forms provided for this purpose.

(3) The appropriate licensing fee must accompany the renewal application.

(4) Updated and complete contact information must accompany the renewal application, including names, phone numbers, address fax number and e-mail address (if available). Contact information must be updated using forms designated by the Director, in a timely manner, whenever a change occurs.

(5) Renewal of a license shall be based upon: satisfactory compliance with the regulations and timely submission of a renewal application and fee.

(6) In any case in which a PWS not less than 30 days prior to expiration of an existing license, has filed a renewal application and fee in proper form for renewal, such existing license shall not expire until final action on the application has been taken by the Director.

(7) Penalties for Late Renewals

(i) Any license granted under §2.3 whose renewal, accompanied by the prescribed fee, is not filed on or before the expiration date of such license shall be automatically lapsed.

(ii) The Director may, in his/her discretion and upon the payment by the license holder of the current license fee, plus an additional fee ~~of fifty percent (50%) of the renewal fee or five hundred dollars ($500.00), whichever is less,~~ as set forth in the *Rules and Regulations Pertaining to the Fee Structure for Licensing, Laboratory and Administrative Services Provided by the Department of Health* reinstate any license lapsed under the provisions of §2.3.

(g) Licenses shall be issued only for the public water supply system and persons named on the application and shall not be transferable or assignable. Existing PWSs which have significant change of use of the water supply shall be reviewed and modified as deemed appropriate by the Director.

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SECTION 3.0 - NEW WATER SOURCES

3.1 No source of water shall be developed for a PWS until a site plan prepared by a professional engineer or land surveyor registered in accordance with Chapter 5-8 of General Laws of Rhode Island, 1956, as amended, has been approved by the Director.

(a) Approval of plans and specifications granted an applicant shall expire within two (2) years if construction of the approved source has not begun within that period.

(b) Expired approvals may be renewed if the data provided in the application is unchanged and attested to by the applicant; and the plans conform with all construction standards and testing requirements in effect at the time of application for renewal.

3.2 In the case of a proposed gravel packed or gravel developed well, the site plan shall contain pertinent information within of the proposed well including, but not limited to, the location of existing and proposed sewage disposal systems and any other existing or proposed potential sources of pollution including, but not limited to, those listed in Appendix 4. Generally, the land within four hundred (400) feet of such wells shall be reserved for protection of the water quality of the well, and shall be delineated on the site plan by a topographic mapping of the four hundred (400) foot area to an appropriate scale. This distance may be modified at the discretion of the Director taking into consideration such factors as the volume and type of waste material to be disposed or stored in close proximity to the land area reserved for protection of the well, the projected yield of the well, the depth below grade to impervious formation, the depth below grade to the water table, the type of soil in the area, or any other factors the Director deems pertinent.

3.3 In the case of a proposed drilled (rock), driven, or dug well, the site plan shall show pertinent information within of the proposed well including, but not limited to, the location of existing and proposed sewage disposal systems and any other existing or proposed potential sources of pollution including but not limited to those listed in Appendix 4. Generally, the land within two hundred (200) feet of such wells shall be reserved for protection of the water quality of the well, and shall be delineated on the site plan by a topographic mapping of the two hundred (200) foot area to an appropriate scale. This distance may be modified at the discretion of the Director taking into consideration such factors as the volume and type of waste material to be disposed or stored in close proximity to the land area reserved for protection of the well, the depth below grade to impervious formation, the depth below grade to the water table, the type of soil in the area, or any other factors the Director deems pertinent.

3.4 In the case of a proposed surface water source, the site plan shall show pertinent information within the entire watershed of the proposed surface water supply, but not limited to the location of existing and proposed sewage disposal systems and any other existing or proposed potential sources of pollution including, but not limited to, those listed in Appendix 4. The portion of the watershed owned or controlled by the water purveyor shall be clearly indicated. All surface water sources shall be provided with water treatment consisting, as a minimum, of coagulation, sedimentation, filtration and disinfection.

3.5 All revisions to approved plans must be submitted to the Director for approval. The Director may require a new application and/or site plan if the revisions are deemed significant.

3.6 Land reserved for the protection of the well as (indicated on the plan) approved by the Director must remain under the direct control of the water supplier by either continued ownership or recorded easement unless written permission to modify this area is granted by the Director.

3.7 It is the responsibility of the water supplier to maintain the protective well area free from potential sources of contamination as listed in Appendix 4.

3.8 Connection to another public water supply - A new public water supply shall not be approved for use at any facility if another community public water supply is reasonably accessible to such facility as determined by the Director, and permission to connect can be obtained from the authority having jurisdiction.

3.9 Applications for approval of new water sources must be accompanied by an assessment of the financial viability for said water system to maintain compliance with the requirements of these Regulations. The assessment shall include a discussion of operation costs including: operation, maintenance, monitoring, anticipated future improvements, debt repayment, and unforeseen emergencies or system breakdowns, and a discussion of how the necessary revenues to pay for these costs will be raised.

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SECTION 4.0 - APPROVAL OF TREATMENT WORKS, STORAGE AND PUMPING FACILITIES

4.1 No new water treatment works or water storage or pumping facilities shall be constructed or such existing works or facilities substantially altered until design plans and specifications prepared by a professional engineer registered in accordance with Chapter 5-8 of the General Laws of Rhode Island, as amended, and a plan for operation and maintenance have been approved by the Director. The design of water treatment works, water storage or water pumping facilities should reflect the guidance contained in (*Ten State Standards*) *Recommended Standards for Water Works: Policies for the Review and Approval of Plans and Specifications for Public Water Supplies*[1] (most recent edition), where applicable. These facilities shall also be installed and constructed in accordance with applicable American Water Works Association (AWWA) Standards with reference to materials used and construction procedures to be followed. Exceptions from this requirement may be granted by the Director.

(a) Any chemical or substance added to a public water supply, any materials used in the manufacture of public water supply components or appurtenances, or any pipe, storage tank, valve, fixture or other materials which come in contact with water intended for use in a public water supply shall meet American National Standards Institute/NSF International standards, specifically ANSI/NSF Standard 60 (most recent edition) and ANSI/NSF Standard 61 (most recent edition) which are hereby adopted by reference.

Only products which meet the standards adopted in or pursuant to this Section shall be used by a supplier of water in a public water supply. Certification that a product meets the standards adopted pursuant to this Section by an organization having a third-party certification program accredited by American National Standards Institute, the American Association for Laboratory Accreditation, or the International Accreditation Service, Inc. or equivalent to test and certify products shall be prima facie evidence that a product meets the standards.

Product Type	Standard
Drinking Water Treatment Chemicals	60
Pipes and Related Products	61
Protective (Barrier) Materials	61
Joining and Sealing Materials	61
Process Media	61
Mechanical Devices	61
Plumbing Devices	61

(b) NSF Standards have also been developed for certain Drinking Water Treatment Units. Units meeting these criteria may be considered for approval, if deemed appropriate by the Director.

[1] Published by Health Research Inc., Health Education Services Division, P.O. Box 7126, Albany, New York 12224.

Product Type	Standard
Cation Exchange Water Softeners	44
Drinking Water Distilation Systems	62

4.2 All newly constructed PWSs or additions to existing systems shall be flushed, adequately disinfected, and the water examined for the presence of coliform organisms in accordance with Appendix 1. No system shall be placed in use until such examination discloses the absence of coliform organisms. Any newly constructed or recoated water storage tank shall be tested for volatile organic compounds (VOCs) prior to being put into service. If VOCs reported are above the laboratory detection limit and/or background source limit, the water system shall flush and/or drain the tank, refill and analyze for VOCs until such time as the concentrations reported are below the laboratory detection limit. An alternative to refilling and retesting shall be to submit documentation acceptable to the Director that the tank coating was NSF Standard 61 approved, was mixed properly and has cured properly. Any waste water resulting from disinfection must be disposed of in accordance with applicable Federal, State and Local regulations, and with the proper permits.

4.3 All revisions to approved plans must be submitted to the Director for approval. The Director may require a new application and/or site plan if the revisions are deemed significant.

4.4 **Use of Non-Centralized Treatment Devices**

(a) Criteria and procedures for PWSs using point-of-entry devices.

(1) PWSs may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this Section and are approved by the Director.

(2) It is the responsibility of the PWS to operate and maintain the point-of-entry treatment system.

(3) The PWS must develop and obtain the Director's approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the Director, point-of-entry devices must provide health protection equivalent to central water treatment. “Equivalent” means that the water would meet all MCLS and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. In addition to the VOCs, monitoring must include physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(4) Effective technology must be properly applied under a plan approved by the Director and the microbiological safety of the water must be maintained.

(i) Adequate certification of performance and field testing must be provided as required by the Director.

(ii) NSF Standards have been developed for certain point of entry and point of use treatment systems. Certification of compliance with these standards shall be considered adequate certification of performance. Units meeting these standards may be considered for approval, if deemed appropriate by the Director.

Product Type	Standard
Drinking Water Treatment Units – Aesthetic Effects	42
Drinking Water Treatment Units – Health Effects	53
Reverse Osmosis Drinking Water Treatment Systems	58
Ultraviolet Microbiological Water Treatment Systems	55
Shower Filtration Systems – Aesthetic Effects	177
Microbiological Water Purifiers	P231

(iii) The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contractor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(5) All consumers shall be protected. Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The Director must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the PWS customer convey with title upon sale of property.

4.5 **Use of Bottled Water or Point of Use Treatment Devices.** PWSs shall not use bottled water or point-of-use devices to achieve compliance with an MCL. Bottled water or point-of-use devices may be used on a temporary basis to avoid an unreasonable risk to health, and only with prior approval of the Director.

(a) Where bottled water is used, the PWS is fully responsible for the provision of sufficient quantities of bottled water to every person supplied by the PWS. The water system must use an approved bottled water supply.

(b) Where a point of use device is used, it must comply with the requirements of §4.4.

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SECTION 5.0 - FILTRATION AND DISINFECTION

5.1 **General Requirements**:

The requirements of this Section constitute Rhode Island's primary drinking water regulations. These regulations establish criteria under which filtration is required as a treatment technique for PWSs supplied by a surface water source, or a ground water source under the direct influence of surface water also referred to as §5.0 systems.

These regulations establish treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium* and turbidity.

Each §5.0 system must provide treatment of that source water that complies with these treatment technique requirements.

5.1.1 The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(1) At least 99.9 percent (3-log) removal and/or inactivation of Giardia lamblia cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer, and

(2) At least 99.99 percent (4-log) removal and or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(3) At least 99 percent (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems.

(4) Compliance with the profiling and benchmark requirements under the provisions of §5.3.7.

5.1.2 A §5.0 system is considered to be in compliance with the requirements of §5.1.1 if:

(1) It meets the requirements for avoiding filtration in §5.2 below and the disinfection requirements in §5.3 OR

(2) It meets the filtration requirements in §5.4 and the disinfection requirements in §5.3.

5.1.3 Each §5.0 system must be operated by qualified personnel who meet the requirements of the *Rules and Regulations Pertaining to the Certification of Public Drinking Water Treatment and Transmission and Distribution Operators* promulgated pursuant to the authority set forth in Chapter 23-65 of the General Laws of Rhode Island, as amended.

5.1.4 §5.0 systems that served fewer than 10,000 people beginning January 1, 2002 but currently serve or will serve at least 10,000 people before January 1, 2005 must comply with all the requirements listed in this Filtration and Disinfection Document for systems serving at least 10,000 people as soon as those systems begin serving at least 10,000 people. These systems must also consult with the Director to establish a disinfection benchmark. If a significant change is made to the disinfection practice these systems must consult with the Director prior to making such change as stated in §5.3.7(4) including, but not limited to, §5.3.7(4)(a)(i-iv).

5.1.5 **Recycle Provisions**: All §5.0 systems that employ conventional filtration or direct filtration treatment and that recycle spent filter backwash water, thickener supernatant, or liquids from dewatering processes must meet the requirements in §5.1.5(1) and §5.8.4.

(1) **Treatment Technique Requirement**. Any system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes must return these flows through the processes of a system's existing conventional or direct filtration system as defined in §1.0 or at an alternate location approved by the Director by June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.

5.2 **Criteria For Avoiding Filtration**:

5.2.1 A PWS that uses a surface water source must meet all of the conditions of §§5.2.5 and 5.2.6 and is subject to §5.2.7 unless the Director has determined in writing that filtration is required.

5.2.2 A PWS that uses a ground water source under the direct influence of surface water must meet all of the conditions of §§5.2.5 and 5.2.6 and is subject to §5.2.7 eighteen (18) months after the Director determines that it is under the direct influence of surface water, unless the Director has determined in writing that filtration is required.

5.2.3 [**DELETED**]

5.2.4 Within 18 months of the failure of a system using surface water or a ground water source under the direct influence of surface water to meet any one (1) of the requirements of §§5.2.5 or 5.2.6, the system must have installed filtration and meet the criteria for filtered systems specified in §5.4.

5.2.5 **Source Water Quality Conditions**:

(1) The fecal coliform concentration must be equal to or less than 20/100ml or the total coliform concentration must be equal to or less than 100/100 ml (measured as specified in Appendix 1) in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least ninety (90) percent of the samples taken for the six (6) previous months that the system served water to the public on an ongoing basis.

If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, must be met.

(2) The turbidity level cannot exceed 5 NTU (measured as specified in appendix 1) in representative samples of the source water immediately prior to the first or only point of disinfectant application.

5.2.6 **Site Specific Conditions**:

(1) **Compliance**

(a) The PWS must meet the requirements of §5.3.5(1) at least eleven (11) of the twelve (12) previous months that the system served water to the public on an ongoing basis.

(b) The PWS must meet the requirements of §§5.3.5(2) and 5.3.5(3) at all times the system serves water to the public.

(c) The PWS must meet the requirements of §5.3.5(4) on an ongoing basis.

(2) The PWS must maintain a watershed control program which minimizes the potential for contamination by *Giardia lamblia* cysts, *Cryptosporidium* oocysts and viruses in the source water. During the onsite inspection (discussed in §5.2.6(3)), the adequacy of a watershed control program will be determined by the Director. The adequacy of a program to limit potential contamination by *Giardia lamblia* cysts, *Cryptosporidium* oocysts, and viruses must include, but not be limited to, the following measures:

(a) The comprehensiveness of the watershed review;

(b) The effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and

(c) The extent to which the water system has maximized land ownership and/or controlled land use within the watershed. At a minimum, the watershed control program must:

(i) characterize the watershed hydrology and land ownership;

(ii) identify watershed characteristics and activities which may have an adverse effect on source water quality; and

(iii) monitor the occurrence of activities which may have an adverse effect on source water quality.

The PWS must demonstrate through ownership and/or written agreements with landowners within the watershed that it can control all human activities which may have an adverse impact on the microbiological quality of the source water.

The PWS must submit an annual report to the Director that identifies any special concerns about the watershed and how they are being handled; describes activities in the watershed that affect water quality; and projects what adverse activities are expected to occur in the future and describes how the PWS expects to address them. Approved watershed protection plans or wellhead protection plans may be used to the extent that they are applicable.

(3) The PWS must be subject to an annual on-site inspection to assess the watershed control program and disinfection treatment process.

A report of the on-site inspection summarizing all findings must be prepared every year. The on-site inspection must indicate to the Director's satisfaction that the watershed control program and disinfection treatment process are adequately designed and maintained. The on-site inspection will include but not be limited to:

(a) A review of the effectiveness of the watershed control program;

(b) A review of the physical condition of the source intake and how well it is protected;

(c) A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;

(d) An inspection of the disinfection equipment for physical deterioration;

(e) A review of operating procedures;

(f) A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and

(g) Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

(4) The PWS must not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system must have been modified sufficiently to prevent another such occurrence as determined by the Director.

(5) The PWS must comply with the maximum contaminant level (MCL) for total coliforms in §16.4(c) at least eleven (11) of the twelve (12) previous months that the system served water to the public on an ongoing basis, unless the Director determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(6) All §5.0 systems must comply with the requirements for total trihalomethanes, haloacetic acids (five), bromate, chlorite, chlorine, chloramines, and chlorine dioxide in §7.0.

5.2.7 **Treatment Technique Violations:**

(1) A system that fails to meet any one (1) of the criteria in §§5.2.5 or 5.2.6 or for which the Director has determined that filtration is required in writing and fails to install filtration by the date specified is in violation.

(2) A system that has not installed filtration is in violation of a treatment technique requirement if:

(a) the turbidity level in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or

(b) the system is identified as a source of a waterborne disease outbreak.

5.3 **Disinfection:**

5.3.1 A PWS that uses a surface water source and does not provide filtration treatment must provide the disinfection treatment specified in §5.3.5 unless the Director determines that filtration is required in writing.

5.3.2 A PWS that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment specified in §5.3.5 eighteen (18) months after the Director determines that the ground water source is under the influence of surface water, unless the Director has determined that filtration is required in writing.

5.3.3 If the Director has determined that filtration is required, the system must comply with any interim disinfection requirements the Director deems necessary before filtration is installed. A system that uses a surface water source that provides filtration treatment must provide the disinfection treatment specified in §5.3.6 beginning June 29, 1993 or beginning when filtration is installed, whichever is later.

5.3.4 A system that uses a ground water source under the direct influence of surface water and provides filtration treatment must provide disinfection treatment as specified in §5.3.6, beginning when filtration is installed. Failure to meet any requirement of this Section is a treatment technique violation.

5.3.5 **Disinfection Requirements For PWSs That Do Not Provide Filtration**:

(1) The disinfection treatment must be sufficient to ensure at least 99.9 percent (3-log) inactivation of Giardia lamblia cysts and 99.99 percent (4-log) inactivation of viruses, every day the system serves water to the public, except any one (1) day each month. Each day a system serves water to the public, the PWS must calculate the CT value(s) from the

system's treatment parameters, using the procedure specified in §§5.6.1(3) and 5.6.1(4) and determine whether this value is sufficient to achieve the specified inactivation rates for Giardia lamblia cysts and viruses.

If a system uses a disinfectant other than chlorine, the system may demonstrate to the Director, through the use of a protocol approved by the Director for on-site disinfection challenge studies or other information satisfactory to the Director, that the $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by §5.3.5(1).

(2) The disinfection system must have either:

(a) redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system; or

(b) automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/L of residual disinfectant concentration in the water.

If the Director determines that automatic shut-off would cause unreasonable risk to health or interfere with fire protection, the system must comply with §5.3.5(2)(a).

(3) The residual disinfectant concentration in the water entering the distribution system measured as specified in §5.5 cannot be less than 0.2 mg/L for more than 4 hours.

(4) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine or chlorine dioxide as specified in §5.5 cannot be undetectable in more than five (5) percent of the samples each month, for any two (2) consecutive months that the system serves water to the public.

Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml measured as heterotrophic plate count (HPC) as specified in §5.5 is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5 percent in one (1) month for any two (2) consecutive months:

$$V = \frac{c+d+e}{a+b} \times 100$$

Where:

a = number of instances where the residual disinfectant concentration is measured;

b = number of instances where the residual disinfectant concentration is not measured but the heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances where the residual disinfectant concentration is measured but not detected and where the HPC is >500/ml; and

e = number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml.

5.3.6 **Disinfection Requirements For PWSs Which Provide Filtration**: Each PWS that provides filtration treatment must provide disinfection treatment as follows:

(1) The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation and/or removal of viruses as determined by the Director.

(2) The residual disinfectant concentration in the water entering the distribution system measured as specified in §5.5 cannot be less than 0.2 mg/L, measured as free chlorine, for more than four (4) hours.

(3) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine or chlorine dioxide, as specified in §5.5 cannot be undetectable in more than five (5) percent of the samples each month, for any two (2) consecutive months that the system serves water to the public.

Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in §5.5, is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus the value of "V" cannot exceed five (5) percent in one (1) month for any two (2) consecutive months. [See formula in §5.3.5(4)].

5.3.7 **Disinfection Profiling and Benchmarking**:

(1) A §5.0 community or non-transient, non-community water system that serves fewer than 10,000 people must develop a disinfection profile, a graphical representation of a system's level of *Giardia lamblia* or virus inactivation measured during the course of a year, under the provisions of §§5.3.7(1)(a), (b), (c), (2) and (3) unless the Director determines that it is unnecessary. At the Director's discretion, a §5.0 system that serves at least 10,000 people may also be required to develop a disinfection profile. If the Director requires a system serving at least 10,000 people to develop a profile, the Director shall specify procedures for developing that profile.

(a) The Director may only determine that a system's profile is unnecessary if a system's TTHM and HAA5 levels are below 0.064 mg/L and 0.048 mg/L, respectively.

(b) If TTHM and HAA5 levels are ≥ 0.064mg/L or ≥ 0.048 mg/L, respectively, the system must comply with §5.3.7(2)(a).

(c) To determine these levels, TTHM and HAA5 samples must be collected after January 1, 1998, during the month with the warmest water temperature, and at the point of maximum residence time in the distribution system.

(2) **Disinfection Profile Criteria.**

(a) Any §5.0 system serving fewer than 10,000 people that meets the criteria in §5.3.7(1)(b) must develop a disinfection profile of its disinfection practice for a period of up to one (1) year. The Director may approve the use of a more representative data set for disinfection profiling than the data set required under §5.3.7(2)(a)(i) and (3).

(i) Systems must collect data for several parameters from the plant, specified in §5.3.7(i)(A) through (D), once per week on the same calendar day over twelve (12) consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the $CT_{99.9}$ values in Tables 1.1-1.6, 2.1 and 3.1 of these Regulations, as appropriate, through the entire treatment plant. Systems serving between 500 and 9,999 persons must begin to collect data no later than July 1, 2003. Systems serving fewer than 500 persons must begin to collect data no

later than January 1, 2004. The system must monitor the parameters listed in §5.3.7(i)(A) through (D), necessary to determine the total inactivation ratio, using analytical methods in §5.5 and Appendix 1.

(A) The temperature of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

(B) If the system uses chlorine, the pH of the disinfected water at each chlorine residual disinfectant concentration sampling point during peak hourly flow;

(C) The disinfectant contact time(s) ("T") during peak hourly flow; and

(D) The residual disinfectant concentration(s) ("C") of the water before or at the first customer and prior to each additional point of disinfection during peak hourly flow.

(ii) Systems must use this data to calculate the inactivation ratios as discussed in §§5.6.1(4)(a) and (b). As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must calculate the inactivation ratio as discussed in §5.6.1(4)(a). A system with more than one (1) point of disinfectant application or measures disinfectant residuals at more than one (1) location must calculate the inactivation ratio as discussed in §5.6.1(4)(b) for each disinfection segment.

(iii) Weekly log inactivations are calculated by multiplying the $CT_{calc}/CT_{99.9}$ ratio across the entire treatment train by 3.

(iv) Systems must use these weekly log inactivations to develop a disinfection profile as specified in §5.3.7(3)(a).

(3) **<u>Developing a Disinfection Profile</u>.**

(a) Each log inactivation serves as a data point in your disinfection profile. Systems serving fewer than 10,000 people will have obtained fifty-two (52) measurements (one (1) for every week of the year). The system and the Director will evaluate how microbial inactivation varied over the course of the year by looking at all 52 measurements (the Disinfection Profile). Systems must retain the Disinfection Profile data in graphic form, such as a spreadsheet, which must be available for review by the Director as part of a sanitary survey. Systems must use this data to calculate a benchmark if the system is considering changes to disinfection practices.

(b) A system that uses chloramines, ozone or chlorine dioxide for primary disinfection must also calculate the logs of inactivation for viruses and develop an additional disinfection profile for viruses using a method approved by the Director.

(4) **<u>Disinfection Benchmark</u>.**

(a) A §5.0 system serving less than 10,000 people that is required to develop a disinfection profile under the provisions of §5.3.7(1), must develop a Disinfection Benchmark as described in §5.3.7(4)(c) and (d) and provide the benchmark to the Director if the system decides to make a significant change to its disinfection practice. A §5.0 system serving at least 10,000 people that is required to develop a disinfection profile under the provisions of §5.3.7(1), must develop a Disinfection Benchmark using procedures specified by the Director if the system decides to make a significant change to its disinfection practice. All systems must consult with the Director for approval prior to making such changes. Significant changes to disinfection practice are:

(i) Changes to the point of disinfection;

(ii) Changes to the disinfectant(s) used in the treatment plant;

(iii) Changes to the disinfection process; and

(iv) Any other modification identified by the Director.

(b) Systems must submit the following information to the Director as part of the consultation and approval process:

(i) A description of the proposed change;

(ii) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) and disinfection benchmark;

(iii) An analysis of how the proposed change will affect the current levels of disinfection; and

(iv) Any additional information requested by the Director.

(c) Any system that is modifying its disinfection practice must calculate its disinfection benchmark using the procedures specified in §5.3.7(4)(c)(i) through (ii).

(i) For one (1) year of profiling data collected weekly and calculated under §5.3.7(2) and (3), the system must determine the lowest average monthly *Giardia lamblia* inactivation for one (1) year. The system must determine the average *Giardia lamblia* inactivation for each calendar month by dividing the sum of all *Giardia lamblia* inactivations for that month by the number of values calculated for that month.

(ii) The disinfection benchmark value is the lowest monthly average value out of twelve (12) values of *Giardia lamblia* inactivation in one (1) year of profiling data.

(d) A system that uses chloramines, ozone or chlorine dioxide for primary disinfection must calculate the disinfection benchmark from the data collected for viruses to develop the disinfection profile in addition to the *Giardia lamblia* disinfection benchmark calculated under §5.3.7(4)(c). This viral benchmark must be approved by the Director and must be calculated in the same manner used to calculate the *Giardia lamblia* disinfection benchmark in §5.3.7(4)(c).

5.4 **Filtration**:

5.4.1 A §5.0 system that does not meet all of the criteria in §5.2 for avoiding filtration, must provide treatment consisting of both disinfection, as specified in §5.3.6 and filtration treatment which complies with the requirements of §5.4 by June 29, 1993, or within eighteen (18) months of the failure to meet any one (1) of the criteria for avoiding filtration, whichever is later. Failure to meet any requirement of this Section by the date specified in §5.4.1, shall constitute a treatment technique violation.

5.4.2 **Conventional Filtration Treatment or Direct Filtration:**

(1) Systems that use conventional filtration or direct filtration that do not meet all of the criteria listed in §5.2 for avoiding filtration must meet the turbidity requirements listed in §5.4.2(a), (b) and (c) below:

(a) The turbidity level of representative samples of a system's filtered water must be less than or equal to 0.3 NTU in at least ninety-five (95) percent of the measurements taken each month, measured as specified in §§5.5 and 5.7. Monthly reporting must be completed according to §5.8.

(b) The turbidity level of representative samples of a system's filtered water must at no time exceed one (1) NTU, measured as specified in §§5.5 and 5.7. Monthly reporting must be completed according to §5.8.

(c) A system that uses lime softening may acidify representative combined filter effluent turbidity samples prior to analysis using a protocol approved by the Director.

5.4.3 **Slow Sand Filtration:**

(1) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to one (1) NTU in at least ninety-five (95) percent of the measurements taken each month, measured as specified in §5.5.

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed five (5) NTU measured as specified in §5.5.

5.4.4 **Diatomaceous Earth Filtration:**

(1) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to one (1) NTU in at least ninety-five (95) percent of the measurements taken each month, measured as specified in §5.5.

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed five (5) NTU, measured as specified in §5.5.

5.4.5 **Other Filtration Technologies:** A PWS may use a filtration technology not listed in §§5.4.2, 5.4.3 or 5.4.4, if it demonstrates to the Director, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of §§5.3.6 and 5.3.7, consistently achieves ninety-nine (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. Upon completion of the demonstration, the Director will determine the 95th percentile turbidity value (not to exceed one (1) NTU) and the maximum turbidity value (not to exceed five (5) NTU) based on the demonstration.

5.5 Analytical Monitoring Requirements

5.5.1 Only the analytical method(s) specified in this Section, or otherwise approved by the Director, may be used to demonstrate compliance with the requirements of §§ 5.2, 5.3, or 5.4.

Measurements for pH, temperature, turbidity and residual disinfectant concentrations must be conducted by a party approved by the Director.

Measurements for total coliforms, fecal coliforms and HPC must be conducted by a laboratory certified by the Director or EPA to do such analysis.

5.5.2 The following procedures shall be performed in accordance with the methods listed.

(1) Fecal Coliform/*E. Coli* Concentration Method, as set forth in Appendix 1.

(2) Total Coliform Concentration, as set forth in Appendix 1.

(3) Heterotrophic Plate Count, as set forth in Appendix 1.

(4) Turbidity, as set forth in Appendix 1.

(5) Residual Disinfectant Concentration, as set forth in Appendix 1.

(6) Temperature, Method 212, pp126-127, as set forth in Appendix 1.

(7) pH Method 423 (pH value) pp 429-437, as set forth in Appendix 1.

(8) Minimal Medium ONPG-MUG method for simultaneous enumeration of total coliform and *E. Coli* as set forth in Appendix 1.

(9) Indigo Method for determination of Ozone in water, as set forth in Appendix 1.

5.6 **Monitoring Requirements for Systems That Do Not Provide Filtration**

5.6.1 A PWS that uses a surface water source and does not provide filtration treatment must begin monitoring, as specified in this Section, unless the Director has determined that filtration is required in writing, in which case the Director may specify alternative monitoring requirements, until filtration is in place.

A PWS that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must begin monitoring as specified in this Section 6 months after the Director determines that the ground water source is under the direct influence of surface water, unless the Director has determined that filtration is required in writing.

(1) Fecal coliform or total coliform density measurements, as required by §5.2.5, must be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system must sample for fecal or total coliforms at the following minimum frequency each week the system serves water to the public:

System Size (Persons Served)	Samples/Week*
<500	1
501 to 3,300	2
3,301 to 10,000	3
10,001 to 25,000	4
>25,000	5

*Samples must be taken on separate days

Also, one (1) fecal or total coliform density measurement must be made every day the system serves water to the public and the turbidity of the source water exceeds 1 NTU (these samples count toward the weekly coliform sampling requirement,) unless the Director determines that the system for logistical reasons outside the system's control cannot have the sample analyzed within thirty (30) hours of collection.

(2) Turbidity measurements as required by §5.2.5(2) must be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four (4) hours (or more frequently) that the system serves water to the public. A PWS may substitute continuous turbidity monitoring for grab sample monitoring

if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the Director.

(3) The total inactivation ratio for each day that the system is in operation must be determined based on the $CT_{99.9}$ values in Tables 1.1-1.6, 2.1 and 3.1 of this Section, as appropriate. The parameters necessary to determine the total inactivation ratio must be monitored as follows:

(a) The temperature of the disinfected water must be measured at least once per day at each residual disinfectant concentration sampling point.

(b) If the system uses chlorine, the pH of the disinfected water must be measured at least once per day at each chlorine residual disinfectant concentration sampling point.

(c) The disinfectant contact time(s) ("T") must be determined for each day during peak hourly flow.

(d) The residual disinfectant concentration(s) ("C") of the water before or at the first customer must be measured each day during peak hourly flow.

(e) If a system uses a disinfectant other than chlorine, the system may demonstrate to the Director, through the use of a protocol approved by the Director, for on-site disinfection challenge studies or other information satisfactory to the Director that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in this Section or other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by §5.3.5(1).

(4) The total inactivation ratio must be calculated as follows:

(a) If the system uses only one (1) point of disinfectant application, the system may determine the total inactivation ratio based on either of the following two (2) methods:

(i) One (1) inactivation ratio ($CT_{calc}/CT_{99.9}$) is determined before or at the first customer during peak hourly flow and if the $CT_{calc}/CT_{99.9}>1.0$, the 99.9 percent *Giardia lamblia* inactivation requirement has been achieved; OR

(ii) Successive $CT_{calc}/CT_{99.9}$ values representing sequential inactivation ratios are determined between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the following method must be used to calculate the total inactivation ratio:

(A) Determine ($CT_{calc}/CT_{99.9}$) for each sequence

(B) Add the ($CT_{calc}/CT_{99.9}$) values together (the sum of all $CT_{calc}/CT_{99.9}$)

(C) If the sum of ($CT_{calc}/CT_{99.9}$) >1.0

Then the 99.9 percent *Giardia lamblia* inactivation requirement has been achieved.

(b) If the system uses more than one (1) point of disinfectant application before or at the first customer, the system must determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The $CT_{calc}/CT_{99.9}$value of each sequence and the sum of $CT_{calc}/CT_{99.9}$must be calculated using the method in §5.6.1(4)(a)(ii) to determine if the system is in compliance with §5.3.5.

(c) Although not required, the total percent inactivation for a system with one (1) or more points of residual disinfectant concentration monitoring may be calculated by solving the following equation:

Percent inactivation = $100-(100/10^{Z})$
where Z = 3 x the sum of $(CT_{calc}/CT_{99.9})$

(5) The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day. In the event of system monitoring failure, grab sampling may be conducted every four (4) hours, for no more than five (5) working days.

Systems serving 3,300 or fewer persons may take grab samples in lieu of continuous monitoring on an ongoing basis at the frequencies prescribed below:

System Size by Population	Samples/day*
<501	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

*The day's samples cannot be taken at the same time. The sampling intervals are subject to the Director's review and approval

If at any time the residual disinfectant concentration falls below 0.2 mg/L in a system using grab sampling in lieu of continuous monitoring, the system must take a grab sample every four (4) hours until the residual concentration is equal to or greater than 0.2 mg/L.

(6) The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §16.4, however, the Director may allow a PWS which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source to take disinfectant residual samples at points other than the total coliform sampling points, if the Director determines that such points are more representative of treated (disinfected) water quality within the distribution system.

Heterotrophic bacteria, measured as HPC as specified in §5.5.2, may be measured in lieu of residual disinfectant concentration.

5.7 **Monitoring Requirements for Systems Using Filtration Treatment**

5.7.1 A PWS that uses a surface water source or a ground water source under the influence of surface water and provides filtration treatment must monitor in accordance with this Section.

(1) **Turbidity**

(a) **Representative Filtered Effluent Turbidity Requirements**

(i) Turbidity measurements as required by §5.4 must be performed on representative samples of the systems filtered water every four (4) hours (or more frequently) that the system serves water to the public. A PWS may substitute continuous turbidity

monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis, using a protocol approved by the Director.

(ii) For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration or diatomaceous earth filtration, the Director may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance.

(iii) For systems serving 500 or fewer persons, the Director may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the Director determines that less frequent monitoring is sufficient to indicate effective filtration performance.

(b) **Individual Filter Turbidity Requirements**

(i) §5.0 systems that use conventional or direct filtration must conduct continuous monitoring of turbidity for each individual filter in the system. The following requirements apply to continuous turbidity monitoring:

(A) Continuous monitoring must be conducted using an approved method in §5.5;

(B) Calibration of turbidimeters must be conducted using procedures specified by the manufacturer;

(C) Results of turbidity monitoring must be recorded at least every fifteen (15) minutes; and

(D) Monthly reporting must be completed and records must be maintained according to §5.8.

(ii) If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four (4) hours in lieu of continuous monitoring until the turbidimeter is back on-line. Systems serving at least 10,000 people have no more than five (5) working days, following equipment failure, and systems serving fewer than 10,000 people have no more than fourteen (14) total days, following equipment failure, to resume continuous monitoring before a violation is incurred.

(iii) For systems serving fewer than 10,000 people, systems that only consist of two (2) or fewer filters may conduct continuous monitoring of combined filter effluent turbidity in lieu of individual filter effluent turbidity monitoring. Continuous monitoring must meet the same requirements set forth in §5.7.1(b)(i) and (b)(ii).

(2) The residual disinfectant concentration of the water entering the distribution system, and throughout the distribution system, must be monitored as indicated in §§5.6.1(5) and 5.6.1(6).

5.8 Reporting and Record Keeping Requirements

5.8.1 A PWS that uses a surface water source and does not provide filtration treatment must report the following information monthly to the Director unless the Director has determined that filtration is required in writing in which case the Director may specify alternate reporting requirements as appropriate until filtration is in place.

A PWS that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must report monthly to the Director, the following information

beginning no later than six (6) months after the Director determines that the ground water source is under the direct influence of surface water.

(1) Source water quality information must be reported to the Director within ten (10) days after the end of each month the system serves water to the public. Information that must be reported:

(a) The cumulative number of months for which results are reported.

(b) The number of fecal and/or total coliform samples, whichever are analyzed during the month (if a system monitors for both, only fecal coliforms must be reported), the dates of sample collection and the dates when the turbidity level exceeded one (1) NTU.

(c) The number of samples during the month that had equal to or less than 20/100 ml fecal coliforms and/or equal to or less than 100/100 ml total coliforms, whichever are analyzed.

(d) The cumulative number of fecal or total coliform samples, whichever are analyzed during the previous six (6) months the system served water to the public.

(e) The cumulative number of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed during the previous six (6) months the system served water to the public.

(f) The percentage of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed during the previous six (6) months the system served water to the public.

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

(h) For the first twelve (12) months of record-keeping, the dates and cumulative number of events during which the turbidity exceeded five (5) NTU and after one (1) year of record keeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded five (5) NTU in the previous twelve (12) months the system served water to the public.

(i) For the first 120 months of record-keeping, the dates and cumulative number of events during which the turbidity exceeded five (5) NTU and after ten (10) years of record keeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded five (5) NTU in the previous 120 months they system service water to the public.

(2) Disinfection information must be reported to the Director within ten (10) days after the end of each month the system serves water to the public. Information that must be reported:

(a) For each day, the lowest measurement of residual disinfectant concentration in mg/L in water entering the distribution system.

(b) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/L and when the Director was notified of the occurrence.

(c) The daily residual disinfectant concentration(s) (in mg/L) and disinfectant contact time(s) (in minutes) used for calculating the CT value(s).

(d) If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection.

(e) The daily measurement(s) of water temperature in degrees centigrade following each point of disinfection.

(f) The daily CT_{calc} and $CT_{calc}/CT_{99.9}$ values for each disinfectant measurement or sequence and the sum of all $CT_{calc}/ CT_{99.9}$ values ($CT_{calc}/CT_{99.9}$) before or at the first customer.

(g) The daily determination of whether disinfection achieves adequate *Giardia* cyst and virus inactivation, i.e. whether ($CT_{calc}/ CT_{99.9}$) is at least 1.0 or where disinfectants other than chlorine are used, other indicator conditions that the Director determines are appropriate, are met.

(h) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring specified in §5.3.

(i) number of instances where the residual disinfectant concentration is measured;

(ii) number of instances where the residual disinfectant concentration is not measured but HPC is measured;

(iii) number of instances where the residual disinfectant concentration is measured, but not detected and no HPC is measured;

(iv) number of instances where the residual disinfectant concentration is detected and where HPC is >500/ml;

(v) number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml;

(vi) for the current and previous month the system served water to the public, the value of "V", as defined in §5.3.5.

(i) A system need not report the data listed in §5.8.1(2)(a) and (c)-(f) if all data listed in §5.8.1(2) (a)-(h) remain on file at the system and the Director determines that:

(i) The system has submitted to the Director all the information required for at least twelve (12) months; and

(ii) The Director has determined that the system is not required to provide filtration treatment.

(3) No later than October 10 of each year, each system must provide to the Director a report which summarizes its compliance with all watershed control program requirements specified in §5.2.6(2).

(4) A report on the on-site inspection conducted during that year as specified in §5.2.6(3).

(5) (a) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the Director as soon as possible, but no later than the end of the next business day.

(b) If at any time the turbidity exceeds five (5) NTU, the system must consult with the Director as soon as practical, but no later than twenty-four (24) hours after the exceedance is known, in accordance with the public notification requirements under §16.8.3.

(c) If at any time the residual falls below 0.2 mg/L in the water entering the distribution system, the system must notify the Director as soon as possible, but no later than by the end of the next business day. The system must notify the Director by the end of the next business day whether or not the residual was restored to at least 0.2 mg/L within four (4) hours.

5.8.2 §5.0 systems that provide filtration treatment must report monthly to the Director the following information in §5.8.2 (1) through (4) unless otherwise stated.

(1) **Turbidity requirements**: Turbidity measurements as required by §§5.4 and 5.7 must be reported within ten (10) days after the end of each month the system serves water to the public. Information that must be reported includes:

(a) The total number of filtered water turbidity measurements taken during the month.

(b) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in §5.4 for the filtration technology being used.

(c) The date and value of any turbidity measurements taken during the month which exceed the maximum allowable turbidity specified in §5.4.

(2) Individual filter effluent reporting requirements (conventional and direct filtration systems only):

Systems must maintain the results of individual filter monitoring taken under §5.7.1(1)(b) for at least three (3) years. Systems must report that they have conducted individual filter turbidity monitoring under §5.7.1(1)(b) within ten (10) days after the end of each month the system serves water to the public. Systems must report individual filter turbidity measurement results taken under §5.7.1(1)(b) within ten (10) days after the end of each month the system serves water to the public only if measurements demonstrate one (1) or more of the conditions in §5.8.2(4).

(3) Disinfection information must be reported to the Director within ten (10) days after the end of each month and must include all items specified in §§ 5.8.1(2)(a), (b), (h), and §5.8.1(5).

(a) Disinfection Profiling: By July 1, 2003, systems serving 500-9,999 people and by January 1, 2004, systems serving fewer than 500 people must report the results of optional monitoring which shows TTHM levels below 0.064 mg/L and HAA5 levels below 0.048 mg/L (only if the system wishes to forgo profiling) or systems must report that they have begun disinfection profiling. If profiling is required by the Director for systems serving at least 10,000 people, the necessary reporting requirements will be specified by the Director. Records of the profile, if required, must be kept indefinitely including raw data and analysis and made available to the Director as part of a sanitary survey.

(b) Disinfection Benchmarking: If a system serving fewer than 10,000 people was required to produce a disinfection profile and is considering a significant change to its disinfection practices, they must report a description of the proposed change in disinfection, a disinfection profile for Giardia lamblia (and, if necessary, viruses) and disinfection benchmark, and an analysis of how the proposed change will affect the current levels of disinfection. If benchmarking is required by the Director for systems serving at least 10,000 people, the necessary reporting requirements will be specified by

the Director. Records of the benchmark must be kept indefinitely including raw data and analysis and made available to the Director as part of a sanitary survey.

(4) **Individual filter effluent follow-up actions**: For all systems, reporting to the Director is required by the 10th of the following month for exceedance listed in §5.8.2(4)(a) through (d) unless otherwise stated. Systems that use lime softening may apply to the Director for alternative exceedance levels for the levels specified in §5.8.2(4)(a) through (d) if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(a) If the individual filter effluent turbidity (or for systems serving fewer than 10,000, the turbidity of combined filter effluent (CFE) for systems with two (2) filters that monitor CFE in lieu of individual filters) exceeded 1.0 NTU in two (2) consecutive measurements taken fifteen (15) minutes apart, the system must report the filter number, the turbidity measurement, the date(s) on which the exceedance occurred and the cause (if known) for the exceedance. In addition, systems serving at least 10,000 people must either produce a filter profile for the filter within seven (7) days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(b) For systems serving at least 10,000 people, if the individual filter effluent turbidity exceeded 0.5 NTU in two (2) consecutive measurements taken fifteen (15) minutes apart at the end of the first four (4) 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 (7) days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(c) If the individual filter effluent turbidity (or for systems serving fewer than 10,000, the CFE turbidity of systems with two (2) filters that monitor CFE in lieu of individual filters) exceeded 1.0 NTU in two (2) consecutive 15-minute readings for three (3) consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must conduct a self-assessment of the filter(s) within fourteen (14) days of the exceedance unless a CPE as specified in §5.8.2(4)(d) was required. Systems with two (2) filters that monitor combined filter effluent in lieu of individual filters must conduct a self-assessment on both filters. The system must report the date the filter self-assessment was triggered and the date it was completed by the 10th of the following month or fourteen (14) days after the self-assessment was triggered only if the self-assessment was triggered during the last four (4) days of the month. The self assessment must consist of at least the following components:

(i) assessment of filter performance;

(ii) development of a filter profile;

(iii) identification and prioritization of factors limiting filter performance;

(iv) assessment of the applicability of corrections; and

(v) preparation of a filter self-assessment report.

(d) If the individual filter effluent turbidity (or for systems serving fewer than 10,000, the CFE for systems with two (2) filters that monitor combined filter effluent in lieu of individual filters) exceeded 2.0 NTU in two (2) consecutive recordings fifteen (15) minutes apart at the same filter for two (2) consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must arrange to have a comprehensive performance evaluation (CPE) conducted by the Director or a third party approved by Director not later than thirty (30) days (sixty (60) days for systems serving fewer than 10,000) following the day the filter exceeded 2.0 NTU in two (2) consecutive measurements for the second straight month. If a CPE has been completed by the Director or a third party approved by the Director within the 12 prior months or the system and Director are jointly participating in an ongoing Comprehensive Technical Assistance (CTA) project at the system, a new CPE is not required. If conducted, a CPE must be completed and submitted to the Director no later than ninety (90) days (120 days for systems serving fewer than 10,000) following the day the filter exceeded 2.0 NTU in two (2) consecutive measurements for the second straight month. The system must report by the 10th of the following month that a CPE was required and the date it was triggered.

5.8.3 For all filtration technologies, a §5.0 system that exceeds the maximum turbidity as specified in §5.4 must inform the Director within twenty-four (24) hours.

http://ecfr.access.gpo.gov/otcgi/cfr/ - TOP5.8.4**Recycle Provisions**:

(1) **Reporting**. A system must notify the Director if the system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the information specified in §5.8.4 (1)(a) and (b).

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

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

(2) **Recordkeeping**. The system must collect and retain on file recycle flow information specified in §5.8.4 (2)(a) through (f) for review and evaluation by the Director beginning June 8, 2004.

(a) Copy of the recycle notification and information submitted to the Director under §5.8.4 (1).

(b) List of all recycle flows and the frequency with which they are returned.

(c) Average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in minutes.

(d) Typical filter run length and a written summary of how filter run length is determined.

(e) The type of treatment provided for the recycle flow.

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

Table 1.1 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by free chlorine at 0.5°C or lower[1]

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 interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 1.2 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by free chlorine at 0.5°C[1]

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

[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 interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH

Table 1.3 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by free chlorine at 10.0°C[1]

Free Residual (mg/L)	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 interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 1.4 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by free chlorine at 15.0°C[1]

Free Residual (mg/L)	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 interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 1.5 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by free chlorine at 20.0°C[1]

Free Residual (mg/L)	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 interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 1.6 CT values (CT99.9) for 99.9 percent inactivation of giardia lamblia cysts by free chlorine at 25°C[1] and higher

Free 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 interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 2.1 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by chlorine dioxide and ozone[1]

Free Residual (mg/L)	Temperature					
	1°C	**5°C**	**10°C**	**15°C**	**20°C**	**>25°C**
Chlorinedioxide	63	26	23	19	15	11
Ozone	2.0	1.9	1.4	0.95	0.72	0.46

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

Table 3.1 CT values ($CT_{99.9}$) for 99.9 percent inactivation of *giardia lamblia* cysts by chloramines[1]

Temperature					
<1°C	**5°C**	**10°C**	**15°C**	**20°C**	**>25°C**
2.0	1.9	1.4	0.95	0.72	0.46

[1] These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system must demonstrate, based on on-site studies or other information, as approved by the State, that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

5.9 Enhanced Treatment For *Cryptosporidium*

5.9.1 General Requirements.
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5.9.22 Reporting Requirements.

5.9.23 Recordkeeping Requirements.

5.9.24 Requirements To Respond To Significant Deficiencies Identified In Sanitary Surveys Performed By The Director.

5.9.1 **General Requirements.**

(a) The requirements of §5.9 are national primary drinking water regulations. The regulations in §5.9 establish or extend treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium*. These requirements are in addition to requirements for filtration and disinfection in other sections of these Regulations.

(b) **Applicability**. The requirements of §5.9 apply to all systems subject to §5.0 of these Regulations, which are public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water.

(1) Wholesale systems, as defined in §1.0 of these Regulations, must comply with the requirements of §5.9 based on the population of the largest system in the combined distribution system.

(2) The requirements of §5.9 for filtered systems apply to systems required by National Primary Drinking Water Regulations to provide filtration treatment, whether or not the system is currently operating a filtration system.

(3) The requirements of §5.9 for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in §5.0 of these Regulations, as applicable.

(c) **Requirements**. Systems subject to §5.9 must comply with the following requirements:

(1) Systems must conduct an initial and a second round of source water monitoring for each plant that treats a surface water or GWUDI source. This monitoring may include sampling for *Cryptosporidium*, *E. coli*, and turbidity as described in §§5.9.2 through 5.9.7, to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.

(2) Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in §§5.9.9 through 5.9.10.

(3) Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in §5.9.11 and provide additional treatment for *Cryptosporidium*, if required, as described in §5.9.12. All unfiltered systems must provide treatment for *Cryptosporidium* as described in §5.9.13. Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in §5.9.14.

(4) Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility as described in §5.9.15.

(5) Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in §§5.9.16 through 5.9.21.

(6) Systems must comply with the applicable recordkeeping and reporting requirements described in §§ 5.9.22 through 5.9.23.

(7) Systems must address significant deficiencies identified in sanitary surveys performed as described in §5.9.24.

5.9.2 **Source Water Monitoring.**

(a) **Initial Round of Source Water Monitoring**. Systems must conduct the following monitoring on the schedule in §5.9.2(c) unless they meet the monitoring exemption criteria in §5.9.2(d).

(1) Filtered systems serving at least 10,000 people must sample their source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for 24 months.

(2) Unfiltered systems serving at least 10,000 people must sample their source water for *Cryptosporidium* at least monthly for 24 months.

(3) (i) Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months.

(ii) A filtered system serving fewer than 10,000 people may avoid *E. coli* monitoring if the system notifies the Director that it will monitor for *Cryptosporidium* as described in §5.9.2(a)(4). The system must notify the Director no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring under §5.9.2(c).

(4) Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under §5.9.2(a)(3):

(i) For systems using lake/reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/100 mL.

(ii) For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/100 mL.

(iii) The system does not conduct *E. coli* monitoring as described in §5.9.2(a)(3).

(iv) Systems using ground water under the direct influence of surface water (GWUDI) must comply with the requirements of §5.9.2(a)(4) based on the *E. coli* level that applies to the nearest surface water body. If no surface water body is nearby, the system must comply based on the requirements that apply to systems using lake/reservoir sources.

(5) For filtered systems serving fewer than 10,000 people, the Director may approve monitoring for an indicator other than *E. coli* under §5.9.2(a)(3). The Director also may approve an alternative to the *E. coli* concentration in §5.9.2(a)(4)(i), (ii) or (iv) to trigger *Cryptosporidium* monitoring. This approval by the Director must be provided to the system in writing and must include the basis for the Director's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in §5.9.11.

(6) Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.

(7) Systems may sample more frequently than required under this section if the sampling frequency is evenly spaced throughout the monitoring period.

(b) **Second Round of Source Water Monitoring**. Systems must conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in §5.9.2(a), unless they meet the monitoring exemption criteria in §5.9.2(d). Systems must conduct this monitoring on the schedule in §5.9.2(c).

(c) **Monitoring Schedule**. Systems must begin the monitoring required in §5.9.2(a) and (b) no later than the month beginning with the date listed in the table below:

SOURCE WATER MONITORING STARTING DATES TABLE

Systems that serve:	Must begin the first round of source water monitoring no later than the month beginning:	And must begin the second round of source water monitoring no later than the month beginning:
(1) At least 100,000 people	(i) October 1, 2006.	(ii) April 1, 2015
(2) From 50,000 to 99,999 people	(i) April 1, 2007	(ii) October 1, 2015
(3) From 10,000 to 49,999 people	(i) April 1, 2008	(ii) October 1, 2016
(4) Fewer than 10,000 and monitor for *E. coli*[a]	(i) October 1, 2008	(ii) October 1, 2017
(5) Fewer than 10,000 and monitor for *Cryptosporidium*[b]	(i) April 1, 2010	(ii) April 1, 2019

[a]Applies only to filtered systems.

[b]Applies to filtered systems that meet the conditions of §5.9.2(a)(4) and unfiltered systems.

(d) **Monitoring Avoidance**.

(1) Filtered systems are not required to conduct source water monitoring under §5.9 if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in §5.9.12.

(2) Unfiltered systems are not required to conduct source water monitoring under §5.9 if the system will provide a total of at least 3-log *Cryptosporidium* inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L in §5.9.13.

(3) If a system chooses to provide the level of treatment in §5.9.2(d)(1) or (2), as applicable, rather than start source water monitoring, the system must notify the Director in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under §5.9.3. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the Director in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in §5.9.14.

(e) **Plants Operating Only Part of The Year**. Systems with treatment plants that must comply with §5.0 and that operate for only part of the year must conduct source water monitoring in accordance with §5.9, but with the following modifications:

(1) Systems must sample their source water only during the months that the plant operates unless the Director specifies another monitoring period based on plant operating practices.

(2) Systems with plants that operate less than six months per year and that monitor for *Cryptosporidium* must collect at least six (6) *Cryptosporidium* samples per year during each of two (2) years of monitoring. Samples must be evenly spaced throughout the period the plant operates.

(f) (1) **New Sources**. A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under §5.9.2(c) must monitor the new source on a schedule the Director approves. Source water monitoring must meet the requirements of this §5.9. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of §§5.9.11 and 5.9.12 or §5.9.13, as applicable, for the new source on a schedule the Director approves.

(2) The requirements of §5.9.2(f) apply to systems that must comply with §5.0 and that begin operation after the monitoring start date applicable to the system's size under §5.9.2(c).

(3) The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under §5.9.11 or determination of the mean *Cryptosporidium* level under §5.9.13, as applicable.

(g) Failure to collect any source water sample required under §5.9.2 in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of §§5.9.3 through 5.9.7 is a monitoring violation.

(h) **Grandfathering Monitoring Data**. Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in §5.9.2(c) to meet the initial source water monitoring requirements in §5.9.2(a). Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under §5.9.2(h) must meet the requirements in §5.9.8.

5.9.3 **Sampling Schedules.**

(a) Systems required to conduct source water monitoring under §5.9.2 must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

(1) Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in §5.9.2(c) for each round of required monitoring.

(2) (i) Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under §5.9.2(a) to EPA electronically.

(ii) If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that EPA approves.

(3) Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring §5.9.2(a) to the Director.

(4) Systems must submit sampling schedules for the second round of source water monitoring §5.9.2(b) to the Director.

(5) If EPA or the Director does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.

(b) Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (i.e., within a five-day period around the schedule date) unless one of the conditions of §5.9.3(b)(1) or (2) applies.

(1) If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample in the scheduled five-day period, the system must sample as close to the scheduled date as is feasible unless the Director approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the Director concurrent with the shipment of the sample to the laboratory.

(2) (i) If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in §5.9.5, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

(ii) The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the Director approves an alternative resampling date. The system must submit an explanation for the delayed sampling date to the Director concurrent with the shipment of the sample to the laboratory.

(c) Systems that fail to meet the criteria of §5.9.3(b) for any source water sample required under §5.9.2 must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the Director for approval prior to when the system begins collecting the missed samples.

5.9.4 **Sampling Locations.**

(a) Systems required to conduct source water monitoring under §5.9.2 must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the Director may approve one set of monitoring results to be used to satisfy the requirements of §5.9.2 for all plants.

(b) (1) Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of §5.9.4 (b)(2).

(2) The Director may approve a system to collect a source water sample after chemical treatment. To grant this approval, the Director must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

(c) Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.

(d) **Bank Filtration**.

(1) Systems that receive *Cryptosporidium* treatment credit for bank filtration under §5.4.3 must collect source water samples in the surface water prior to bank filtration.

(2) Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (i.e., after bank filtration). Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under §5.9.18(c).

(e) **Multiple Sources**. Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in §5.9.4(e)(1) or (2). The use of multiple sources during monitoring must be consistent with routine operational practice.

(1) If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.

(2) If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either §5.9.4(e)(2)(i) or (ii) for sample analysis.

(i) Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.

(ii) Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

(f) **Additional Requirements**. Systems must submit a description of their sampling location(s) to the Director at the same time as the sampling schedule required under §5.9.3. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the Director does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).

5.9.5 **Analytical Methods.**

(a) ***Cryptosporidium***. Systems must analyze for *Cryptosporidium* using Method 1623: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-002 or Method 1622: *Cryptosporidium* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-001, which are incorporated by reference.

(1) Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL as generated by the methods listed in §5.9.5(a). Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in §5.9.5(a), up to a packed pellet volume of at least 2 mL.

(2) (i) Matrix spike (MS) samples, as required by the methods in §5.9.5(a), must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under §5.9.6.

(ii) If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

(3) Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.

(b) ***E. coli***. Systems must use methods for enumeration of *E. coli* in source water approved in Appendix I.

(1) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of §5.9.5(b)(2).

(2) The Director may approve on a case-by-case basis the holding of an *E. coli* sample for up to 48 hours between sample collection and initiation of analysis if the Director determines that analyzing an *E. coli* sample within 30 hours is not feasible. *E. coli* samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in Appendix I.

(3) Systems must maintain samples between 0ºC and 10ºC during storage and transit to the laboratory.

(c) **Turbidity**. Systems must use methods for turbidity measurement approved in Appendix I Section IIA3.

5.9.6 **Approved Laboratories.**

(a) ***Cryptosporidium***. Systems must have *Cryptosporidium* samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of *Cryptosporidium* in Water or a laboratory that has been certified for *Cryptosporidium* analysis by an equivalent laboratory certification program approved by the Director.

(b) ***E. coli***. Any laboratory certified by the EPA, the National Environmental Laboratory Accreditation Conference or the Director for total coliform or fecal coliform analysis under §12.0 is approved for *E. coli* analysis under §5.9 when the laboratory uses the same technique for *E. coli* that the laboratory uses for §12.0.

(c) **Turbidity**. Measurements of turbidity must be made by a party approved by the Director.

5.9.7 **Reporting Source Water Monitoring Results.**

(a) Systems must report results from the source water monitoring required under §5.9.2 no later than 10 days after the end of the first month following the month when the sample is collected.

(b) (1) All systems serving at least 10,000 people must report the results from the initial source water monitoring required under §5.9.2(a) to EPA electronically.

(2) If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that EPA approves.

(c) Systems serving fewer than 10,000 people must report results from the initial source water monitoring required under §5.9.2(a) to the Director.

(d) All systems must report results from the second round of source water monitoring required under §5.9.2(b) to the Director.

(e) Systems must report the applicable information in §5.9.7(e)(1) and (2) for the source water monitoring required under §5.9.2.

(1) Systems must report the following data elements for each *Cryptosporidium* analysis:

Data element.

1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Sample type (field or matrix spike).
5. Sample volume filtered (L), to nearest ¼ L.
6. Was 100% of filtered volume examined.
7. Number of oocysts counted.

(i) For matrix spike samples, systems must also report the sample volume spiked and estimated number of oocysts spiked. These data are not required for field samples.

(ii) For samples in which less than 10 L is filtered or less than 100% of the sample volume is examined, systems must also report the number of filters used and the packed pellet volume.

(iii) For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.

(2) Systems must report the following data elements for each *E. coli* analysis:

Data element.

1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Analytical method number.
5. Method type.
6. Source type (flowing stream, lake/reservoir, GWUDI).
7. *E. coli*/100 mL.
8. Turbidity.[2]

5.9.8 **<u>Grandfathering Previously Collected Data</u>.**

(a) (1) Systems may comply with the initial source water monitoring requirements of §5.9.2(a) by grandfathering sample results collected before the system is required to begin monitoring (i.e., previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in this section and the Director must approve.

(2) A filtered system may grandfather *Cryptosporidium* samples to meet the requirements of §5.9.2(a) when the system does not have corresponding *E. coli* and turbidity samples.

2 Systems serving fewer than 10,000 people that are not required to monitor for turbidity under §5.9.2 are not required to report turbidity with their *E. coli* results.

A system that grandfathers *Cryptosporidium* samples without *E. coli* and turbidity samples is not required to collect *E. coli* and turbidity samples when the system completes the requirements for *Cryptosporidium* monitoring under §5.9.2(a).

(b) ***E. coli* Sample Analysis**. The analysis of *E. coli* samples must meet the analytical method and approved laboratory requirements of §§5.9.5 through 5.9.6.

(c) ***Cryptosporidium* Sample Analysis**. The analysis of *Cryptosporidium* samples must meet the criteria in this paragraph.

(1) Laboratories analyzed *Cryptosporidium* samples using one of the analytical methods in §5.9.8(c)(1)(i) through (vi) below, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods on-line from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave, NW, Washington, DC 20460 (Telephone: 800-426-4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202-566-2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(i) **Method 1623**: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-002.

(ii) **Method 1622**: *Cryptosporidium* in Water by Filtration/IMS/FA, 2005, United States Environmental Protection Agency, EPA-815-R-05-001.

(iii) **Method 1623**: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, 2001, United States Environmental Protection Agency, EPA-821-R-01-025.

(iv) **Method 1622**: *Cryptosporidium* in Water by Filtration/IMS/FA, 2001, United States Environmental Protection Agency, EPA-821--R-01-026.

(v) **Method 1623**: *Cryptosporidium* and *Giardia* in Water by Filtration/IMS/FA, 1999, United States Environmental Protection Agency, EPA-821-R-99-006.

(vi) **Method 1622**: *Cryptosporidium* in Water by Filtration/IMS/FA, 1999, United States Environmental Protection Agency, EPA-821-R-99-001.

(2) For each *Cryptosporidium* sample, the laboratory analyzed at least 10 L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods listed in §5.9.8(c)(1) above.

(d) **Sampling Location**. The sampling location must meet the conditions in §5.9.4.

(e) **Sampling Frequency**. *Cryptosporidium* samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in §5.9.3(b)(1) and (2) if the system provides documentation of the condition when reporting monitoring results.

(1) The Director may approve grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the Director specifies to ensure that the data used to comply with the initial source water monitoring requirements of §5.9.2(a) are seasonally representative and unbiased.

(2) Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems must follow the monthly averaging procedure in §5.9.11(b)(5) or §5.9.13(a)(3), as applicable, when calculating the bin classification for filtered systems or the mean *Cryptosporidium* concentration for unfiltered systems.

(f) **Reporting Monitoring Results For Grandfathering**. Systems that request to grand-father previously collected monitoring results must report the following information by the applicable dates listed in this paragraph. Systems serving at least 10,000 people must report this information to EPA unless the Director approves reporting to the Director rather than EPA. Systems serving fewer than 10,000 people must report this information to the Director.

(1) Systems must report that they intend to submit previously collected monitoring results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of §5.9.2(a). Systems must report this information no later than the date the sampling schedule under §5.9.3 is required.

(2) Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in 5.9.8(f)(2)(i) through (iv) below, no later than two months after the applicable date listed in §5.9.2(c).

(i) For each sample result, systems must report the applicable data elements in §5.9.7.

(ii) Systems must certify that the reported monitoring results include all results the system generated during the time period beginning with the first reported result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring under §5.9, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in this section.

(iii) Systems must certify that the samples were representative of a plant's source water(s) and the source water(s) have not changed. Systems must report a description of the sampling location(s), which must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.

(iv) For *Cryptosporidium* samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in §5.9.8(c)(1) were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.

(g) If the Director determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the Director may disapprove the data. Alternatively, the Director may approve the previously collected data if the system reports additional source water monitoring data, as determined by the Director, to ensure that the data set used under §5.9.11 or §5.9.13 represents average source water conditions for the system.

(h) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring under §5.9.2(a) and some of the data are rejected due to not meeting the requirements of this section, systems must conduct additional monitoring to replace rejected data on a schedule the Director approves. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

5.9.9 **Requirements When Making a Significant Change in Disinfection Practice.**

(a) Following the completion of initial source water monitoring under §5.9.2(a), a system that plans to make a significant change to its disinfection practice, as defined in §5.9.9(b) below, must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in §5.9.10. Prior to changing the disinfection practice, the system must notify the Director and must include in this notice the information in §5.9.9(a)(1) through (3) below.

(1) A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in §5.9.10.

(2) A description of the proposed change in disinfection practice.

(3) An analysis of how the proposed change will affect the current level of disinfection.

(b) Significant changes to disinfection practice are defined as follows:

(1) Changes to the point of disinfection;

(2) Changes to the disinfectant(s) used in the treatment plant;

(3) Changes to the disinfection process; or

(4) Any other modification identified by the Director as a significant change to disinfection practice.

5.9.10 **Developing The Disinfection Profile And Benchmark.**

(a) Systems required to develop disinfection profiles under §5.9.9 must follow the requirements of this section. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire plant, based on $CT_{99.9}$ values in Tables 1.1 through 1.6, 2.1 and 3.1 of §5.0 as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the Director.

(b) Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in §5.9.10(b)(1) through (4) below. Systems with more than one point of disinfectant application must conduct the monitoring in §5.9.10(b)(1) through (4) below for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in Appendix I.

(1) For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the Director.

(2) For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the Director.

(3) The disinfectant contact time(s) (t) must be determined during peak hourly flow.

(4) The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.

(c) In lieu of conducting new monitoring under §5.9.10(b) above, systems may elect to meet the requirements of §5.9.10(c)(1) or (2) below.

(1) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of §5.9.10(b) may use these data to develop disinfection profiles as specified in this section if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

(2) Systems may use disinfection profile(s) developed under §5.3.7 or § 5.6.1 part 3 and 4 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under §5.3.7 or § 5.6.1 part 3 and 4 must develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.

(d) Systems must calculate the total inactivation ratio for *Giardia lamblia* as specified in §5.9.10 (d)(1) through (3) below.

(1) Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the methods in §5.9.10 (d)(1)(i) or (ii) below.

(i) Determine one inactivation ratio ($CT_{calc}/CT_{99.9}$) before or at the first customer during peak hourly flow.

(ii) Determine successive $CT_{calc}/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system must calculate the total inactivation ratio by determining ($CT_{calc}/CT_{99.9}$) for each sequence and then adding the ($CT_{calc}/CT_{99.9}$) values together to determine (Σ ($CT_{calc}/CT_{99.9}$)).

(2) Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CT_{calc}/CT_{99.9}$) value of each segment and (Σ ($CT_{calc}/CT_{99.9}$)) must be calculated using the method in §5.9.10 (d)(1)(ii) above.

(3) The system must determine the total logs of inactivation by multiplying the value calculated in §5.9.10(d)(1) or (d)(2) above by 3.0.

(4) Systems must calculate the log of inactivation for viruses using a protocol approved by the Director.

(e) Systems must use the procedures specified in §5.9.10(e)(1) and (2) below to calculate a disinfection benchmark.

(1) For each year of profiling data collected and calculated under §5.9.10(a) through (d), systems must determine the lowest mean monthly level of both *Giardia lamblia* and virus inactivation. Systems must determine the mean *Giardia lamblia* and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly *Giardia lamblia* and virus log inactivation by the number of values calculated for that month.

(2) The disinfection benchmark is the lowest monthly mean value (for systems with one year of profiling data) or the mean of the lowest monthly mean values (for systems with more than one year of profiling data) of *Giardia lamblia* and virus log inactivation in each year of profiling data.

5.9.11 **Bin Classification For Filtered Systems**.

(a) Following completion of the initial round of source water monitoring required under §5.9.2(a), filtered systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results reported under §5.9.2(a) and must follow the procedures in §5.9.11(b)(1) through (5) below.

(b) (1) For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.

(2) For systems that collect a total of at least 24 samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected.

(3) For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.

(4) For systems with plants operating only part of the year that monitor fewer than 12 months per year under §5.9.2(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

(5) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in §5.9.11(b)(1) through (4) above.

(c) Filtered systems must determine their initial bin classification from the following table and using the *Cryptosporidium* bin concentration calculated under §5.9.11(a)-(b) above:

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BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS

For systems that are:	With a *Cryptosporidium* bin concentration of[3]	The bin classification is
Required to monitor for *Cryptosporidium* under §5.9.2	*Cryptosporidium* < 0.075 oocyst/L	Bin 1
	0.075 oocysts/L ≤ *Cryptosporidium* < 1.0 oocysts/L	Bin 2
	1.0 oocysts/L ≤ *Cryptosporidium* < 3.0 oocysts/L	Bin 3
	Cryptosporidium ≥ 3.0 oocysts/L	Bin 4
Serving fewer than 10,000 people and NOT required to monitor for *Cryptosporidium* under §5.9.2(a)(4).	NA	Bin 1

(d) Following completion of the second round of source water monitoring required under § 5.9.2(b), filtered systems must recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported under §5.9.2(b) and following the procedures in §5.9.11(b)(1) through (4). Systems must then redetermine their bin classification using this bin concentration and the table in §5.9.11(c) above.

(e) (1) Filtered systems must report their initial bin classification under §5.9.11(c) to the Director for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in §5.9.2(c).

(2) Systems must report their bin classification under §5.9.11 (d) to the Director for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in §5.9.2(c).

(3) The bin classification report to the Director must include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

(f) Failure to comply with the conditions of §5.9.11(e) is a violation of the treatment technique requirement.

5.9.12 **Filtered System Additional *Cryptosporidium* Treatment Requirements**.

(a) Filtered systems must provide the level of additional treatment for *Cryptosporidium* specified in this paragraph based on their bin classification as determined under §5.9.11 and according to the schedule in §5.9.14.

[3] Based on calculations in §5.9.11(a) or (d), as applicable.

If the system bin classification is	And the system uses the following filtration treatment in full compliance with §5.0 (as applicable), then the additional Cryptosporidium treatment requirements are			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	[4]
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	[5]
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	[6]

(b) (1) Filtered systems must use one or more of the treatment and management options listed in §5.9.16, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in §5.9.12(a) above.

(2) Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under §5.9.12(a) above using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in §§5.9.17 through 5.9.21.

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in §§5.9.17 through 5.9.21 for microbial toolbox options that is at least equal to the level of treatment required in §5.9.12(a) above is a violation of the treatment technique requirement.

(d) If the Director determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under §5.9.2(a) or §5.9.2(b), significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the Director to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in §5.9.16.

5.9.13 **Unfiltered System *Cryptosporidium* Treatment Requirements**.

(a) **Determination of Mean *Cryptosporidium* Level**.

(1) Following completion of the initial source water monitoring required under §5.9.2(a), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under § 5.9.2(a). Systems must report this value to the Director for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in §5.9.2(c).

[4] As determined by the Director such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.

[5] As determined by the Director such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.

[6] As determined by the Director such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

(2) Following completion of the second round of source water monitoring required under §5.9.2(b), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under §5.9.2(b). Systems must report this value to the Director for approval no later than 6 months after the month the system is required to complete the second round of source water monitoring based on the schedule in §5.9.2(c).

(3) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level in §5.9.13(a)(1) or (2) above.

(4) The report to the Director of the mean *Cryptosporidium* levels calculated under §5.9.13(a)(1) and (2) above must include a summary of the source water monitoring data used for the calculation.

(5) Failure to comply with the conditions of §5.9.13(a) of this section is a violation of the treatment technique requirement.

(b) ***Cryptosporidium* Inactivation Requirements**. Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in this paragraph, based on their mean *Cryptosporidium* levels as determined under §5.9.13(a) and according to the schedule in §5.9.14.

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

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

(c) **Inactivation Treatment Technology Requirements**. Unfiltered systems must use chlorine dioxide, ozone, or UV as described in § 5.9.21 to meet the *Cryptosporidium* inactivation requirements of this section.

(1) Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in §5.9.13(b) on more than one day in the calendar month are in violation of the treatment technique requirement.

(2) Systems that use UV light and fail to achieve the *Cryptosporidium* inactivation required in §5.9.13(b) by meeting the criteria in §5.9.21(d)(3)(ii) are in violation of the treatment technique requirement.

(d) **Use of Two Disinfectants**. Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of this section and *Giardia lamblia* and virus inactivation requirements of §5.3.5 using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either *Cryptosporidium*, *Giardia lamblia*, or viruses.

5.9.14 **Schedule For Compliance With *Cryptosporidium* Treatment Requirements**.

(a) Following initial bin classification under §5.9.11(c), filtered systems must provide the level of treatment for *Cryptosporidium* required under §5.9.12 according to the schedule in §5.9.14(c) below.

(b) Following initial determination of the mean *Cryptosporidium* level under §5.9.13(a)(1), unfiltered systems must provide the level of treatment for *Cryptosporidium* required under § 5.9.13 according to the schedule in §5.9.14(c).

(c) *Cryptosporidium* treatment compliance dates.

***CRYPTOSPORIDIUM* TREATMENT COMPLIANCE DATES TABLE**

Systems that serve	Must comply with Cryptosporidium treatment requirements no later than:[7]
(1) At least 100,000 people	(i) April 1, 2012
(2) From 50,000 to 99,999 people	(i) October 1, 2012
(3) From 10,000 to 49,999 people	(i) October 1, 2013
(4) Fewer than 10,000 people	(i) October 1, 2014.

(d) If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under §5.9.11(d), the system must provide the level of treatment for *Cryptosporidium* required under §5.9.12 on a schedule the Director approves.

(e) If the mean *Cryptosporidium* level for an unfiltered system changes following the second round of monitoring, as determined under §5.9.13(a)(2), and if the system must provide a different level of *Cryptosporidium* treatment under §5.9.13 due to this change, the system must meet this treatment requirement on a schedule the Director approves.

5.9.15 **Requirements For Uncovered Finished Water Storage Facilities**.

(a) Systems using uncovered finished water storage facilities must comply with the conditions of this section.

(b) Systems must notify the Director of the use of each uncovered finished water storage facility.

(c) Systems must meet the conditions of §5.9.15(c)(1) or (2) below for each uncovered finished water storage facility or be in compliance with a Director-approved schedule to meet these conditions no later than April 1, 2009.

(1) Systems must cover any uncovered finished water storage facility.

(2) Systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium* using a protocol approved by the Director.

(d) Failure to comply with the requirements of this section is a violation of the treatment technique requirement.

5.9.16 **Microbial Toolbox Options For Meeting *Cryptosporidium* Treatment Requirements.**

(a) (1) Systems receive the treatment credits listed in the table in §5.9.16(b) below by meeting the conditions for microbial toolbox options described in §§5.9.17 through 5.9.21.

[7] The Director may allow up to an additional two years for complying with the treatment requirement for systems making capital improvements.

Systems apply these treatment credits to meet the treatment requirements in §5.9.12 or §5.9.13, as applicable.

(2) Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in §5.9.21 only.

(b) The following table summarizes options in the microbial toolbox:

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MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
(1) Watershed control program	0.5-log credit for Director-approved program comprising required elements, annual program status report to Director, and regular watershed survey. Unfiltered systems are not eligible for credit. Specific criteria are in §5.9.17(a).
(2) Alternative source/intake management	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in §5.9.17(b).
Toolbox Option	***Cryptosporidium* treatment credit with design and implementation criteria**
Pre Filtration Toolbox Options	
(3) Presedimentation basin with coagulation	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative Director-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through basins. Specific criteria are in §5.9.18(a).
(4) Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in §5.9.18(b).
(5) Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in §5.9.18(c).
Treatment Performance Toolbox Options	
(6) Combined filter performance	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria are in §5.9.19(a).
(7) Individual filter performance	0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in §5.9.19(b).
(8) Demonstration of performance	Credit awarded to unit process or treatment train based on a demonstration to the Director with a Director-approved protocol. Specific criteria are in §5.9.19(c).

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Additional Filtration Toolbox Options	
(9) Bag or cartridge filters (individual filters)	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in § 5.9.20(a).
(10) Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in §5.9.20(a).
(11) Membrane filtration	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in §5.9.20(b).
(12) Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in §5.9.20(c).
(13) Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in §5.9.20(d).
Inactivation Toolbox Options	
(14) Chlorine dioxide	Log credit based on measured CT in relation to CT table. Specific criteria in §5.9.21(b).
(15) Ozone	Log credit based on measured CT in relation to CT table. Specific criteria in §5.9.21(b).
(16) UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in §5.9.21(d).

5.9.17 **Source Toolbox Components**.

(a) **Watershed Control Program**. Systems receive 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of this section.

(1) Systems that intend to apply for the watershed control program credit must notify the Director of this intent no later than two years prior to the treatment compliance date applicable to the system in §5.9.14.

(2) Systems must submit to the Director a proposed watershed control plan no later than one year before the applicable treatment compliance date in §5.9.14. The Director must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the elements in §5.9.17(a)(2)(i) through (iv) below.

(i) Identification of an "area of influence" outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under §5.9.17(a)(5)(ii).

(ii) Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system's source water quality.

(iii) An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system's source water.

(iv) A statement of goals and specific actions the system will undertake to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

(3) Systems with existing watershed control programs (i.e., programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in §5.9.17(a)(2) and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

(4) If the Director does not respond to a system regarding approval of a watershed control plan submitted under this section and the system meets the other requirements of this section, the watershed control program will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded unless and until the Director subsequently withdraws such approval.

(5) Systems must complete the actions in §5.9.17(a)(5)(i) through (iii) below to maintain the 0.5-log credit.

(i) Submit an annual watershed control program status report to the Director. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the Director or as the result of the watershed survey conducted under §5.9.17(a)(5)(ii). It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the Director prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

(ii) Undergo a watershed sanitary survey every three years for community water systems and every five years for noncommunity water systems and submit the survey report to the Director. The survey must be conducted according to the Director's guidelines and by persons the Director approves.

(A) The watershed sanitary survey must meet the following criteria: encompass the region identified in the Director-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.

(B) If the Director determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the Director requires, which may be earlier than the regular date in §5.9.17(a)(5)(ii) above.

(iii) The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public uponrequest. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The Director may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.

(6) If the Director determines that a system is not carrying out the approved watershed control plan, the Director may withdraw the watershed control program treatment credit.

(b) **Alternative Source**.

(1) A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the Director approves, a system may determine its bin classification under §5.9.11 based on the alternative source monitoring results.

(2) If systems conduct alternative source monitoring under §5.9.17(b)(1) above, systems must also monitor their current plant intake concurrently as described in §5.9.2.

(3) Alternative source monitoring under §5.9.17(b)(1) above must meet the requirements for source monitoring to determine bin classification, as described in §§5.9.2 through 5.9.7. Systems must report the alternative source monitoring results to the Director, along with supporting information documenting the operating conditions under which the samples were collected.

(4) If a system determines its bin classification under §5.9.11 using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in §5.9.14.

5.9.18 **Pre-Filtration Treatment Toolbox Components**.

(a) **Presedimentation**. Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.

(1) The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or GWUDI source.

(2) The system must continuously add a coagulant to the presedimentation basin.

(3) The presedimentation basin must achieve the performance criteria in §5.9.18(a)(3)(i) or (ii) below.

(i) Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\log_{10}$(monthly mean of daily influent turbidity)-$\log_{10}$(monthly mean of daily effluent turbidity).

(ii) Complies with Director-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

(b) **Two-Stage Lime Softening**. Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.

(c) **Bank Filtration**. Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring under §5.9.2(a) must collect samples as described in §5.9.4(d) and are not eligible for this credit.

(1) Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in §5.9.18(c)(4) below.

(2) Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.

(3) Only horizontal and vertical wells are eligible for treatment credit.

(4) For vertical wells, the ground water flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

(5) Systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the Director and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the Director determines that microbial removal has been compromised, the Director may revoke treatment credit until the system implements corrective actions approved by the Director to remediate the problem.

(6) Springs and infiltration galleries are not eligible for treatment credit under this section, but are eligible for credit under §5.9.19(c).

(7) **Bank Filtration Demonstration of Performance**. The Director may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in §5.9.18(c)(1)-(5) above.

(i) The study must follow a Director-approved protocol and must involve the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.

(ii) The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

5.9.19 **Treatment Performance Toolbox Components**.

(a) **Combined filter performance**. Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log *Cryptosporidium* treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in Appendix I.

(b) **Individual filter performance**. Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be inaddition to the 0.5-log credit under §5.9.19(a) above, during any month the system meets the criteria in this paragraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in §5.7, as applicable.

(1) The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.

(2) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

(3) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of §5.9.19(b)(1) or (2) above during any month does not receive a treatment technique violation under §5.9.12(c) if the Director determines the following:

(i) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.

(ii) The system has experienced no more than two such failures in any calendar year.

(c) **Demonstration of Performance**. The Director may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in §5.9.12 or §§5.9.18 through 5.9.21 and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(1) Systems cannot receive the prescribed treatment credit for any toolbox box option in §§5.9.18 through 5.9.21 if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

(2) The demonstration of performance study must follow a Director-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

(3) Approval by the Director must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The Director may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

5.9.20 **Additional Filtration Toolbox Components**.

(a) **Bag and Cartridge Filters**. Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in §5.9.20(a)(1) through (10) below. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of §5.9.20(a)(2) through (9) below to the Director. The filters must treat the entire plant flow taken from a §5.0 source.

(1) The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in §5.9.20(a)(2) through (a)(9) below. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria specified in §5.9.20(a)(2) through (9) below.

(2) Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium*. Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(3) Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium*. The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.

(4) The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation:

Maximum Feed Concentration = $1 \times 10^4 \times$ (Filtrate Detection Limit)

(5) Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

(6) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of §5.9.

(7) Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$

Where:

LRV = log removal value demonstrated during challenge testing;

C_f = the feed concentration measured during the challenge test; and

C_p = the filtrate concentration measured during the challenge test.

In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p must be set equal to the detection limit.

(8) Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV_{filter}) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

(9) If fewer than twenty (20) filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest LRV_{filter} among the filters tested. If twenty (20) or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of LRV_{filter} values for the various filters tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(10) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the Director.

(b) **Membrane Filtration**.

(1) Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in §1.0 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under §5.9.20(b)(1)(i) and (ii) below.

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in §5.9.20(b)(2) below.

(ii) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in §5.9.20(b)(3) below.

(2) **Challenge Testing**. The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the Director. Challenge testing must be conducted according to the criteria in §5.9.20(b)(2) (i) through (vii) below. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in 5.9.20(b)(2) (i) through (vii) below.

(i) Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

(ii) Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism

or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.

(iii) The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation:

Maximum Feed Concentration = 3.16×10^6 x (Filtrate Detection Limit)

(iv) Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (i.e., backwashing).

(v) Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation:

$LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$

Where:

LRV = log removal value demonstrated during challenge test;

C_f = the feed concentration measured during the challenge test; and

C_p = the filtrate concentration measured during the challenge test.

Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p is be set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

(vi) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($LRV_{C\text{-}Test}$). If fewer than twenty (20) modules are tested, then $LRV_{C\text{-}Test}$ is equal to the lowest of the representative LRVs among the modules tested. If twenty (20) or more modules are tested, then $LRV_{C\text{-}Test}$ is equal to the 10th percentile of the representative LRVs among the modules tested. The percentile is defined by (i/(n+1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(vii) The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

(viii) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive

performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the Director.

(3) **Direct Integrity Testing**. Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and meets the requirements described in §5.9.20(b)(3)(i) through (vi) below. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (i.e., one or more leaks that could result in contamination of the filtrate).

(i) The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.

(ii) The direct integrity method must have a resolution of 3 micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.

(iii) The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the Director, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either §5.9.20 (b)(3)(iii)(A) or (B) below as applicable to the type of direct integrity test the system uses.

(A) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

$LRV_{DIT} = LOG_{10} (Q_p/(VCF \times Q_{breach}))$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test;

Q_p = total design filtrate flow from the membrane unit;

Q_{breach} = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and

VCF = volumetric concentration factor.

The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

(B) For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

$LRV_{DIT} = LOG_{10}(C_f)-LOG_{10}(C_p)$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test;

C_f = the typical feed concentration of the marker used in the test; and

C_p = the filtrate concentration of the marker from an integral membrane unit.

(iv) Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the Director.

(v) If the result of a direct integrity test exceeds the control limit established under §5.9.20(b)(3)(iv) above, the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.

(vi) Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The Director may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.

(4) **Indirect Integrity Monitoring**. Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in §5.9.20(b)(4)(i) through (v) below. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in §5.9.20(b)(3)(i) through (v) below is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the Director summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

(i) Unless the Director approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

(ii) Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.

(iii) Continuous monitoring must be separately conducted on each membrane unit.

(iv) If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (i.e., two consecutive 15-minute readings above 0.15 NTU), direct integrity testing must immediately be performed on the associated membrane unit as specified in §5.9.20(b)(3)(i) through (v) above.

(v) If indirect integrity monitoring includes a Director-approved alternative parameter and if the alternative parameter exceeds a Director-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in §5.9.20(b)(3)(i) through (v).

(c) **Second Stage Filtration**. Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the Director approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The Director must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

(d) **Slow Sand Filtration (as secondary filter)**. Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The Director must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

5.9.21 **Inactivation Toolbox Components.**

(a) **Calculation of CT Values**.

(1) CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under §5.9.21(b) or (c) below must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in Appendix I.

(2) Systems with several disinfection segments in sequence may calculate CT for each segment, where a disinfection segment is defined as a treatment unit process with a measurable disinfectant residual level and a liquid volume. Under this approach, systems must add the *Cryptosporidium* CT values in each segment to determine the total CT for the treatment plant.

(b) **CT Values For Chlorine Dioxide and Ozone**.

(1) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in §5.9.21(a) above.

CT Values (mg·min/L) for *Cryptosporidium* Inactivation by Chlorine Dioxide[8]

Log credit	Water Temperature, °C										
	≤ 0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25	159	153	140	128	107	90	69	45	29	19	12
(ii) 0.5	319	305	279	256	214	180	138	89	58	38	24
(iii) 1.0	637	610	558	511	429	360	277	179	116	75	49
(iv) 1.5	956	915	838	767	643	539	415	268	174	113	73
(v) 2.0.	1275	1220	1117	1023	858	719	553	357	232	150	98
(vi) 2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122
(vii) 3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

(2) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in §5.9.21(a) above.

[8] Systems may use this equation to determine log credit between the indicated values:
Log credit = $(0.001506 \times (1.09116)^{Temp}) \times CT$.

CT Values (mg·min/L) for *Cryptosporidium* Inactivation by Ozone[9]

Log credit	Water Temperature, ºC										
	≤ 0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
(ii) 0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
(iii) 1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
(iv) 1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
(v) 2.0.	48	46	42	38	32	26	20	12	7.8	4.9	3.1
(vi) 2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
(vii) 3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

(c) **Site-Specific Study**. The Director may approve alternative chlorine dioxide or ozone CT values to those listed in §5.9.21(b) above on a site-specific basis. The Director must base this approval on a site-specific study a system conducts that follows a Director-approved protocol.

(d) **Ultraviolet Light**. Systems receive *Cryptosporidium*, *Giardia lamblia*, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in §5.9.21 (d)(1) below. Systems must validate and monitor UV reactors as described in §5.9.21(d)(2) and (3) below to demonstrate that they are achieving a particular UV dose value for treatment credit.

(1) **UV Dose Table**. The treatment credits listed in this table are for UV light at a wavelength of 254 nm as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing, as described in §5.9.21(d)(2) below. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.

UV Dose Table for *Cryptosporidium*, *Giardia lamblia*, and Virus Inactivation Credit

Log credit	*Cryptosporidium* UV dose (mJ/cm^2)	*Giardia lamblia* UV dose (mJ/cm^2)	Virus UV dose (mJ/cm^2)
(i) 0.5	1.6	1.5	39
(ii) 1.0	2.5	2.1	58
(iii) 1.5	3.9	3.0	79
(iv) 2.0	5.8	5.2	100
(v) 2.5.	8.5	7.7	121
(vi) 3.0	12	11	143
(vii) 3.5	15	15	163
(viii) 4.0	22	22	186

(2) **Reactor Validation Testing**. Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in §5.9.21(d)(1) above (i.e., validated operating conditions).

[9] Systems may use this equation to determine log credit between the indicated values:
Log credit = $(0.0397 \times (1.09757)^{Temp}) \times CT$.

These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

(i) When determining validated operating conditions, systems must account for the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.

(ii) Validation testing must include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.

(iii) The Director may approve an alternative approach to validation testing.

(3) **Reactor Monitoring**.

(i) Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under §5.9.21 (d)(2) above. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the State designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the Director approves.

(ii) To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as described in §5.9.21 (d)(1) and (2) above. Systems must demonstrate compliance with this condition by the monitoring required under §5.9.21(d)(3)(i) above.

5.9.22 **Reporting Requirements.**

(a) Systems must report sampling schedules under §5.9.3 and source water monitoring results under §5.9.7 unless they notify the Director that they will not conduct source water monitoring due to meeting the criteria of §5.9.2(d).

(b) Systems must report the use of uncovered finished water storage facilities to the Director as described in §5.9.15.

(c) Filtered systems must report their *Cryptosporidium* bin classification as described in §5.9.11.

(d) Unfiltered systems must report their mean source water *Cryptosporidium* level as described in §5.9.13.

(e) Systems must report disinfection profiles and benchmarks to the Director as described in §§5.9.9 through 5.9.10 prior to making a significant change in disinfection practice.

(f) Systems must report to the Director in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under §5.9.12 or § 5.9.13. Alternatively, the Director may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox option	Systems must submit the following information	On the following schedule
(1) Watershed control program (WCP)	(i) Notice of intention to develop a new or continue an existing watershed control program	No later than two years before the applicable treatment compliance date in §5.9.14
	(ii) Watershed control plan	No later than one year before the applicable treatment compliance date in §5.9.14.
	(iii) Annual watershed control program status report	Every 12 months, beginning one year after the applicable treatment compliance date in §5.9.14.
	(iv) Watershed sanitary survey report	For community water systems, every three years beginning three years after the applicable treatment compliance date in §5.9.14. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in §5.9.14.
(2) Alternative source/ intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results	No later than the applicable treatment compliance date in §5.9.14.
(3) Presedimentation	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100% of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative State-approved performance criteria.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(4) Two-stage lime softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration (ii) Both stages treated 100% of the plant flow.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(5) Bank filtration	(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit).	No later than the applicable treatment compliance date in §5.9.14.
	(ii) If monthly average of daily max turbidity is greater than 1 NTU then system must report result and submit an assessment of the cause.	Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.

Toolbox option	Systems must submit the following information	On the following schedule
(6) Combined filter performance	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(7) Individual filter performance	Monthly verification of the following: (i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(8) Demonstration of performance	(i) Results from testing following a State approved protocol.	No later than the applicable treatment compliance date in §5.9.14.
	(ii) As required by the State, monthly verification of operation within conditions of State approval for demonstration of performance credit.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(9) Bag filters and cartridge filters	(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge filtration; (B) Removal efficiency established through challenge testing that meets criteria in this subpart.	No later than the applicable treatment compliance date in §5.9.14.
	(ii) Monthly verification that 100% of plant flow was filtered	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(10) Membrane filtration	(i) Results of verification testing demonstrating the fol-lowing: (A) Removal efficiency established through challenge testing that meets criteria in this subpart; (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.	No later than the applicable treatment compliance date in §5.9.14.
	(ii) Monthly report summarizing the following: (A) All di-rect integrity tests above the control limit; (B) If applicable, any turbidity or alternative state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.

Toolbox option	Systems must submit the following information	On the following schedule
(11) Second stage filtration	Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step.	Within ten (10) days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(12) Slow sand filtration (as secondary filter)	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from §5.0 sources.	Within ten (10) days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.
(13) Chlorine dioxide	Summary of CT values for each day as described in §5.9.21.	Within ten (10) days following the month in which monitoring was conducted.
(14) Ozone	Summary of CT values for each day as described in §5.9.21.	Within ten (10) days following the month in which monitoring was conducted.
(15) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose.	No later than the applicable treatment compliance date in §5.9.14.
	(ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in 5.9.21(d)..	Within ten (10) days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in §5.9.14.

5.9.23 **Recordkeeping Requirements.**

(a) Systems must keep results from the initial round of source water monitoring under §5.9.2(a) and the second round of source water monitoring under §5.9.2(b) until three (3) years after bin classification under §5.9.11 for filtered systems or determination of the mean *Cryptosporidium* level under §5.9.11 for unfiltered systems for the particular round of monitoring.

(b) Systems must keep any notification to the Director that they will not conduct source water monitoring due to meeting the criteria of §5.9.2(d) for three (3) years.

(c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under §§5.9.17 through 5.9.21 and with uncovered finished water reservoirs under §5.9.15, as applicable, for 3 years.

5.9.24 **Requirements to Respond to Significant Deficiencies Identified in Sanitary Surveys Performed by the Director.**

(a) For the purposes of this section, a "sanitary survey," as conducted by the Director, includes but is not limited to, an onsite review of the water source(s) (identifying sources of contamination by using results of source water assessments or other relevant information where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water. The sanitary survey must include an evaluation of the applicable components listed in §5.9.24(a)(1) through (8):

(1) Source,

(2) Treatment,

(3) Distribution system,

(4) Finished water storage,

(5) Pumps, pump facilities, and controls,

(6) Monitoring, reporting, and data verification,

(7) System management and operation, and

(8) Operator compliance with Director requirements.

(b) For the purposes of this section, significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the Director determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.

(c) For sanitary surveys performed by the Director, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than forty-five (45) days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.

(d) Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by the Director, or if there is no approved schedule, according to the schedule reported under §5.9.24(c) above if such deficiencies are within the control of the system.

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SECTION 6.0 - CONTROL OF LEAD AND COPPER

6.80[10] General requirements

6.81 Applicability of corrosion control treatment steps to small, medium-size and large water systems

6.82 Description of corrosion control treatment requirements

6.83 Source water treatment requirements

6.84 Lead service line replacement requirements

6.85 Public education and supplemental monitoring requirements

6.86 Monitoring requirements for lead and copper in tap water

6.87 Monitoring requirements for water quality parameters

6.88 Source monitoring requirements for lead and copper in water

6.89 Analytical methods

6.90 Reporting requirements

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6.80 General Requirements

(a) **Applicability and Effective Dates**

(1) The requirements of Section 6 constitute the national primary drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of this Section applies to community water systems and non-transient, non-community water systems (hereinafter referred to as "water systems" or "systems").

(2) **[Reserved]**.

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

(c) **Lead and Copper Action Levels**

(1) The lead action level is exceeded if the concentration of lead in more than ten (10) percent of tap water samples collected during any monitoring period conducted in accordance with §6.86 is greater than 0.015 mg/L (i.e., if the "90th percentile" lead level is greater than 0.015 mg/L).

(2) The copper action level is exceeded if the concentration of copper in more than ten (10) percent of tap water samples collected during any monitoring period conducted in accordance with §6.86 is greater than 1.3 mg/L (i.e., if the "90th percentile" copper level is greater than 1.3 mg/L).

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

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

[10] Sections 6.1 through 6.79 are not used and are intentionally omitted.

lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(ii) The number of samples taken during the monitoring period shall be multiplied by 0.9.

(iii) The contaminant concentration in the numbered sample yielded by the calculation in §6.80(c)(3)(ii) is the 90th percentile contaminant level.

(iv) For water systems serving fewer than 100 people that collect five (5) samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.

(v) For a public water system that has been allowed by the Director to collect fewer than five samples in accordance with §6.86(c), the sample result with the highest concentration is considered the 90th percentile value

(d) **Corrosion Control Treatment Requirements**

(1) All water systems shall install and operate optimal corrosion control treatment as defined in §1.0.

(2) Any water system that complies with the applicable corrosion control treatment requirements specified by the Director under §§6.81 and 6.82 shall be deemed in compliance with the treatment requirement contained in §6.80(d)(1).

(e) **Source Water Treatment Requirements**. Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the Director under §6.83.

(f) **Lead Service Line Replacement Requirements**. Any system exceeding the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the lead service line replacement requirements contained in §6.84.

(g) **Public Education Requirements**. Pursuant to §6.85, all water systems must provide a consumer notice of lead tap water monitoring results to persons served at the sites (taps) that are tested. Any system exceeding the lead action level shall implement the public education requirements.

(h) **Monitoring and Analytical Requirements**. Tap water monitoring for lead and copper, monitoring for water quality parameters, source water monitoring for lead and copper, and analyses of the monitoring results under this subpart shall be completed in compliance with §§6.86, 6.87, 6.88 and 6.89.

(i) **Reporting Requirements**. Systems shall report to the Director any information required by the treatment provisions of this subpart and §6.90.

(j) **Record-Keeping Requirements**. Systems shall maintain records in accordance with §6.91.

(k) Failure to comply with the applicable requirements of §§6.80-6.91, including requirements established by the Director pursuant to these provisions, shall constitute a violation of these Regulations.

6.81 **Applicability of Corrosion Control Treatment Steps to Small, Medium-size and Large Water Systems**

(a) Systems shall complete the applicable corrosion control treatment requirements described in §6.82 by the deadlines established in this section.

(1) A large system (serving >50,000 persons) shall complete the corrosion control treatment steps specified in §6.81(d), unless it is deemed to have optimized corrosion control under §6.81(b)(2) or (b)(3).

(2) A small system (serving <3,300 persons) and a medium-size system (serving >3,300 and <50,000 persons) shall complete the corrosion control treatment steps specified in §6.81(e), unless it is deemed to have optimized corrosion control under §6.81(b)(1), (b)(2), or (b)(3).

(b) A system is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in this section if the system satisfies one (1) of the criteria specified in §6.81(b)(1) through (b)(3). Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the Director determines appropriate to ensure optimal corrosion control treatment is maintained.

(1) A small or medium-size water system is deemed to have optimized corrosion control if the system meets the lead and copper action levels during each of two (2) consecutive six-month monitoring periods conducted in accordance with §6.86.

(2) Any water system may be deemed by the Director to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the Director that it has conducted activities equivalent to the corrosion control steps applicable to such system under this Section. If the Director makes this determination, the Director shall provide the system with written notice explaining the basis for his decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with §6.82(f). Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the Director-designated optimal water quality control parameters in accordance with §6.82(g) and continue to conduct lead and copper tap and water quality parameter sampling in accordance with §6.86(d)(3) and §6.87(d), respectively. A system shall provide the Director with the following information in order to support a determination under this paragraph:

(i) the results of all test samples collected for each of the water quality parameters in §6.82(c)(3).

(ii) a report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in §6.82(c)(1), the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment;

(iii) a report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps; and

(iv) the results of tap water samples collected in accordance with §6.86 at least once every six (6) months for one (1) year after corrosion control has been installed.

(3) Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with §6.86 and source water monitoring conducted in accordance with §6.88 that demonstrates for two (2) consecutive six-month monitoring periods that the difference between the 90th percentile tap water lead level computed under §6.80(c)(3), and the highest source water lead concentration, is less than the Practical Quantitation Level for lead specified in §6.89(a)(1)(ii).

(i) Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if

the 90th percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two (2) consecutive 6-month monitoring periods.

(ii) Any water system deemed to have optimized corrosion control in accordance with this aragraph shall continue monitoring for lead and copper at the tap no less frequently than once every three (3) calendar years using the reduced number of sites specified in §6.86(c) and collecting the samples at times and locations specified in §6.86(d)(4)(iv).

(iii) Any water system deemed to have optimized corrosion control pursuant to this paragraph shall notify the Director in writing pursuant to §6.90(a)(3) of any upcoming long-term change in treatment or addition of a new source as described in that section. The Director must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The Director may require any such system to conduct additional monitoring or to take other action the Director deems appropriate to ensure that such systems maintain minimal levels of corrosion in the distribution system .

(iv) As of July 12, 2001, a system is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment pursuant to §6.81(b)(3)(v) unless it meets the copper action level.

(v) Any system triggered into corrosion control because it is no longer deemed to have optimized corrosion control under this paragraph shall implement corrosion control treatment in accordance with the deadlines in §6.81(e). Any such large system shall adhere to the schedule specified in that paragraph for medium-size systems, with the time periods for completing each step being triggered by the date the system is no longer deemed to have optimized corrosion control under this paragraph.

(c) Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two (2) consecutive monitoring periods conducted pursuant to §6.86, and submits the results to the Director. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The Director may require a system to repeat treatment steps previously completed by the system where the Director determines that this is necessary to implement properly the treatment requirements of this Section. The Director shall notify the system in writing of such a determination and explain the basis for its decision. The requirement for any small or medium-size system to implement corrosion control treatment steps in accordance with §6.81(e) (including systems deemed to have optimized corrosion control under §6.81(b)(1)) is triggered whenever any small or medium-size system exceeds the lead or copper action level.

(d) **Treatment Steps and Deadlines for Large Systems**. Except as provided in §6.81(b)(2) and (3), large systems shall complete the following corrosion control treatment steps (described in the referenced portions of §§6.82, 6.86, and 6.87) by the indicated dates.

(1) ***Step 1***: The system shall conduct initial monitoring (§6.86(d)(1) and §6.87(b)) during two (2) consecutive six-month monitoring periods within twelve (12) months of beginning operation.

(2) ***Step 2***: The system shall complete corrosion control studies (§6.82(c)) within thirty (30) months of beginning operation.

(3) ***Step 3***: The Director shall designate optimal corrosion control treatment (§6.82(d)) within thirty-six (36) months of beginning operation.

(4) ***Step 4***: The system shall install optimal corrosion control treatment (§6.82(e)) within sixty (60) months of beginning operation.

(5) ***Step 5***: The system shall complete follow-up sampling (§6.86(d)(2) and §6.87(c)) within seventy-two (72) months of beginning operation.

(6) ***Step 6***: The Director shall review installation of treatment and designate optimal water quality control parameters (§6.82(f)) within seventy-eight (78) months of beginning operation.

(7) ***Step 7***: The system shall operate in compliance with the Director-specified optimal water quality control parameters (§6.82(g)) and continue to conduct tap sampling (§6.86(d)(3) and §6.87(d)).

(e) **Treatment Steps and Deadlines for Small and Medium-size Systems**. Except as provided in §6.81(b), small and medium-size systems shall complete the following corrosion control treatment steps (described in the referenced portions of §§6.82, 6.86 and 6.87) by the indicated time periods.

(1) ***Step 1***: The system shall conduct initial tap sampling (§6.86(d)(1) and §6.87(b)) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under §6.86(d)(4). A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (§6.82(a)) within six (6) months after the end of the monitoring period during which it exceeds one (1) of the action levels.

(2) ***Step 2***: Within twelve (12) months after the end of the monitoring period during which a system exceeds the lead or copper action level, the Director may require the system to perform corrosion control studies (§6.82(b)). If the Director does not require the system to perform such studies, the Director shall specify optimal corrosion control treatment (§6.82(d)) within the following time frames:

(i) for medium-size systems, within eighteen (18) months after the end of the monitoring period during which such system exceeds the lead or copper action level,

(ii) for small systems, within twenty-four (24) months after the end of the monitoring period during which such system exceeds the lead or copper action level.

(3) ***Step 3***: If the Director requires a system to perform corrosion control studies under step 2, the system shall complete the studies (§6.82(c)) within 18 months after the Director requires that such studies be conducted.

(4) ***Step 4***: If the system has performed corrosion control studies under step 2, the Director shall designate optimal corrosion control treatment (§6.82(d)) within 6 months after completion of Step 3.

(5) ***Step 5***: The system shall install optimal corrosion control treatment (§6.82(e)) within twenty-four (24) months after the Director designates such treatment.

(6) ***Step 6***: The system shall complete follow-up sampling (§6.86(d)(2) and §6.87(c)) within thirty-six (36) months after the Director designates optimal corrosion control treatment.

(7) ***Step 7***: The Director shall review the system's installation of treatment and designate optimal water quality control parameters (§6.82(f)) within six (6) months after completion of Step 6.

(8) ***Step 8***: The system shall operate in compliance with the Director-designated optimal water quality control parameters (§6.82(g)) and continue to conduct tap sampling (§6.86(d)(3) and §6.87(d)).

6.82 **Description of Corrosion Control Treatment Requirements.** Each system shall complete the corrosion control treatment requirements described below which are applicable to such system under §6.81.

(a) **System Recommendation Regarding Corrosion Control Treatment**. Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one (1) or more of the corrosion control treatments listed in §6.82(c)(1) which the system believes constitutes optimal corrosion control for that system. The Director may require the system to conduct additional water quality parameter monitoring in accordance with §6.87(b) to assist the Director in reviewing the system's recommendation.

(b) **Decision to Require Studies of Corrosion Control Treatment (Applicable to Small and Medium-size Systems**. The Director may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under §6.82(c) to identify optimal corrosion control treatment for the system.

(c) **Performance of Corrosion Control Studies**.

(1) Any PWS performing corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:

(i) alkalinity and pH adjustment;

(ii) calcium hardness adjustment; and

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

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

(3) The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:

(i) lead;

(ii) copper;

(iii) pH;

(iv) alkalinity;

(v) calcium;

(vi) conductivity;

(vii) orthophosphate (when an inhibitor containing a phosphate compound is used);

(viii) silicate (when an inhibitor containing a silicate compound is used); and

(ix) water temperature.

(4) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one (1) of the following:

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

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

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

(6) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the Director in writing the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in §6.82(c)(1) through (5).

(d) **Designation of Optimal Corrosion Control Treatment**

(1) Based upon consideration of available information including, where applicable, studies performed under §6.82(c) and a system's recommended treatment alternative, the Director shall either approve the corrosion control treatment option recommended by the system, or designate alternative corrosion control treatment(s) from among those listed in §6.82(c)(1). When designating optimal treatment the Director shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(2) The Director shall notify the system of his decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the Director requests additional information to aid his review, the water system shall provide the information.

(e) **Installation of Optimal Corrosion Control**. Each system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated by the Director under §6.82(d).

(f) **Review of Treatment and Specification of Optimal Water Quality Control Parameters**. The Director shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the water system and determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the Director in §6.82(d). Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the Director shall designate:

(1) a minimum value or a range of values for pH measured at each entry point to the distribution system;

(2) a minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the Director determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;

(3) if a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the Director determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

(4) if alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples;

(5) if calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed above shall be those that the Director determines to reflect optimal corrosion control treatment for the system. The Director may designate values for additional water quality control parameters determined by the Director to reflect optimal corrosion control for the system. The Director shall notify the system in writing of these determinations and explain the basis for his decisions.

(g) **Continued Operation and Monitoring**. All systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the Director under §6.82(f), in accordance with this paragraph for all samples collected under §§6.87(d)-(f). Compliance with the requirements of this paragraph shall be determined every six (6) months, as specified under §6.87(d). A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any Director-specified parameter on more than nine (9) days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the Director. Daily values are calculated as follows. The Director has the discretion to delete results of obvious sampling errors from this calculation.

(1) On days when more than one (1) measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both.

(2) On days when only one (1) measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

(3) On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the sample site.

(h) **Modification of the Director's Treatment Decisions**. Upon his own initiative or in response to a request by a water system or other interested party, the Director may modify his determination of the optimal corrosion control treatment under §6.82(d) or optimal water quality control parameters under §6.82(f). A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate and provide supporting documentation. The Director may modify his determination where he concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the Director's decision and provide an implementation schedule for completing the treatment modifications.

6.83 **Source Water Treatment Requirements** Systems shall complete the applicable source water monitoring and treatment requirements (described in the referenced portions of §6.83(b), and in §§6.86, and 6.88) by the following deadlines.

(a) **Deadlines for Completing Source Water Treatment Steps**

(1) ***Step 1***: A system exceeding the lead or copper action level shall complete lead and copper source water monitoring (§6.88(b)) and make a treatment recommendation to the Director (§6.83(b)(1)) no later than 180 days after the end of the monitoring period during which the lead or copper action level was exceeded.

(2) ***Step 2***: The Director shall make a determination regarding source water treatment (§6.83(b)(2)) within six (6) months after submission of monitoring results under Step 1.

(3) ***Step 3***: If the Director requires installation of source water treatment, the system shall install the treatment (§6.83(b)(3)) within twenty-four (24) months after completion of Step 2.

(4) ***Step 4***: The system shall complete follow-up tap water monitoring (§6.86(d)(2) and source water monitoring (§6.88(c)) within thirty-six (36) months after completion of Step 2.

(5) ***Step 5***: The Director shall review the system's installation and operation of source water treatment and specify maximum permissible source water levels (§6.83(b)(4)) within six (6) months after completion of Step 4.

(6) ***Step 6***: The system shall operate in compliance with the Director-specified maximum permissible lead and copper source water levels (§6.83(b)(4)) and continue source water monitoring (§6.88(d)).

(b) **Description of Source Water Treatment Requirements**

(1) **System Treatment Recommendation**. Any system which exceeds the lead or copper action level shall recommend in writing to the Director the installation and operation of one (1) of the source water treatments listed in §6.83(b)(2). A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at users' taps.

(2) The Director shall complete an evaluation of the results of all source water samples submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the Director determines that treatment is needed, the Director shall either require installation and operation of the source water treatment recommended by the system (if any) or require the installation and operation of another source water treatment from among the following: ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the Director requests additional information to aid in his review, the water system shall provide the information by the date specified by the Director in his request. The Director shall notify the system in writing of its determination and set forth the basis for its decision.

(3) **Installation of Source Water Treatment**. Each system shall properly install and operate the source water treatment designated by the Director under §6.83(b)(2).

(4) The Director shall review the source water samples taken by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment designated by the Director. Based upon his review, the Director shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and

maintained. The Director shall notify the system in writing and explain the basis for his decision.

(5) **Continued Operation and Maintenance**. Each water system shall maintain lead and copper levels below the maximum permissible concentrations designated by the Director at each sampling point monitored in accordance with §6.88. The system is out of compliance with this paragraph if the level of lead or copper at any sampling point is greater than the maximum permissible concentration designated by the Director.

(6) **Modification of Treatment Decisions**. Upon his own initiative or in response to a request by a water system or other interested party, the Director may modify his determination of the source water treatment under §6.83(b)(2), or maximum permissible lead and copper concentrations for finished water entering the distribution system under §6.83(b)(4). A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate and provide supporting documentation. The Director may modify his determination where he concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the Director's decision, and provide an implementation schedule for completing the treatment modifications.

6.84 **Lead Service Line Replacement Requirements**

(a) Systems that fail to meet the lead action level in tap samples taken pursuant to §6.86(d)(2), after installing corrosion control and/or source water treatment (whichever sampling occurs later), shall replace lead service lines in accordance with the requirements of this Section. If a system is in violation of §6.81 or §6.83 for failure to install source water or corrosion control treatment, the Director may require the system to commence lead service line replacement under this section after the date by which the system was required to conduct monitoring under §6.86(d)(2) has passed.

(b) (1) A water system shall replace annually at least seven (7) percent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The system shall identify the initial number of lead service lines in its distribution system, including an identification of the portion(s) owned by the system, based upon a materials evaluation, including the evaluation required under §6.86(a) and relevant legal authorities (e.g., contracts, local ordinances) regarding the portion owned by the system. The first year of lead service line replacement shall begin on the first day following the end of the monitoring period in which the action level was exceeded under §6.84(a). If monitoring is required annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs. If the Director has established an alternate monitoring period, then the end of the monitoring period will be the last day of that period.

(2) Any water system resuming a lead service line replacement program after the cessation of its lead service line replacement program as allowed by §6.84(f) shall update its inventory of lead service lines to include those sites that were previously determined not to require replacement through the sampling provision under §6.84(c). The system will then divide the updated number of remaining lead service lines by the number of remaining years in the program to determine the number of lines that must be replaced per year (7 percent lead service line replacement is based on a 15-year replacement program, so, for example, systems resuming lead service line replacement after previously conducting two years of

replacement would divide the updated inventory by 13). For those systems that have completed a 15-year lead service line replacement program, the Director will determine a schedule for replacing or retesting lines that were previously tested out under the replacement program when the system re-exceeds the action level.

(c) A system is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to §6.86(b)(3), is less than or equal to 0.015 mg/L.

(d) A water system shall replace that portion of the lead service line that it owns. In cases where the system does not own the entire lead service line, the system shall notify the owner of the line, or the owner's authorized agent, that the system will replace the portion of the service line that it owns and shall offer to replace the owner's portion of the line. A system is not required to bear the cost of replacing the privately-owned portion of the line, nor is it required to replace the privately-owned portion where the owner chooses not to pay the cost of replacing the privately-owned portion of the line, or where replacing the privately-owned portion would be precluded by the State, local or common law. A water system that does not replace the entire length of the service line also shall complete the following tasks.

(1) At least forty-five (45) days prior to commencing with the partial replacement of a lead service line, the water system shall provide notice to the resident(s) of all buildings served by the line explaining that they may experience a temporary increase of lead levels in their drinking water, along with guidance on measures consumers can take to minimize their exposure to lead. The Director may allow the water system to provide notice under the previous sentence less than forty-five (45) days prior to commencing partial lead service line replacement where such replacement is in conjunction with emergency repairs. In addition, the water system shall inform the resident(s) served by the line that the system will, at the system's expense, collect a sample from each partially-replaced lead service line that is representative of the water in the service line for analysis of lead content, as prescribed under §6.86(b)(3), within seventy-two (72) hours after the completion of the partial replacement of the service line. The system shall collect the sample and report the results of the analysis to the owner and the resident(s) served by the line within three (3) business days of receiving the results. Mailed notices post-marked within three (3) business days of receiving the results shall be considered "on time."

(2) The water system shall provide the information required by §6.84(d)(1) to the residents of individual dwellings by mail or by other methods approved by the Director. In instances where multi-family dwellings are served by the line, the water system shall have the option to post the information at a conspicuous location.

(e) The Director shall require a system to replace lead service lines on a shorter schedule than that required by this section, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The Director shall make this determination in writing and notify the system of its finding within six (6) months after the system is triggered into lead service line replacement based on monitoring referenced in §6.84(a).

(f) Any system may cease replacing lead service lines whenever first draw samples collected pursuant to §6.86(b)(2) meet the lead action level during each of two (2) consecutive monitoring periods and the system submits the results to the Director. If the first draw tap samples collected in any such system thereafter exceeds the lead action level, the system shall recommence replacing lead service lines, pursuant to §6.84(b)(2).

(g) To demonstrate compliance with §§6.84(a)-(d), a system shall report to the Director the information specified in §6.90(e).

6.85 **Public Education and Supplemental Monitoring Requirements.** All water systems must deliver a consumer notice of lead tap water monitoring results to persons served by the water system at sites that are tested, as specified in §6.85(d). A water system that exceeds the lead action level based on tap water samples collected in accordance with §6.86 shall deliver the public education materials contained in §6.85 (a) in accordance with the requirements in §6.85(b). Water systems that exceed the lead action level must sample the tap water of any customer who requests it in accordance with §6.85(c).

(a) **Content of Written Public Education Materials**.

(1) **Community Water Systems and Non-transient Non-community Water Systems**. Water systems must include the following elements in printed materials (e.g., brochures and pamphlets) in the same order as listed below. In addition, language in §§6.85(a)(1)(i) through (ii) and §6.85(a)(1)(vi) must be included in the materials, exactly as written, except for the text in brackets in these paragraphs for which the water system must include system-specific information. Any additional information presented by a water system must be consistent with the information below and be in plain language that can be understood by the general public. Water systems must submit all written public education materials to the Director prior to delivery. The Director may require the system to obtain approval of the content of written public materials prior to delivery.

(i) IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER. [INSERT NAME OF WATER SYSTEM] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and young children. Please read this information closely to see what you can do to reduce lead in your drinking water.

(ii) **Health Effects of Lead**. Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

(iii) **Sources of Lead**.

(A) Explain what lead is.

(B) Explain possible sources of lead in drinking water and how lead enters drinking water. Include information on home/building plumbing materials and service lines that may contain lead.

(C) Discuss other important sources of lead exposure in addition to drinking water (e.g., paint).

(iv) Discuss the steps the consumer can take to reduce their exposure to lead in drinking water.

(A) Encourage running the water to flush out the lead.

(B) Explain concerns with using hot water from the tap and specifically caution against the use of hot water for preparing baby formula.

(C) Explain that boiling water does not reduce lead levels.

(D) Discuss other options consumers can take to reduce exposure to lead in drinking water, such as alternative sources or treatment of water.

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

(v) Explain why there are elevated levels of lead in the system's drinking water (if known) and what the water system is doing to reduce the lead levels in homes/buildings in this area.

(vi) For more information, call us at [INSERT YOUR NUMBER] [(IF APPLICABLE), or visit our Web site at [INSERT YOUR WEB SITE HERE]]. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at http://www.epa.gov/lead or contact your health care provider.

(2) **Community Water Systems**. In addition to including the elements specified in §6.85(a)(1), community water systems must:

(i) Tell consumers how to get their water tested.

(ii) Discuss lead in plumbing components and the difference between low lead and lead free.

(b) **Delivery of Public Education Materials**.

(1) For public water systems serving a large proportion of non-English speaking consumers, as determined by the Director, the public education materials must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the public education materials or to request assistance in the appropriate language.

(2) A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with §6.86, and that is not already conducting public education tasks under this section, must conduct the public education tasks under this section within sixty (60) days after the end of the monitoring period in which the exceedance occurred:

(i) Deliver printed materials meeting the content requirements of §6.85(a) to all bill paying customers.

(ii) (A) Contact customers who are most at risk by delivering education materials that meet the content requirements of §6.85(a) to local public health agencies even if they are not located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users. The water system must contact the local public health agencies directly by phone or in person. The local public health agencies may provide a specific list of additional community based organizations serving target populations, which may include organizations outside the service area of the water system. If such lists are provided, systems must deliver education materials that meet the content requirements of §6.85(a) to all organizations on the provided lists.

(B) Contact customers who are most at risk by delivering materials that meet the content requirements of §6.85(a) to the following organizations listed in 1 through 6 that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users:

(1) Public and private schools or school boards.

(2) Women, Infants and Children (WIC) and Head Start programs.

(3) Public and private hospitals and medical clinics.

(4) Pediatricians.

(5) Family planning clinics.

(6) Local welfare agencies.

(C) Make a good faith effort to locate the following organizations within the service area and deliver materials that meet the content requirements of §6.85(a) to them, along with an informational notice that encourages distribution to all potentially affected customers or users. The good faith effort to contact at-risk customers may include requesting a specific contact list of these organizations from the local public health agencies, even if the agencies are not located within the water system's service area:

(1) Licensed childcare centers

(2) Public and private preschools.

(3) Obstetricians-Gynecologists and Midwives.

(iii) No less often than quarterly, provide information on or in each water bill as long as the system exceeds the action level for lead. The message on the water bill must include the following statement exactly as written except for the text in brackets for which the water system must include system-specific information: [INSERT NAME OF WATER SYSTEM] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information please call [INSERT NAME OF WATER SYSTEM] [or visit (INSERT YOUR WEB SITE HERE)]. The message or delivery mechanism can be modified in consultation with the Director; specifically, the Director may allow a separate mailing of public education materials to customers if the water system cannot place the information on water bills.

(iv) Post material meeting the content requirements of §6.85(a) on the water system's Web site if the system serves a population greater than 100,000.

(v) Submit a press release to newspaper, television and radio stations.

(vi) In addition to §§6.85(b)(2)(i) through (v), systems must implement at least three activities from one or more categories listed below. The educational content and selection of these activities must be determined in consultation with the Director.

(A) Public Service Announcements.

(B) Paid advertisements.

(C) Public Area Information Displays.

(D) E-mails to customers.

(E) Public Meetings.

(F) Household Deliveries.

(G) Targeted Individual Customer Contact.

(H) Direct material distribution to all multi-family homes and institutions.

(I) Other methods approved by the Director.

(vii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the Director has established an alternate monitoring period, the last day of that period.

(3) As long as a community water system exceeds the action level, it must repeat the activities pursuant to §6.85(b)(2) as described in §§6.85(b)(3)(i) through (iv).

(i) A community water system shall repeat the tasks contained in §§6.85(b)(2)(i), (ii) and (vi) every 12 months.

(ii) A community water system shall repeat tasks contained in §6.85(b)(2)(iii) with each billing cycle.

(iii) A community water system serving a population greater than 100,000 shall post and retain material on a publicly accessible Web site pursuant to §6.85(b)(2)(iv).

(iv) The community water system shall repeat the task in §6.85(b)(2)(v) twice every 12 months on a schedule agreed upon with the Director. The Director can allow activities in §6.85(b)(2) to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the Director in advance of the 60-day deadline.

(4) Within 60 days after the end of the monitoring period in which the exceedance occurred (unless it already is repeating public education tasks pursuant to §6.85 (b)(5)), a non-transient non-community water system shall deliver the public education materials specified by §6.85(a) as follows:

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

(ii) Distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the non-transient non-community water system. The Director may allow the system to utilize electronic transmission in lieu of or combined with printed materials as long as it achieves at least the same coverage.

(iii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the Director has established an alternate monitoring period, the last day of that period.

(5) A non-transient non-community water system shall repeat the tasks contained in §6.85(b)(4) at least once during each calendar year in which the system exceeds the lead action level. The Director can allow activities in §6.85(b)(4) to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the Director in advance of the 60-day deadline.

(6) A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six-month monitoring period conducted pursuant to §6.86. Such a system shall recommence public education in accordance with this section if it subsequently exceeds the lead action level during any monitoring period.

(7) A community water system may apply to the Director, in writing (unless the Director has waived the requirement for prior Director approval), to use only the text specified in §6.85(a)(1) in lieu of the text in §§6.85(a)(1) and (a)(2) and to perform the tasks listed in §§6.85(b)(4) and (b)(5) in lieu of the tasks in §§6.85(b)(2) and (b)(3) if:

(i) The system is a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing or installing point of use treatment devices; and

(ii) The system provides water as part of the cost of services provided and does not separately charge for water consumption.

(8) A community water system serving 3,300 or fewer people may limit certain aspects of their public education programs as follows:

(i) With respect to the requirements of §6.85(b)(2)(vi), a system serving 3,300 or fewer must implement at least one of the activities listed in that paragraph.

(ii) With respect to the requirements of §6.85(b)(2)(ii), a system serving 3,300 or fewer people may limit the distribution of the public education materials required under that paragraph to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children.

(iii) With respect to the requirements of §6.85(b)(2)(v), the Director may waive this requirement for systems serving 3,300 or fewer persons as long as system distributes notices to every household served by the system.

(c) **Supplemental Monitoring and Notification of Results**. A water system that fails to meet the lead action level on the basis of tap samples collected in accordance with §6.86 shall offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

(d) **Notification of Results**.

(1) **Reporting Requirement**. All water systems must provide a notice of the individual tap results from lead tap water monitoring carried out under the requirements of §6.86 to the persons served by the water system at the specific sampling site from which the sample was taken (e.g., the occupants of the residence where the tap was tested).

(2) **Timing of Notification**. A water system must provide the consumer notice as soon as practical, but no later than 30 days after the system learns of the tap monitoring results.

(3) **Content**. The consumer notice must include the results of lead tap water monitoring for the tap that was tested, an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water and contact information for the water utility. The notice must also provide the maximum contaminant level goal and the action level for lead and the definitions for these two terms from §6.10(3)(c).

(4) **Delivery**. The consumer notice must be provided to persons served at the tap that was tested, either by mail or by another method approved by the Director. For example, upon approval

by the Director, a non-transient non-community water system could post the results on a bulletin board in the facility to allow users to review the information. The system must provide the notice to customers at sample taps tested, including consumers who do not receive water bills.

6.86 **Monitoring Requirements for Lead and Copper in Tap Water**

(a) **Sample Site Location**

(1) By the applicable date for commencement of monitoring under §6.86(d)(1), each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this section, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in §6.86(c). All sites from which first draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

(2) A water system shall use the information on lead, copper and galvanized steel that is required when conducting a materials evaluation (presence of lead from piping, solder, caulking, interior home plumbing, copper from piping and alloys, service lines, and home plumbing, and galvanized piping, service lines and home plumbing within the distribution system.) When an evaluation of the information collected pursuant to the above is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in paragraph (a) of this section, the water system shall review the sources of information listed below in order to identify a sufficient number of sampling sites. In addition, the system shall seek to collect such information where possible in the course of its normal operations (e.g., checking service line materials when reading water meters or performing maintenance activities):

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

(ii) all inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and

(iii) all existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.

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

(i) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(ii) are served by a lead service line.

When multiple-family residences comprise at least twenty (20) percent of the structures served by a water system, the system may include these types of structures in its sampling pool.

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

(i) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(ii) are served by a lead service line.

(5) Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with "tier 3 sampling sites", consisting of single family structures that contain copper pipes with lead solder installed before 1983. A community water system with insufficient tier 1, tier 2 and tier 3 sampling sites shall complete its sampling pool with representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

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

(i) contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(ii) are served by a lead service line.

(7) A non-transient, non-community water system with insufficient tier 1 sites that meet the targeting criteria in §6.86(a)(6) shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983. If additional sites are needed to complete the sampling pool, the non-transient non-community water system shall use representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

(8) Any water system whose distribution system contains lead service lines shall draw fifty (50) percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and fifty (50) percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first draw samples from all of the sites identified as being served by such lines.

(b) **Sample Collection Methods**

(1) All tap samples for lead and copper collected in accordance with this subpart, with the exception of lead service line samples collected under Section 6.84(c) and samples collected under §6.86(b)(5), shall be first draw samples.

(2) Each first-draw tap sample for lead and copper shall be one (1) liter in volume and have stood motionless in the plumbing system of each sampling site for at least six (6) hours. First draw samples from residential housing shall be collected from the cold water kitchen tap or bathroom sink tap. First-draw samples from a non-residential building shall be one (1) liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to §6.86(b)(5) shall be one (1) liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. First draw samples may be collected by the system or the system may allow residents to collect first draw samples after instructing the residents of the sampling procedures specified in this paragraph. To avoid problems of residents handling nitric acid, acidification of first draw samples may be done

up to fourteen (14) days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

(3) Each service line sample shall be one (1) liter in volume and have stood motionless in the lead service line for at least six (6) hours. Lead service line samples shall be collected in one (1) of the following three (3) ways:

(i) at the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line;

(ii) tapping directly into the lead service line; or

(iii) if the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

(4) A water system shall collect each first draw tap sample from the same sampling site from which it collected a previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

(5) A non-transient non-community water system, or a community water system that meets the criteria of §6.85(b)(7), that does not have enough taps that can supply first-draw samples, as defined in §1.0, may apply to the Director in writing to substitute non-first draw samples. Such systems must collect as many first draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites. The Director has the discretion to waive the requirement for prior Director approval of non-first draw sample sites selected by the system, either through State regulation or written notification to the system.

(c) **Number of Samples**. Water systems shall collect at least one (1) sample during each monitoring period specified in §6.86(d) from the number of sites listed in the first column ("standard monitoring") of the table in this paragraph. A system conducting reduced monitoring under §6.86(d)(4) shall collect at least one (1) sample from the number of sites specified in the second column ("reduced monitoring") of the table in this paragraph during each monitoring period specified in §6.86(d)(4). Such reduced monitoring sites shall be representative of the sites required for standard monitoring. A public water system that has fewer than five drinking water taps, that can be used for human consumption meeting the sample site criteria of §6.86(a) to reach the required number of sample sites listed in §6.86(c), must collect at least one sample from each tap and then must collect additional samples from those taps on different days during the monitoring period to meet the required number of sites. Alternatively the Director may allow these public water systems to collect a number of samples less than the number of sites specified in §6.86(c), provided that 100 percent of all taps that can be used for human consumption are sampled. The Director must approve this reduction of the minimum number of samples in writing based on a request from the system or onsite verification by the Director. The Director may specify sampling locations when a system is conducting reduced monitoring. The table is as follows:

System Size (# of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
>100,000	100	50
10,001-100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
<100	5	5

(d) **Timing of Monitoring**

(1) **Initial Tap Sampling**. The first six-month monitoring period for small, medium-size and large systems shall begin on the following dates:

System Size (# People Served)	First Six-Month Monitoring Period Begins On
>50,000	January 1, 1992
3,301 to 50,000	July 1, 1992
<3,300	July 1, 1993

(i) All large systems shall monitor during two (2) consecutive six-month periods.

(ii) All small and medium-size systems shall monitor during each six-month monitoring period until:

(A) the system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under §6.81, in which case the system shall continue monitoring in accordance with §6.86(d)(2), or

(B) the system meets the lead and copper action levels during two (2) consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with §6.86(d)(4).

(2) **Monitoring after Installation of Corrosion Control and Source Water Treatment**

(i) Any large system which installs optimal corrosion control treatment pursuant to §6.81(d)(4) shall monitor during two (2) consecutive six-month monitoring periods by the date specified in §6.81(d)(5).

(ii) Any small or medium-size system which installs optimal corrosion control treatment pursuant to §6.81(e)(5) shall monitor during two (2) consecutive six-month monitoring periods by the date specified in §6.81(e)(6).

(iii) Any system which installs source water treatment pursuant to §6.83(a)(3) shall monitor during two (2) consecutive six-month monitoring periods by the date specified in §6.83(a)(4).

(3) **Monitoring after the Director Specifies Water Quality Parameter Values for Optimal Corrosion Control**. After the Director specifies the values for water quality control parameters under §6.82(f), the system shall monitor during each subsequent six-month

monitoring period, with the first monitoring period to begin on the date the Director specifies the optimal values under §6.82(f).

(4) **Reduced Monitoring**

(i) A small or medium-size water system that meets the lead and copper action levels during each of two (2) consecutive six-month monitoring periods may reduce the number of samples in accordance with §6.86(c), and reduce the frequency of sampling to once per year. A small or medium water system collecting fewer than five samples as specified in §6.86(c), that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the frequency of sampling to once per year. In no case can the system reduce the number of samples required below the minimum of one sample per available tap. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.

(ii) Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Director under §6.82(f) during each of two (2) consecutive six-month monitoring periods may reduce the frequency of monitoring to once per year and reduce the number of lead and copper samples in accordance with §6.86(c) if it receives written approval from the Director. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. The Director shall review monitoring, treatment and other relevant information submitted by the water system in accordance with §6.90, and shall notify the system in writing when the Director determines the system is eligible to commence reduced monitoring pursuant to this paragraph. The Director shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iii) A small or medium-size water system that meets the lead and copper action levels during three (3) consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three (3) years. Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Director under §6.82(f) during three (3) consecutive years of monitoring may reduce the frequency of monitoring from annually to once every three (3) years if it receives written approval from the Director. Samples collected once every three years shall be collected no later than every third calendar year. The Director shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with §6.90, and shall notify the system in writing, when the Director determines the system is eligible to reduce the frequency of monitoring to once every three (3) years. The Director shall review, and where appropriate, revise his determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iv) A water system that reduces the number and frequency of sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in §6.86(a). Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August or September

unless the Director has approved a different sampling period in accordance with §6.86(d)(4)(iv)(A).

(A) The Director, at his or her discretion, may approve a different period for conducting the lead and copper tap sampling for systems collecting a reduced number of samples. Such a period shall be no longer than four (4) consecutive months and must represent a time of normal operation where the highest levels of lead are most likely to occur. For a non-transient, non-community water system that does not operate during the months of June through September, and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the Director shall designate a period that represents a time of normal operation for the system. This sampling shall begin during the period approved or designated by the Director in the calendar year immediately following the end of the second consecutive six (6) month monitoring period for systems initiating annual monitoring and during the three (3) year period following the end of the third consecutive calendar year of annual monitoring for systems initiating triennial monitoring

(B) Systems monitoring annually, that have been collecting samples during the months of June through September and that receive the Director's approval to alter their sample collection period under §6.86(d)(4)(iv)(A), must collect their next round of samples during a time period that ends no later than 21 months after the previous round of sampling. Systems monitoring triennially that have been collecting samples during the months of June through September, and receive the Director's approval to alter the sampling collection period as per §6.86(d)(4)(iv)(A), must collect their next round of samples during a time period that ends no later than 45 months after the previous round of sampling. Subsequent rounds of sampling must be collected annually or triennially, as required by this section.

(v) Any water system that demonstrates for two (2) consecutive 6-month monitoring periods that the tap water lead level computed under §6.80(c)(3) is less than or equal to 0.005 mg/L and the tap water copper level computed under §6.80(c)(3) is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with §6.86(c) and reduce the frequency of sampling to once every three (3) calendar years.

(vi) (A) A small or medium-size water system subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling in accordance §6.86 (c) and collect the number of samples specified for standard monitoring under §6.86(c). Such a system shall also conduct water quality parameter monitoring in accordance with §§6.87(b), (c) or (d) (as appropriate) during the monitoring period in which it exceeded the action level. Any such system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in §6.86(c) after it has completed two (2) subsequent consecutive six-month rounds of monitoring that meet the criteria of §6.86(d)(4)(i) and/or may resume triennial monitoring for lead and copper at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either §6.86(d)(4)(iii) or §6.86(d)(4)(v).

(B) Any water system subject to the reduced monitoring frequency that fails to meet the lead action level during any four (4) month monitoring period or that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the Director under §6.82(f) for more than nine (9)

days in any six (6) month period specified in §6.87(d) shall conduct tap water sampling for lead and copper at the frequency specified in §6.86(d)(3), collect the number of samples specified for standard monitoring under §6.86(c), and shall resume monitoring for water quality parameters within the distribution system in accordance with §6.87(d). This standard tap water sampling shall begin no later than the six (6) month period beginning January 1 of the calendar year following the lead action level exceedance or water quality parameter excursion. Such a system may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:

(1) The system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in §6.86(c) after it has completed two (2) subsequent six-month rounds of monitoring that meet the criteria of §6.86(d)(4)(ii) and the system has received written approval from the Director that it is appropriate to resume reduced monitoring on an annual frequency. This sampling shall begin during the calendar year immediately following the end of the second consecutive six (6) month monitoring period.

(2) The system may resume triennial monitoring for lead and copper at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either §6.86(d)(4)(iii) or §6.86(d)(4)(v) and the system has received written approval from the Director that it is appropriate to resume triennial monitoring.

(3) The system may reduce the number of water quality parameter tap water samples required in accordance with §6.87(e)(1) and the frequency with which it collects such samples in accordance with §6.87(e)(2). Such a system may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of §6.87(e)(2), that it has re-qualified for triennial monitoring.

(vii) Any water system subject to a reduced monitoring frequency under §6.86(d)(4) shall notify the Director in writing in accordance with §6.90(a)(3) of any upcoming long-term change in treatment or addition of a new source as described in that section. The Director must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The Director may require the system to resume sampling in accordance with §6.86(d)(3) and collect the number of samples specified for standard monitoring under §6.86(c) or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation of its corrosion control treatment given the potentially different water quality considerations.

(e) **Additional Monitoring by Systems**. The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the Director in making any determinations (i.e., calculating the 90th percentile lead or copper level) under this subpart.

(f) **Invalidation of Lead or Copper Tap Water Samples**. A sample invalidated under this paragraph does not count toward determining lead or copper 90th percentile levels under §6.80(c)(3) or toward meeting the minimum monitoring requirements of §6.86(c).

(1) The Director may invalidate a lead or copper tap water sample if at least one (1) of the following conditions is met:

(i) The laboratory establishes that improper sample analysis caused erroneous results;

(ii) The Director determines that the sample was taken from a site that did not meet the site selection criteria of this section;

(iii) The sample container was damaged in transit; or

(iv) There is substantial reason to believe that the sample was subject to tampering.

(2) The system must report the results of all samples to the Director and all supporting documentation for samples the system believes should be invalidated.

(3) To invalidate a sample under §6.86(f)(l), the decision and the rationale for the decision must be documented in writing. The Director shall not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.

(4) The water system must collect replacement samples for any samples invalidated under this Section if, after the invalidation of one (1) or more samples, the system has too few samples to meet the minimum requirements of §6.86(c). Any such replacement samples must be taken as soon as possible, but no later than twenty (20) days after the date the Director invalidates the sample or by the end of the applicable monitoring period, whichever occurs later. Replacement samples taken after the end of the applicable monitoring period shall not also be used to meet the monitoring requirements of a subsequent monitoring period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the monitoring period.

6.87 **Monitoring Requirements for Water Quality Parameters**. All large water systems, and all small and medium-size systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this section. The requirements of this section are summarized in the table at the end of this section.

(a) **General Requirements**

(1) **Sample Collection Methods**

(i) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system and seasonal variability. Tap sampling under this section is not required to be conducted at taps targeted for lead and copper sampling under §6.86(a). [Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for coliform sampling.]

(ii) Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a system draws water from more than one (1) source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(2) **Number of Samples**

(i) Systems shall collect two (2) tap samples for applicable water quality parameters during each monitoring period specified under §§6.87(b)-(e) from the following number of sites.

System Size (# People Served)	# of Sites for Water Quality Parameters
>100,000	25
10,001-100,000	10
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
<100	1

(ii) Except as provided in §6.87(c)(3), systems shall collect two (2) samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in §6.87(b). During each monitoring period specified in §§6.87(c)-(e), systems shall collect one (1) sample for each applicable water quality parameter at each entry point to the distribution system.

(b) **Initial Sampling**. All large water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in §6.86(d)(1). All small and medium-size systems shall measure the applicable water quality parameters at the locations specified below during each six-month monitoring period specified in §6.86(d)(1) during which the system exceeds the lead or copper action level.

(1) **At taps**:

(i) pH;

(ii) alkalinity;

(iii) orthophosphate, when an inhibitor containing a phosphate compound is used;

(iv) silica, when an inhibitor containing a silicate compound is used;

(v) calcium;

(vi) conductivity; and

(vii) water temperature.

(2) **At each entry point to the distribution system**: all of the applicable parameters listed in §6.87(b)(1).

(c) **Monitoring after Installation of Corrosion Control**. Any large system which installs optimal corrosion control treatment pursuant to §6.81(d)(4) shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in §6.86(d)(2)(i). Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in §6.86(d)(2)(ii) in which the system exceeds the lead or copper action level.

(1) At taps, two (2) samples for:

(i) pH;

(ii) alkalinity;

(iii) orthophosphate, when an inhibitor containing a phosphate compound is used;

(iv) silica, when an inhibitor containing a silicate compound is used; and

(v) calcium, when calcium carbonate stabilization is used as part of corrosion control.

(2) Except as provided in §6.87(c)(3), at each entry point to the distribution system, at least one (1) sample no less frequently than every two (2) weeks (bi-weekly) for:

(i) pH;

(ii) when alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and

(iii) when a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).

(3) Any ground water system can limit entry point sampling described in §6.87(c)(2) to those entry points that are representative of water quality and treatment conditions throughout the system. If water from untreated ground water sources mixes with water from treated ground water sources, the system must monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of any monitoring under this paragraph, the system shall provide to the Director written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(d) **Monitoring after the Director Specifies Water Quality Parameter Values for Optimal Corrosion Control**. After the Director specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under §6.82(f), all large systems shall measure the applicable water quality parameters in accordance with §6.87(c) and determine compliance with the requirements of §6.82(g) every six (6) months with the first six (6) month period to begin on either January 1 or July 1, whichever comes first, after the Director specifies the optimal values under §6.82(f) . Any small or medium-size system shall conduct such monitoring during each six (6) month period specified in this paragraph in which the system exceeds the lead or copper action level. For any such small and medium-size system that is subject to a reduced monitoring frequency pursuant to §6.86(d)(4) at the time of the action level exceedance, the start of the applicable six (6) month period under this paragraph shall coincide with the start of the applicable monitoring period under §6.86(d)(4). Compliance with Director-designated optimal water quality parameter values shall be determined as specified under §6.82(g).

(e) **Reduced Monitoring**.

(1) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two (2) consecutive six-month monitoring periods under §6.87(d) shall continue monitoring at the entry point(s) to the distribution system as specified in §6.87(c)(2). Such system may collect two (2) tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period.

System Size (# People Served)	Reduced # of Sites for Water Quality Parameters
>100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
<100	1

(2) (i) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Director under §6.82(f) during three (3) consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in §6.87(e)(1) from every six (6) months to annually. This sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of six-month monitoring occurs. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Director under §6.82(f) during three (3) consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in §6.87(e)(1) from annually to every three (3) years. This sampling begins no later than the third calendar year following the end of the monitoring period in which the third consecutive year of monitoring occurs.

(ii) A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in §6.87(e)(1) to every three (3) years if it demonstrates during two (2) consecutive monitoring periods that its tap water lead level at the 90th percentile is less than or equal to the PQL for lead specified in §6.89(a)(1)(ii), that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L for copper in §6.80(c)(2), and that it also has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Director under §6.82(f). Monitoring conducted every three years shall be done no later than every third calendar year.

(3) A water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

(4) Any water system subject to reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the Director under §6.82(f) for more than nine (9) days in any six-month period specified in §6.82(g) shall resume distribution system tap water sampling in accordance with the number and frequency requirements in §6.87(d). Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in §6.87(e)(1) after it has completed two (2) subsequent consecutive six-month rounds of monitoring that meet the criteria of that paragraph and/or may resume triennial monitoring for water quality parameters at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either §6.87(e)(2)(i) or §6.87(e)(2)(ii).

(f) **Additional Monitoring by Systems**. The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the Director in making any determinations (i.e., determining concentrations of water quality parameters) under this section or §6.82.

Summary of Monitoring Requirements For Water Quality Parameters[1]

Monitoring Period	Parameters[2]	Location	Frequency
Initial Monitoring	pH, alkalinity, orthophosphate or silica[3], calcium, conductivity, temperature	Taps and at entry point(s) to distribution system	Every 6 months
After Installation of Corrosion Control	pH, alkalinity, orthophosphate or silica[3], calcium[4]	Taps	Every 6 months
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5]	Entry point(s) to distribution system	No less frequently than every two (2) weeks
After Director Specifies Parameter Values For Optimal Corrosion Control	pH, alkalinity, orthophosphate or silica[3], calcium[4]	Taps	Every 6 months
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5]	Entry point(s) to distribution system	No less frequently than every two (2) weeks
Reduced Monitoring	pH, alkalinity, orthophosphate or silica[3], calcium[4]	Taps	Every 6 months, annually[7] or every 3 years[8] reduced number of sites
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5]	Entry point(s) to distribution system	No less frequently than every two (2) weeks

[1] Table is for illustrative purposes; consult the text of this section for precise regulatory requirements.

[2] Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.

[3] Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.

[4] Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.

[5] Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.

[6] Ground water systems may limit monitoring to representative locations throughout the system.

[7] Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six (6) months to annually if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of monitoring.

[8] Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every 3 years if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of annual monitoring. Water systems may accelerate to triennial monitoring for water quality parameters at the tap if they have maintained 90th percentile lead levels less than or equal to 0.005 mg/L, 90th percentile copper levels less than or equal to 0.65 mg/L, and the range of water quality parameters designated by the Director under §6.82(f) as representing optimal corrosion control during two (2) consecutive six-month monitoring periods.

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6.88 **Monitoring Requirements for Lead and Copper in Source Water**

(a) **<u>Sample Location, Collection Methods and Number of Samples</u>**

(1) A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with §6.86 shall collect lead and copper source water samples in accordance with the following requirements regarding sample location, number of samples, and collection methods:

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

(ii) Surface water systems shall take a minimum of one (1) sample at every entry point to the distribution system after any application of treatment, or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. **NOTE:** For the purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.

(iii) If a system draws water from more than one (1) source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(iv) The Director may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples must be done by certified laboratory personnel. Composite samples from a maximum of five (5) samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 mg/L or the copper concentration is greater than or equal to 0.160 mg/L, then either:

(A) A follow-up sample shall be taken and analyzed within 14 days at each sampling point included in the composite; or

(B) If duplicates of, or sufficient quantities from, the original samples from each sampling point used in the composite are available, the system may use these instead of resampling.

(2) Where the results of sampling indicate an exceedance of maximum permissible source water levels established under §6.83(b)(4), the Director may require that one (1) additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two (2) weeks) at the same sampling point. If a Director-required confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the Director-specified maximum permissible levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL.

(b) **<u>Monitoring Frequency after System Exceeds Tap Water Action Level</u>**. Any system which exceeds the lead or copper action level at the tap shall collect one (1) source water sample from

each entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or if the Director has established an alternate monitoring period, the last day of that period.

(c) **Monitoring Frequency after Installation of Source Water Treatment**. Any system which installs source water treatment pursuant to §6.83(a)(3) shall collect an additional source water sample from each entry point to the distribution system during two (2) consecutive six-month monitoring periods by the deadline specified in §6.83(a)(4).

(d) **Monitoring Frequency after the Director Specifies Maximum Permissible Source Water Levels or Determines That Source Water Treatment Is Not Needed**

(1) A system shall monitor at the frequency specified below in cases where the Director specifies maximum permissible source water levels under §6.83(b)(4), or determines that the system is not required to install source water treatment under §6.83(b)(2).

(i) A water system using only groundwater shall collect samples once during the three-year compliance period (as that term is defined in Section 1) in effect when the applicable Director determination under §6.88(d)(1) is made. Such systems shall collect samples once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.

(ii) A water system using surface water (or a combination of surface and ground water) shall collect samples once during each year, the first annual monitoring period to begin during the year in which the applicable Director determination is made under §6.88(d)(1).

(2) A system is not required to conduct source water sampling for lead and/or copper if the system meets the action level for the specific contaminant in tap water samples during the entire source water sampling period applicable to the system under §6.88(d)(1)(i) or §6.88(d)(1)(ii).

(e) **Reduced Monitoring Frequency**

(1) A water system using only ground water may reduce the monitoring frequency for lead and/or copper in source water to once during each nine-year compliance cycle (as that term is defined in §1.0) provided that the samples are collected no later than every ninth calendar year and if the system meets one (1) of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Director in §6.83(b)(4) during at least three (3) consecutive compliance periods under §6.88(d)(1); or

(ii) The Director has determined that source water treatment is not needed and the system demonstrates that, during at least three (3) consecutive compliance periods in which sampling was conducted under §6.88(d)(1), the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.

(2) A water system using surface water (or a combination of surface water and ground water) may reduce the monitoring frequency in §6.88(d)(1) to once during each nine-year compliance cycle (as that term is defined in Section 1) provided that the samples are

collected no later than every ninth calendar year and if the system meets one (1) of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Director in §6.83(b)(4) for at least three (3) consecutive years; or

(ii) The Director has determined that source water treatment is not needed and the system demonstrates that, during at least three (3) consecutive years, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.

(3) A water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three (3) consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the Director in §6.83(a)(5).

6.89 **Analytical Methods**

(a) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica and temperature shall be conducted with the methods in Appendix 1.

(1) Analyses under this section shall only be conducted by certified laboratories using the methods specified in Appendix 1. Analyses for pH and temperature shall be conducted using methods specified in Appendix 1 by a party approved by the Director. To obtain certification to conduct analyses for lead and copper, laboratories must:

(i) Analyze performance evaluation samples which include lead and copper provided by a third party accredited provider or equivalent samples provided by the Director; and

(ii) Achieve quantitative acceptance limits as follows:

(A) ***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.

(B) ***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 PQL for copper is 0.050 mg/L.

(iii) Achieve the method detection limit for lead of 0.001 mg/L according to the procedures in appendix B of part 136 of 40 CFR. This need only be accomplished if the laboratory will be processing source water composite samples under §6.88(a)(1)(iv).

(iv) Be currently certified by EPA or the Director to perform analyses to the specifications described in §6.89(a)(1).

(2) The Director may 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 section.

(3) All lead and copper levels measured between the PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL specified for lead and copper in Appendix 1. All levels below the lead and copper MDLs must be reported as zero.

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

(b) [Reserved]

6.90 **Reporting Requirements**. All water systems shall report all of the following information to the Director in accordance with this section.

(a) **<u>Reporting Requirements for Tap Water Monitoring for Lead and Copper and for Water Quality Parameter Monitoring</u>**

(1) Except as provided in §6.90(a)(1)(viii), a water system shall report the information specified below for all tap water samples specified in §6.86 and for all water quality parameter samples specified in §6.87 within the first 10 days following the end of each applicable monitoring period specified in §6.86 and §6.87 (i.e., every six-months, annually, every 3 years, or every 9 years). For monitoring periods with a duration less than six (6) months, the end of the monitoring period is the last date samples can be collected during that period as specified in §§6.86 and 6.87.

(i) the results of all tap samples for lead and copper including the location of each site and the criteria under §6.86(a)(3),(4),(5),(6) and/or (7) under which the site was selected for the system's sampling pool;

(ii) documentation for each tap water lead or copper sample for which the water system requests invalidation pursuant to §6.86(f)(2);

(iii) [Reserved];

(iv) the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with §6.80(c)(3)) unless the Director calculates the system's 90th percentile lead and copper levels under §6.90(h);

(v) with the exception of initial tap sampling conducted pursuant to §6.86(d)(1), the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

(vi) the results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under §§6.87(b)-(e);

(vii) the results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under §6.87(b)-(e).

(viii) A water system shall report the results of all water quality parameter samples collected under §§6.87(c)-(f) during each six-month monitoring period specified in §6.87(d) within the first ten (10) days following the end of the monitoring period unless the Director has specified a more frequent reporting requirement.

(2) For a non-transient non-community water system, or a community water system meeting the criteria of §6.85(b)(7), that does not have enough taps that can provide first-draw samples, the system must either:

(i) Provide written documentation to the Director identifying standing times and locations for enough non-first draw samples to make up its sampling pool under §6.86(b)(5) by the start of the first applicable monitoring period under §6.86(d) that commences after

system activation, unless the Director has waived prior Director's approval of non-first-draw sample sites selected by the system pursuant to Section 6.86(b)(5); or

(ii) If the Director has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to §6.86(b)(5) and include this information with the lead and copper tap sample results required to be submitted pursuant to §6.90(a)(1)(i).

(3) At a time specified by the Director, or if no specific time is designated by the Director, then as early as possible prior to the addition of a new source or any long-term change in water treatment, a water system deemed to have optimized corrosion control under §6.81(b)(3), a water system subject to reduced monitoring pursuant to §6.86(d)(4) shall send written documentation to the Director describing the change or addition. The Director must review and approve the addition of a new source or long-term change in treatment before it is implemented by the water system. Examples of long-term treatment changes include the addition of a new treatment process or modification of an existing treatment process. Examples of modifications include switching secondary disinfectants, switching coagulants (e.g., alum to ferric chloride), and switching corrosion inhibitor products (e.g., orthophosphate to blended phosphate). Long-term changes can include dose changes to existing chemicals if the system is planning long-term changes to its finished water pH or residual inhibitor concentration. Long-term treatment changes would not include chemical dose fluctuations associated with daily raw water quality changes.

(4) Each ground water system that limits water quality parameter monitoring to a subset of entry points under §6.87(c)(3) shall provide, by the commencement of such monitoring, written correspondence to the Director that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(b) **Source Water Monitoring Reporting Requirements**

(1) A water system shall report the sampling results for all source water samples collected in accordance with §6.88 within the first 10 days following the end of each source water monitoring period (i.e., annually, per compliance period, per compliance cycle) specified in §6.88.

(2) With the exception of the first round of source water sampling conducted pursuant to §6.88(b), the system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

(c) **Corrosion Control Treatment Reporting Requirements**. By the applicable dates under §6.81, systems shall report the following information:

(1) for systems demonstrating that they have already optimized corrosion control, information required in §6.81(b)(2) or (3).

(2) for systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under §6.82(a).

(3) for systems required to evaluate the effectiveness of corrosion control treatments under §6.82(c), the information required by that paragraph.

(4) for systems required to install optimal corrosion control designated by the Director under §6.82(d), a letter certifying that the system has completed installing that treatment.

(d) **Source Water Treatment Reporting Requirements**. By the applicable dates in §6.83, systems shall provide the following information to the Director:

(1) if required under Section 6.83(b)(1), their recommendation regarding source water treatment;

(2) for systems required to install source water treatment under §6.83(b)(2), a letter certifying that the system has completed installing the treatment designated by the Director within 24 months after the Director designated the treatment.

(e) **Lead Service Line Replacement Reporting Requirements**. Systems shall report the following information to the Director to demonstrate compliance with the requirements of §6.84:

(1) No later than twelve (12) months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in §6.84(a), the system shall submit written documentation to the Director of the materials evaluation conducted as required in §6.86(a), identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level, and provide the system's schedule for replacing annually at least seven (7) percent of the initial number of lead service lines in its distribution system.

(2) No later than twelve (12) months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in §6.84(a), and every twelve (12) months thereafter, the system shall demonstrate to the Director in writing that the system has either:

(i) replaced in the previous 12 months at least 7 percent of the initial lead service lines (or a greater number of lines specified by the Director under §6.84(f)) in its distribution system, or

(ii) conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to §6.86(b)(3), is less than or equal to 0.015 mg/L. In such cases, the total number of lines replaced and/or which meet the criteria in §6.84(c) shall equal at least seven (7) percent of the initial number of lead lines identified under §6.90(e)(1) (or the percentage specified by the Director under §6.84(e)).

(3) The annual letter submitted to the Director under paragraph §6.90(e)(2) of this section shall contain the following information:

(i) the number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule;

(ii) the number and location of each lead service line replaced during the previous year of the system's replacement schedule;

(iii) if measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

(4) Any system which collects lead service line samples following partial lead service line replacement required by §6.84 shall report the results to the Director within the first ten (10) days of the month following the month in which the system receives the laboratory results, or as specified by the Director. The Director, at his or her discretion may eliminate this requirement to report these monitoring results. Systems shall also report any additional information as specified by the Director, and in a time and manner prescribed by the Director, to verify that all partial lead service line replacement activities have taken place.

(f) **Public Education Program Reporting Requirements**

(1) Any water system that is subject to the public education requirements in §6.85 shall, within ten (10) days after the end of each period in which the system is required to perform public education tasks in accordance with §6.85(b), send written documentation to the Director that contains:

(i) A demonstration that the system has delivered the public education materials that meet the content requirements in §§6.85(a) and the delivery requirements in §6.85(b); and

(ii) A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the system delivered public education materials during the period in which the system was required to perform public education tasks.

(2) Unless required by the Director, a system that previously has submitted the information required by §6.90(f)(1)(ii) need not resubmit the information required by §6.90(f)(1)(ii), as long as there have been no changes in the distribution list and the system certifies that the public education materials were distributed to the same list submitted previously.

(3) No later than three (3) months following the end of the monitoring period, each system must mail a sample copy of the consumer notification of tap results to the Director along with a certification that the notification has been distributed in a manner consistent with the requirements of §6.85(d).

(g) **Reporting of Additional Monitoring Data**. Any system which collects sampling data in addition to that required by this subpart shall report the results to the Director within the first ten (10) days following the end of the applicable monitoring period under §§6.86, 6.87 and §6.88 during which the samples are collected.

(h) **Reporting of 90th Percentile Lead and Copper Concentrations Where the Director Calculates a System's 90th Percentile Concentration**. A water system is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by §6.90(a)(1)(iv) if:

(1) The Director has previously notified the water system that it will calculate the water system's 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to §6.90(h)(2)(i), and has specified a date before the end of the applicable monitoring period by which the system must provide the results of lead and copper tap water samples;

(2) The system has provided the following information to the Director by the date specified in §6.90(h)(1):

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under §§6.86(a)(3), (4), (5), (6), and/or (7) under which the site was selected for the system's sampling pool, pursuant to §6.90(a)(1)(i); and

(ii) An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed; and

(3) The Director has provided the results of the 90th percentile lead and copper calculations, in writing, to the water system before the end of the monitoring period.

6.91 **Record Keeping Requirements**. Any system subject to the requirements of this section shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters,

evaluations, schedules, Director determinations and any other information required by §6.81 through §6.88. Each water system shall retain the records required by this section for no fewer than twelve (12) years.

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SECTION 7.0 DISINFECTANT RESIDUALS, DISINFECTION BYPRODUCTS, AND DISINFECTION BYPRODUCT PRECURSORS

7.1 Maximum Contaminant Levels (MCLs) for Disinfection Byproducts

(a) The maximum contaminant levels (MCLs) for disinfection byproducts are as follows:

DISINFECTION BYPRODUCT	MCL (mg/L)
Total trihalomethanes (TTHM)	0.080
Haloacetic acids (five) (HAA5)	0.060
Bromate	0.010
Chlorite	1.0

(b) **Compliance dates**.

(1) CWSs and NTNCWSs. §5.0 systems must comply with this Section as follows:

(i) Stage I TTHM and HAA5-RAA Compliance. All systems must comply with the MCLs for TTHM and HAA5 as a running annual average (RRA) until the date specified for §7.10 compliance in §7.10.1(c).

(ii) Stage II Disinfection Byproducts-LRAA Compliance. The MCLs for TTHM and HAA5 must be complied with as a locational running annual average (LRRA) at each monitoring location beginning the date specified for §7.10 compliance in §7.10.1 (c).

(c)(1) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for disinfection byproducts identified in §7.1(a):

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
Bromate	Control of ozone treatment process to reduce production of bromate.
Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

(2) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in §7.1(a) for all systems that disinfect their source water:

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
TTHM and HAA5	Enhanced coagulation or enhanced softening, plus GAC10; or nanofiltration with a molecular weight cutoff ≤1000 Daltons; or GAC20

(3) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in §7.1(a) for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

DISINFECTION BYPRODUCT	BEST AVAILABLE TECHNOLOGY
TTHM and HAA5	Systems serving ≥10,000: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance Systems serving <10,000: Improved distribution system and storage tank management to reduce residence time

7.2 **Maximum Residual Disinfectant Levels (MRDLs)**

(a) Maximum residual disinfectant levels (MRDLs) are as follows:

DISINFECTANT RESIDUAL	MRDL (mg/L)
Chlorine	4.0 (as Cl_2)
Chloramines	4.0 (as Cl_2)
Chlorine dioxide	0.8 (as ClO_2)

(b) **Compliance Dates**.

(1) CWSs and NTNCWSs. §5.0 systems serving 10,000 or more persons must comply with this Section beginning January 1, 2002. §5.0 systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subpart beginning January 1, 2004.

(2) Transient NCWSs. §5.0 systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. §5.0 systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

(c) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels identified in §7.1(a): control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

7.3 **General Requirements**

(a) The requirements of §7.0 constitute the State of Rhode Island primary drinking water regulations.

(1) The regulations in this Section establish criteria under which community water systems (CWSs) and non-transient, non-community water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet MCLs and MRDLs in §§7.1 and 7.2, respectively, and must meet the treatment technique requirements for disinfection byproduct precursors in §7.8.

(2) The regulations in this Section establish criteria under which transient NCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in §7.2.

(3) The EPA has established MCLs for TTHM and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and

unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform, bromodichloromethane, dibromochloromethane, bromoform, dichloroacetic acid, and trichloroacetic acid.

(b) **Compliance Dates**.

(1) CWSs and NTNCWSs. Unless otherwise noted, systems must comply with the requirements of this subpart as follows. §5.0 systems serving 10,000 or more persons must comply with this subpart beginning January 1, 2002. §5.0 systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subpart beginning January 1, 2004.

(2) Transient NCWSs. §5.0 systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this subpart beginning January 1, 2002. §5.0 systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this subpart beginning January 1, 2004.

(c) Each CWS and NTNCWS regulated under §7.3(a) must be operated by qualified personnel who meet the requirements specified by the Director and be certified in accordance with the *Rules and Regulations Pertaining to the Certification of Public Drinking Water Supply Transmission and Distribution Operators* (*R23-65-DWQ*), as amended.

(d) **Control Of Disinfectant Residuals.** Notwithstanding the MRDLs in §7.2, systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

7.4 Analytical Requirements

(a) **General**.

(1) Systems must use only the analytical method(s) specified in §7.4 and Appendix 1, or their equivalent as approved by EPA, to demonstrate compliance with the requirements of §7.0. These methods are effective for compliance monitoring on February 16, 1999 unless a different effective date is specified in these Regulations.

(2) [**RESERVED**][11]

(b) **Disinfection Byproducts**.

(1) Systems must measure disinfection byproducts by the methods (as modified by the footnotes) listed in Appendix 1.

(2) [**RESERVED**][12]

(3) A party approved by EPA or the Director must measure daily chlorite samples at the entrance to the distribution system.

[11] Requirements formerly contained in this section have been moved to Appendix 1.
[12] Requirements formerly contained in this section have been moved to Appendix 1.

(c) **Disinfectant Residuals**

(1) Systems must measure residual disinfectant concentrations for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the Appendix 1.

(2) If approved by the Director, systems may also measure residual disinfectant concentrations for chlorine, chloramines and chlorine dioxide by using DPD colorimetric test kits.

(3) A party approved by EPA or the Director must measure residual disinfectant concentration.

(d) **Additional Analytical Methods.** Systems required to analyze parameters not included in §7.4(b) and (c) must use the following methods. A party approved by EPA or the Director must measure these parameters.

(1) **Alkalinity.** All methods allowed in Appendix 1 for measuring alkalinity.

(2) **Bromide.** All methods allowed in Appendix 1 for measuring bromide.

(3) **Total Organic Carbon (TOC).** All methods allowed in Appendix 1 for measuring total organic carbon (TOC).

(4) **Specific Ultraviolet Absorbance (SUVA).** SUVA is equal to the UV absorption at 254 nm (UV_{254}) (measured in m^{-1}) divided by the dissolved organic carbon (DOC) concentration (measured as mg/L). In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in Appendix 1

(5) **pH.** All methods allowed in Appendix 1 for measuring pH.

(6) **Magnesium.** All methods allowed in Appendix I for measuring magnesium.

7.5 **Monitoring Requirements**

(a) **General Requirements**

(1) Systems must take all samples during normal operating conditions.

(2) Systems may consider multiple wells drawing water from a single aquifer as one (1) treatment plant for determining the minimum number of TTHM and HAA5 samples required, with approval of the Director in accordance with criteria developed by the Director.

(3) Failure to monitor in accordance with the monitoring plan required under §7.1(f) is a monitoring violation.

(4) Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.

(5) Systems may use only data collected under the provisions of this Section subpart or the Information Collection Rule known as subpart M of 40 CFR 141 to qualify for reduced monitoring.

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(b) **Monitoring Requirements for Disinfection Byproducts**

(1) **TTHMs and HAA5**

(i) Routine monitoring. Systems must monitor at the frequency indicated in the following table:

Routine Monitoring Frequency for TTHM and HAA5

Type Of System	Minimum Monitoring Frequency	Sample Location In The Distribution System
§5.0 system serving at least 10,000 persons.	Four (4) water samples per quarter per treatment plant.	At least 25 percent of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of persons served, different sources of water, and different treatment methods.[13]
§5.0 system serving from 500 to 9,999 persons.	One (1) water sample per quarter per treatment plant.	Locations representing maximum residence time.[14]
§5.0 system serving fewer than 500 persons.	One (1) sample per year per treatment plant during month of warmest water temperature.	Locations representing maximum residence time.[14] If the sample (or average of annual samples, if more than one (1) sample is taken) exceeds the MCL, the system must increase monitoring to one (1) sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in Paragraph (b)(1)(iv) of this Section.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	One (1) water sample per quarter per treatment plant[14].	Locations representing maximum residence time.[14]
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.	One (1) water sample per year per treatment plant[15] during month of warmest water temperature.	Locations representing maximum residence time. [14] If the sample (or average of annual samples, if more than one (1) sample is taken) exceeds the MCL, the system must increase monitoring to one (1) sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in Paragraph (b)(1)(iv) of this Section.

[13] If a system elects to sample more frequently than the minimum required, at least twenty-five percent (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.

[14] Multiple wells drawing water from a single aquifer may be considered one (1) treatment plant for determining the minimum number of samples required, with Director approval in accordance with criteria developed by the Director

(ii) Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

Reduced Monitoring Frequency for TTHM and HAA5

If You Are A…	You May Reduce Monitoring If You Have Monitored At Least One (1) Year And Your…	To This Level
§5.0 system serving at least 10,000 persons which has a source water annual average TOC level, before any treatment, ≤4.0 mg/L.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One (1) sample per treatment plant per quarter at distribution system location reflecting maximum residence time.
§5.0 system serving from 500 to 9,999 persons which has a source erage TOC level, before any treatment, ≤4.0 mg/L.	TTHM annual average ≤ 0.040 mg/L and HAA5 ≤0.030 mg/L.	One (1) sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. **NOTE:** Any §5.0 system serving fewer than 500 persons may not reduce its monitoring to less than one (1) sample per treatment plant per year.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One (1) sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.	TTHM annual average ≤0.040 mg/L and HAA5 distribution annual average ≤0.030 mg/L for two (2) consecutive years OR TTHM annual average ≤0.020 mg/L and HAA5 annual average ≤0.015 mg/L for one (1) year.	One (1) sample per treatment plant per three-year monitoring cycle at system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring.

(iii) **Monitoring requirements for source water TOC**. In order to qualify for reduced monitoring for TTHM and HAA5 under §7.5(b)(1)(ii), §5.0 systems not monitoring under the provisions of §7.5 (d) must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the Director. In addition to meeting other criteria for reduced monitoring in §7.5(b)(1)(ii), the source water TOC running annual average must be ≤ 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. Once qualified for reduced monitoring for TTHM and HAA5 under §7.5(b)(1)(ii), a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment

(iv) Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in §7.5(b)(1)(i) (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L or 0.045 mg/L for TTHM or HAA5 respectively. For systems using only ground water not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to the increased monitoring identified in §7.5(b)(1)(i) (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5, respectively.

(v) Systems on increased monitoring may return to routine monitoring if, after at least one (1) year of monitoring, their TTHM annual average is ≤0.060 mg/L and their HAA5 annual average is ≤0.045 mg/L.

(vi) The Director may return a system to routine monitoring at the Director's discretion.

(2) **Chlorite**. Community and non-transient, non-community water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.

(i) Routine Monitoring

(A) Daily monitoring: Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by §7.5(b)(2)(ii), in addition to the sample required at the entrance to the distribution system.

(B) Monthly monitoring: Systems must take a three-sample set each month in the distribution system. The system must take one (1) sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under §7.5(b)(2)(ii) to meet the requirement for monitoring in this Paragraph.

(ii) Additional monitoring. On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three (3) chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) Reduced monitoring

(A) Chlorite monitoring at the entrance to the distribution system required by §7.5(b)(2)(i)(A) may not be reduced.

(B) Chlorite monitoring in the distribution system required by §7.5(b)(2)(i)(B) may be reduced to one (1) three-sample set per quarter after one (1) year of monitoring

where no individual chlorite sample taken in the distribution system under §7.5(b)(2)(i)(B) has exceeded the chlorite MCL and the system has not been required to conduct monitoring under §7.5(b)(2)(ii). The system may remain on the reduced monitoring schedule until either any of the three (3) individual chlorite samples taken quarterly in the distribution system under §7.5(b)(2)(i)(B) exceeds the chlorite MCL or the system is required to conduct monitoring under §7.5(b)(2)(ii), at which time the system must revert to routine monitoring.

(3) **Bromate**

(i) Routine monitoring. Community and nontransient noncommunity systems using ozone, for disinfection or oxidation, must take one (1) sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.

(ii) Reduced monitoring.

(A) Until March 31, 2009, 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 upon representative monthly bromide measurements for one (1) year. The system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is ≥0.05 mg/L based upon representative monthly measurements. If the running annual average source water bromide concentration is ≥ 0.05 mg/L, the system must resume routine monitoring required by §7.5(b)(3)(i).

(B) Beginning April 1, 2009, systems may no longer use the provisions of §7.5(b)(3)(ii)(A) to qualify for reduced monitoring. A system required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's running annual average bromate concentration is ≤ 0.0025 mg/L based on monthly bromate measurements under §7.5(b)(3)(i) for the most recent four quarters, with samples analyzed using Method 317.0 Revision 2.0, 326.0 or 321.8. If a system has qualified for reduced bromate monitoring under §7.5(b)(3)(ii)(A), that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples ≤ 0.0025 mg/L based on samples analyzed using Method 317.0 Revision 2.0, 326.0, or 321.8. If the running annual average bromate concentration is >0.0025 mg/L, the system must resume routine monitoring required by §7.5(b)(3)(i).

(c) **Monitoring Requirements For Disinfectant Residuals**

(1) **Chlorine And Chloramines**

(i) Routine monitoring. Community and non-transient, non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in §§16.0 and 17.0 of these Regulations. §5.0 Systems may use the results of residual disinfectant concentration sampling conducted under §§5.6.1(6) and 5.7.1(2), in lieu of taking separate samples.

(ii) Reduced monitoring. Monitoring may not be reduced.

(2) **Chlorine Dioxide**

(i) Routine monitoring. Community, nontransient noncommunity, and transient noncommunity water systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by §7.5(c)(2)(ii), in addition to the sample required at the entrance to the distribution system.

(ii) Additional monitoring. On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three (3) chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three (3) samples as close to the first customer as possible, at intervals of at least six (6) hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one (1) or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the system must take one (1) sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) Reduced monitoring. Chlorine dioxide monitoring may not be reduced.

(d) **Monitoring Requirements for Disinfection Byproduct Precursors (DBPP)**

(1) **Routine Monitoring.** §5.0 Systems which use conventional filtration treatment (as defined in §1.0) must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under §7.5(d)(1) must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one (1) paired sample and one (1) source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

(2) **Reduced Monitoring.** §5.0 Systems with an average treated water TOC of less than 2.0 mg/L for two (2) consecutive years, or less than 1.0 mg/L for one (1) year, may reduce monitoring for both TOC and alkalinity to one (1) paired sample and one (1) 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 $\geq$ 2.0 mg/L.

(e) **Bromide.** Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one (1) year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

(f) **Monitoring Plans.** Each system required to monitor under this subpart must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Director and the general public no later than thirty (30) days following the applicable compliance dates in §7.3. All §5.0 systems serving more than 3300 people must

submit a copy of the monitoring plan to the Director no later than the date of the first report required under §7.7. The Director may also require the plan to be submitted by any other system. After review, the Director may require changes in any plan elements. The plan must include at least the following elements.

(1) Specific locations and schedules for collecting samples for any parameters included in this subpart.

(2) How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

(3) If approved by the Director for monitoring as a consecutive system, or if providing water to a consecutive system, the sampling plan must reflect the entire distribution system.

7.6 **Compliance Requirements**

(a) **General Requirements**

(1) Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHM, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.

(2) All samples taken and analyzed under the provisions of this Section must be included in determining compliance, even if that number is greater than the minimum required.

(3) If, during the first year of monitoring under §7.5, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

(b) **Disinfection Byproducts**

(1) **TTHMs and HAA5**

(i) For systems monitoring quarterly, compliance with MCLs in §7.1 must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by §7.5(b)(1).

(ii) For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of §7.5(b)(1) does not exceed the MCLs in §7.1. If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant and such a system is not in violation of the MCL until it has completed one (1) year of quarterly monitoring, unless the result of fewer than four (4) quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three (3) quarters of monitoring.

(iii) If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to Section 16.8, whichever is effective for your system, in addition to reporting to the State pursuant to Section 7.7.

(iv) If a PWS fails to complete four (4) consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(2) **Bromate.** Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one (1) sample, the average f all samples taken during the month) collected by the system as prescribed by §7.5(b)(3). If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to §16.8 in addition to reporting to the Director pursuant to §7.7. If a PWS fails to complete twelve (12) consecutive months' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(3) **Chlorite.** Compliance must be based on an arithmetic average of each three (3) sample set taken in the distribution system as prescribed by §7.5(b)(2)(i)(B) and §7.5(b)(2)(ii). If the arithmetic average of any three (3) sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to §16.8, in addition to reporting to the Director pursuant to §7.7

(c) **Disinfectant Residuals**

(1) **Chlorine and Chloramines**

(i) Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under §7.5(c)(1). If the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to §16.8, in addition to reporting to the Director pursuant to §7.7.

(ii) In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to §7.7 must clearly indicate which residual disinfectant was analyzed for each sample.

(2) **Chlorine Dioxide**

(i) Acute violations. Compliance must be based on consecutive daily samples collected by the system under §7.5(c)(2). If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (1) (or more) of the three (3) samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and must notify the public pursuant to the procedures for acute health risks in §16.8 in addition to reporting to the Director pursuant to §7.7. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under §16.8 in addition to reporting to the Director pursuant to §7.7.

(ii) Nonacute violations. Compliance must be based on consecutive daily samples collected by the system under §7.5(c)(2). If any two (2) consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must

take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in §16.8 in addition to reporting to the Director pursuant to §7.7. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under §16.8 in addition to reporting to the Director pursuant to §7.7.

(d) **Disinfection Byproduct Precursors (DBPP)**. Compliance must be determined as specified by §7.8(c). Systems may begin monitoring to determine whether Step 1 TOC removals can be met twelve (12) months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first twelve (12) months after the compliance date that it is not able to meet the Step 1 requirements in §7.8(b)(2) and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to §7.8 (b)(3) and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under §7.8 is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to §16.8, in addition to reporting to the Director pursuant to §7.7.

7.7 **Reporting and Recordkeeping Requirements**

(a) Systems required to sample quarterly or more frequently must report to the Director within ten (10) days after the end of each quarter in which samples were collected. Systems required to sample less frequently than quarterly must report to the Director within ten (10) days after the end of each monitoring period in which samples were collected.

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(b) **Disinfection Byproducts**. Systems must report the information specified in the following table:

If you are a	You must report[1]
(1) System monitoring for TTHMs and HAA5 under the requirements of §7.5(b) on a quarterly or more frequent basis.	(i) The number of samples taken during the last quarter. (ii) The location, date, and result of each sample taken during the last quarter. (iii) The arithmetic average of all samples taken in the last quarter. (iv) The annual arithmetic average of the quarterly arithmetic averages of this Section for the last four (4) quarters. (v) Whether, based on §7.6(b)(1), the MCL was violated
(2) System monitoring for TTHMs and HAA5 under the requirements of §7.5(b) less frequently than quarterly (but as least annually).	(i) The number of samples taken during the last year. (ii) The location, date, and result of each sample taken during the last monitoring period. (iii) The arithmetic average of all samples taken over the last year. (iv) Whether, based on §7.6(b)(1), the MCL was violated.
(3) System monitoring for TTHMs and HAA5 under the requirements of §7.5(b) less frequently than annually.	(i) The location, date, and result of each sample taken. (ii) Whether, based on §7.6(b)(1), the MCL was violated.
(4) System monitoring for chlorite under the requirements of §7.5 (b).	(i) The number of entry point samples taken each month for the last 3 months. (ii) The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. (iii) For each month in the reporting period, the arithmetic average of all samples taken in each three (3) samples set taken in the distribution system. (iv) Whether, based on §7.6(b)(3), the MCL was violated, in which month, and how many times it was violated each month.
(5) System monitoring for bromate under the requirements of §7.5(b).	(i) The number of samples taken during the last quarter. (ii) The location, date, and result of each sample taken during the last quarter. (iii) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. (iv) Whether, based on §7.6(b)(2), the MCL was violated.

[1] The Director may choose to perform calculations and determine whether the MCL was exceeded, in lieu of having the system report that information

(c) **Disinfectants**. Systems must report the information specified in the following table:

If you are a	You must report[1]
(1) System monitoring for chlorine or chloramines under the requirements of §7.5(c).	(i) The number of samples taken during each month of the last quarter. (ii) The month arithmetic average of all samples taken in each month for the last 12 months. (iii) The arithmetic average of the monthly averages for the last 12 months. (iv) Whether, based on §7.6(c)(1), the MRDL was violated.
(2) System monitoring for chlorine dioxide under the requirements of §7.5(c).	(i) The dates, result, and locations of samples taken during the last quarter. (ii) Whether, based on §7.6(c)(2), the MRDL was violated. (iii) Whether the MRDL was exceeded in any two (2) consecutive daily samples and whether the resulting violation was acute or nonacute.

[1] The Director may choose to perform calculations and determine whether the MRDL was exceeded, in lieu of having the system report that information

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(d) **<u>Disinfection Byproduct Precursors and Enhanced Coagulation or Enhanced Softening</u>**. Systems must report the information specified in the following table:

If you are a	You must report[1]
(1) System monitoring monthly or quarterly for TOC under the requirements of §7.5(d) and required to meet the enhanced coagulation or enhanced softening requirements in §7.8(b)(2) or (3).	(i) The number of paired (source water and treated water) samples taken during the last quarter. (ii) The location, date, and results of each paired sample and associated alkalinity taken during the last quarter. (iii) For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal. (iv) Calculations for determining compliance with the TOC percent removal requirements, as provided in §7.8(c)(1). (v) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in §7.8(b) for the last four (4) quarters.
(2) System monitoring monthly or quarterly for TOC under the requirements of §7.5(d) and meeting one (1) or more of the alternative compliance criteria in §§ 7.8(a)(2) or (3).	(i) The alternative compliance criterion that the system is using. (ii) The number of paired samples taken during the last quarter. (iii) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. (iv) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in §7.8(a)(2)(i) or (iii) or of treated water TOC for systems meeting the criterion in §7.8(a)(2)(ii). (v) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in §7.8(a)(2)(v) or of treated water SUVA for systems meeting the criterion in 7.8(a)(2)(vi). (vi) The running annual average of source water alkalinity for systems meeting the criterion in §7.8(a)(2)(iii) and of treated water alkalinity for systems meeting the criterion in §7.8(a)(3)(i). (vii) The running annual average for both TTHM and HAA5 for systems meeting the criterion in §§7.8(a)(2)(iii) or (iv). (viii) The running annual average of the amount of magnesium hardness removal (as CaCO3, in mg/L) for systems meeting the criterion in §7.8(a)(3)(ii). (ix) Whether the system is in compliance with the particular alternative compliance criterion in §7.8(a)(2) or (3).

[1] The Director may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

7.8 **Treatment Technique For Control Of Disinfection Byproduct (DBP) Precursors**

(a) **Applicability**

(1) §5.0 systems using conventional filtration treatment (as defined in §1.0) must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in §7.8(b) unless the system meets at least one (1) of the alternative compliance criteria listed in §7.8(a)(2) or (a)(3).

(2) **Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems.** §5.0 systems using conventional filtration treatment may use the alternative compliance criteria in §7.8(a)(2)(i) through (vi) to comply with this Section in lieu of complying with §7.8(b). Systems must still comply with monitoring requirements in §7.5(d).

(i) The system's source water TOC level, measured according to §7.4(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(ii) The system's treated water TOC level, measured according to §7.4(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(iii) The system's source water TOC level, measured according to §7.4(d)(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to §7.4(d)(1), is greater than 60 mg/L (as $CaCO_3$), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in §7.3(b), the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in §7.3(b) to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Director for approval not later than the effective date for compliance in §7.3(b). These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of these Regulations.

(iv) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(v) The system's source water SUVA, prior to any treatment and measured monthly according to §7.4(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(vi) The system's finished water SUVA, measured monthly according to §7.4(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(3) **Additional Alternative Compliance Criteria for Softening Systems**. Systems practicing enhanced softening that cannot achieve the TOC removals required by §7.8(b)(2) may use the alternative compliance criteria in §7.8(a)(3)(i) and (ii) in lieu of complying with §7.8(b). Systems must still comply with monitoring requirements in §7.5(d).

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as $CaCO_3$), measured monthly according to §7.4(d)(1) and calculated quarterly as a running annual average.

(ii) Softening that results in removing at least 10 mg/L of magnesium hardness (as $CaCO_3$), measured monthly according to §7.4(d)(6) and calculated quarterly as an annual running average.

(b) **Enhanced Coagulation and Enhanced Softening Performance Requirements**

(1) Systems must achieve the percent reduction of TOC specified in §7.8(b)(2) between the source water and the combined filter effluent, unless the Director approves a system's request for alternate minimum TOC removal (Step 2) requirements under §7.8(b)(3).

(2) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with §7.4(d). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC.

Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening for §5.0 Systems Using Conventional Treatment [1, 2]

Source-water TOC, mg/L	Source-water alkalinity, mg/L as $CaCO_3$ (in percentages)		
	0 - 60	**>60 - 120**	**>120[3]**
>2.0 - 4.0	35.0	25.0	15.0
>4.0 - 8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

[1] Systems meeting at least one (1) of the conditions in Paragraph (a)(2)(i)-(vi) of this Section are not required to operate with enhanced coagulation.

[2] Softening systems meeting one (1) of the alternative compliance criteria in Paragraph (a)(3) of this Section are not required to operate with enhanced softening.

[3] Systems practicing softening must meet the TOC removal requirements in this column.

(3) §5.0 conventional treatment systems that cannot achieve the Step 1 TOC removals required by §7.8(b)(2) due to water quality parameters or operational constraints must apply to the Director, within three (3) months of failure to achieve the TOC removals required by §7.8(b)(2), for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Director approves the alternative minimum TOC removal (Step 2) requirements, the Director may make those requirements retroactive for the purposes of determining compliance. Until the Director approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in §7.8(b)(2).

(4) **Alternate Minimum TOC Removal (Step 2) Requirements**. Applications made to the Director by enhanced coagulation systems for approval of alternate minimum TOC removal (Step 2) requirements under §7.8(b)(3) must include, at a minimum, results of bench- or pilot-scale testing conducted under §7.8(b)(4)(i)). The submitted bench- or pilot-scale testing must be used to determine the alternate enhanced coagulation level.

(i) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in §§7.8(b)(4)(i) through (v) such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of ≤0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Director, this minimum requirement supersedes the minimum TOC removal required by the table in §7.8(b)(2). This requirement will be effective until such time as the Director approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve Director-set alternative minimum TOC removal levels is a violation of these Regulations.

(ii) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

Enhanced Coagulation Step 2 Target pH

Alkalinity (mg/L as $CaCO_3$)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

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

(iv) The system may operate at any coagulant dose or pH necessary (consistent with the other requirements of these Regulations) to achieve the minimum TOC percent removal approved under §7.8(b)(3).

(v) 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 to the Director for a waiver of enhanced coagulation requirements.

(c) **Compliance Calculations**

(1) §5.0 systems other than those identified in §7.8(a)(2) or (a)(3) must comply with requirements contained in §7.8(b)(2) or (b)(3). Systems must calculate compliance quarterly, beginning after the system has collected twelve(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)) × 100

(ii) Determine the required monthly TOC percent removal (from either the table in §7.8(b)(2) or from §7.8(b)(3).

(iii) Divide the value in §7.8(c)(1)(i) by the value in §7.8(c)(1)(ii).

(iv) Add together the results of §7.8(c)(1)(iii) for the last twelve (12) months and divide by 12.

(v) If the value calculated in §7.8(c)(1)(iv) is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(2) Systems may use the provisions in §§7.8(c)(2)(i) through (v) in lieu of the calculations in §§7.8(c)(1)(i) through (v) to determine compliance with TOC percent removal requirements.

(i) In any month that the system's treated or source water TOC level, measured according to §7.4(d)(3), is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in §7.8(c)(1)(iii)) when calculating compliance under the provisions of §7.8(c)(1).

(ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO3), the system may assign a monthly value of 1.0 (in lieu of the value calculated in §7.8(c)(1)(iii)) when calculating compliance under the provisions of §7.8(c)(1).

(iii) In any month that the system's source water SUVA, prior to any treatment and measured according to §7.4(d)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in §7.8(c)(1)(iii)) when calculating compliance under the provisions of §7.8(c)(1).

(iv) In any month that the system's finished water SUVA, measured according to §7.4(d)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in §7.8(c)(1)(iii)) when calculating compliance under the provisions of §7.8(c)(1).

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO3), the system may assign a monthly value of 1.0 (in lieu of the value calculated in §7.8(c)(1)(iii)) when calculating compliance under the provisions of §7.8 (c)(1).

(3) §5.0 systems using conventional treatment may also comply with the requirements of this Section by meeting the criteria in §§7.8 (a)(2) or (3).

(d) **Treatment Technique Requirements for DBP Precursors.** The following are identified as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For §5.0 systems using conventional treatment, enhanced coagulation or enhanced softening.

7.9 Initial Distribution System Evaluations

7.9.1 General Requirements.

7.9.2 Standard Monitoring.

7.9.3 System Specific Studies.

7.9.4 40/30 Certification.

7.9.5 Very Small System Waivers.

7.9.6 Stage 2 (§7.10) Compliance Monitoring Location Recommendations.

7.9.1 **General Requirements.**

(a) The requirements of §7.9 constitute national primary drinking water regulations. The regulations in §7.9 establish monitoring and other requirements for identifying §7.10 compliance monitoring locations for determining compliance with maximum contaminant levels for totaltrihalomethanes (TTHM) and haloacetic acids (five)(HAA5). You must use an Initial Distribution System Evaluation (IDSE) to determine locations with representative high TTHM and HAA5 concentrations throughout your distribution system. IDSEs are used in conjunction with, but separate from, §7.0 compliance monitoring, to identify and select §7.10 compliance monitoring locations.

(b) **Applicability**. You are subject to these requirements if your system is a community water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light; or if your system is a nontransient noncommunity water system that serves at least 10,000 people and uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.

(c) **Schedule**.

(1) You must comply with the requirements of §7.9 on the schedule in the table below.

If you serve this population	You must submit your standard monitoring plan or system specific study plan[15] or 40/30 certification[16] to the Director by or receive very small system waiver from Director	You must complete your standard monitoring or system specific study by	You must submit your IDSE report to Director by[17]
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system			
(i) ≥100,000	October 1, 2006	September 30, 2008	January 1, 2009
(ii) 50,000-99,999	April 1, 2007	March 31, 2009	July 1, 2009
(iii) 10,000-49,999	October 1, 2007	September 30, 2009	January 1, 2010
(iv) < 10,000 (CWS Only)	April 1, 2008	March 31, 2010	July 1, 2010
Other systems that are part of a combined distribution system			
(v) Wholesale system or consecutive system	At the same time as the system with the earliest compliance date in the combined distribution system		

[15] If, within 12 months after the date identified in this column, the Director does not approve your plan or notify you that it has not yet completed its review, you may consider the plan that you submitted as approved. You must implement that plan and you must complete standard monitoring or a system specific study no later than the date identified in the third column.

[16] You must submit your 40/30 certification under §7.9.4 by the date indicated.

[17] If, within three months after the date identified in this column (nine months after the date identified in this column if you must comply on the schedule in §7.9.1(c)(1)(iii)), the Director does not approve your IDSE report or notify you that it has not yet completed its review, you may consider the report that you submitted as approved and you must implement the recommended §7.10 monitoring as required.

(2) For the purpose of the schedule in §7.9.1(c)(1), the Director may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The Director may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) You must conduct standard monitoring that meets the requirements in §7.9.2, or a system specific study that meets the requirements in §7.9.3, or certify to the Director that you meet 40/30 certification criteria under §7.9.4, or qualify for a very small system waiver under § 7.9.5.

(1) You must have taken the full complement of routine TTHM and HAA5 compliance samples required of a system with your population and source water under §7.0 (or you must have taken the full complement of reduced TTHM and HAA5 compliance samples required of a system with your population and source water under §7.0 if you meet reduced monitoring criteria under §7. during the period specified in §7.9.4(a) to meet the 40/30 certification criteria in §7.9.4. You must have taken TTHM and HAA5 samples under §§ 7.4 and 7.5 to be eligible for the very small system waiver in §7.9.5.

(2) If you have not taken the required samples, you must conduct standard monitoring that meets the requirements in §7.9.2, or a system specific study that meets the requirements in §7.9.3.

(e) You must use only the analytical methods specified in §7.4 or otherwise approved by EPA for monitoring under this subpart, to demonstrate compliance with the requirements of this subpart.

(f) IDSE results will not be used for the purpose of determining compliance with MCLs in §7.0.

7.9.2 **Standard Monitoring.**

(a) **Standard Monitoring Plan**. Your standard monitoring plan must comply with §7.9.2(a)(1) through (a)(4). You must prepare and submit your standard monitoring plan to the Director according to the schedule in §7.9.1(c).

(1) Your standard monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating locations and dates of all projected standard monitoring, and all projected §7.0 compliance monitoring.

(2) Your standard monitoring plan must include justification of standard monitoring location selection and a summary of data you relied on to justify standard monitoring location selection.

(3) Your standard monitoring plan must specify the population served and system type (§5.0 or ground water).

(4) You must retain a complete copy of your standard monitoring plan submitted under §7.9.2(a), including any Director modification of your standard monitoring plan, for as long asyou are required to retain your IDSE report under §7.9.2(c)(4).

(b) **Standard Monitoring**.

(1) You must monitor as indicated in the table below. You must collect dual sample sets at each monitoring location. One sample in the dual sample set must be analyzed for TTHM. The other sample in the dual sample set must be analyzed for HAA5. You must conduct one monitoring period during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature. You must review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature.

Source Water Type	Population Size Category	Monitoring periods and frequency of sampling	Distribution system monitoring locations[18]				
			Total per monitoring period	Near entry points	Average residence time	High TTHM locations	High HAA5 locations
§5.0							
	< 500 consecutive systems	one (during peak historical month)[19]	2	1	.....	1	
	< 500 non-consecutive systems	.....	2	.....	.....	1	1
	500-3,300 consecutive systems	four (every 90 days)	2	1	.....	1	
	500-3,300 non-consecutive systems	.....	2	.....	.....	1	1
	3,301-9,999	.....	4	.....	1	2	1
	10,000-49,999	six (every 60 days)	8	1	2	3	2
	50,000-249,999	.....	16	3	4	5	4
	250,000-999,999	.....	24	4	6	8	6
	1,000,000-4,999,999	.....	32	6	8	10	8
	≥ 5,000,000	.....	40	8	10	12	10
Ground Water:							
	< 500 consecutive systems	one (during peak historical month)[20]	2	1	.....	1	
	< 500 non-consecutive systems	.....	2	.....	.....	1	1
	500-9,999	four (every 90 days)	2	.....	.....	1	1
	10,000-99,999	.....	6	1	1	2	2
	1,000,000-4,999,999	.....	8	1	1	3	3
	≥ 5,000,000	.....	12	2	2	4	4

(2) You must take samples at locations other than the existing §7.0 monitoring locations. Monitoring locations must be distributed throughout the distribution system.

(3) If the number of entry points to the distribution system is fewer than the specified number of entry point monitoring locations, excess entry point samples must be replaced equally at high TTHM and HAA5 locations. If there is an odd extra location

[18] A dual sample set (i.e., a TTHM and an HAA5 sample) must be taken at each monitoring location during each monitoring period

[19] The peak historical month is the month with the highest TTHM or HAA5 levels or the warmest water temperature.

number, you must take a sample at a high TTHM location. If the number of entry points to the distribution system is more than the specified number of entry point monitoring locations, you must take samples at entry points to the distribution system having the highest annual water flows.

(4) Your monitoring under §7.9.2(b) may not be reduced under the provisions of other sections of these Regulations.

(c) **IDSE Report**. Your IDSE report must include the elements required in §7.9.2(c)(1) through (c)(4). You must submit your IDSE report to the Director according to the schedule in §7.9.1(c).

(1) Your IDSE report must include all TTHM and HAA5 analytical results from §7.0 compliance monitoring and all standard monitoring conducted during the period of the IDSE as individual analytical results and LRAAs presented in a tabular or spreadsheet format acceptable to the Director. If changed from your standard monitoring plan submitted under §7.9.2(a), your report must also include a schematic of your distribution system, the population served, and system type (§5.0 or ground water).

(2) Your IDSE report must include an explanation of any deviations from your approved standard monitoring plan.

(3) You must recommend and justify §7.10 compliance monitoring locations and timing based on the protocol in §7.9.6.

(4) You must retain a complete copy of your IDSE report submitted under §7.9.2 for 10 years after the date that you submitted your report. If the Director modifies the §7.10 monitoring requirements that you recommended in your IDSE report or if the Director approves alternative monitoring locations, you must keep a copy of the Director's notification on file for 10 years after the date of the Director's notification. You must make the IDSE report and any Director notification available for review by the Director or the public.

7.9.3 **System Specific Studies.**

(a) **System Specific Study Plan**. Your system specific study plan must be based on either existing monitoring results as required under §7.9.3(a)(1) or modeling as required under §7.9.3(a)(2). You must prepare and submit your system specific study plan to the Director according to the schedule in §7.9.1(c).

(1) **Existing Monitoring Results**. You may comply by submitting monitoring results collected before you are required to begin monitoring under §7.9.1(c). The monitoring results and analysis must meet the criteria in §7.9.3(a)(1)(i) and (a)(1)(ii).

(i) **Minimum Requirements**.

(A) TTHM and HAA5 results must be based on samples collected and analyzed in accordance with §7.4. Samples must be collected no earlier than five years prior to the study plan submission date.

(B) The monitoring locations and frequency must meet the conditions identified in this paragraph [§7.9.3(a)(1)(i)(B)]. Each location must be sampled once during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature for every 12 months of data submitted for that location. Monitoring results must include all §7.0 compliance

monitoring results plus additional monitoring results as necessary to meet minimum sample requirements.

System Type	Population Size Category	Number of Monitoring Locations	Number of Samples	
			TTHM	HAA5
§5.0				
	< 500	3	3	3
	500-3,300	3	9	9
	3,301-9,999	6	36	36
	10,000-49,999	12	72	72
	50,000-249,999	24	144	144
	250,000-999,999	36	216	216
	1,000,000-4,999,999	48	288	288
	≥ 5,000,000	60	300	300
Ground Water:				
	< 500	3	3	3
	500-9,999	3	9	9
	10,000-99,999	12	48	48
	1,000,000-4,999,999	18	72	72
	≥ 5,000,000	24	96	96

(ii) **Reporting Monitoring Results**. You must report the information in this paragraph [§7.9.3(a)(1)(ii)].

(A) You must report previously collected monitoring results and certify that the reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent §7.0 results.

(B) You must certify that the samples were representative of the entire distribution system and that treatment, and distribution system have not changed significantly since the samples were collected.

(C) Your study monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed or planned system specific study monitoring.

(D) Your system specific study plan must specify the population served and system type (§5.0 or ground water).

(E) You must retain a complete copy of your system specific study plan submitted under §7.9.3(a)(1) including any Director modification of your system specific study plan, for as long as you are required to retain your IDSE report under §7.9.3(b)(5).

(F) If you submit previously collected data that fully meet the number of samples required under §7.9.3(a)(1)(i)(B) and the Director rejects some of the data, you must either conduct additional monitoring to replace rejected data on a schedule the Director approves or conduct standard monitoring under §7.9.2.

(2) **Modeling**. You may comply through analysis of an extended period simulation hydraulic model. The extended period simulation hydraulic model and analysis must meet the criteria in this paragraph [§7.9.3(a)(2)].

(i) **Minimum Requirements**.

(A) The model must simulate 24 hour variation in demand and show a consistently repeating 24 hour pattern of residence time.

(B) The model must represent the criteria listed in §7.9.3(a)(2)(i)(B)(1) through (9).

(1) 75% of pipe volume;

(2) 50% of pipe length;

(3) All pressure zones;

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

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

(6) All 6-inch and larger pipes that connect remote areas of a distribution system to the main portion of the system;

(7) All storage facilities with standard operations represented in the model; and

(8) All active pump stations with controls represented in the model; and

(9) All active control valves.

(C) The model must be calibrated, or have calibration plans, for the current configuration of the distribution system during the period of high TTHM formation potential. All storage facilities must be evaluated as part of the calibration process. All required calibration must be completed no later than 12 months after plan submission.

(ii) **Reporting Modeling**. Your system specific study plan must include the information in this paragraph [§7.9.3(a)(2)(ii)].

(A) Tabular or spreadsheet data demonstrating that the model meets requirements in §7.9.3(a)(2)(i)(B).

(B) A description of all calibration activities undertaken, and if calibration is complete, a graph of predicted tank levels versus measured tank levels for the storage facility with the highest residence time in each pressure zone, and a time series graph of the residence time at the longest residence time storage facility in the distribution system showing the predictions for the entire simulation period (i.e., from time zero until the time it takes to for the model to reach a consistently repeating pattern of residence time).

(C) Model output showing preliminary 24 hour average residence time predictions throughout the distribution system.

(D) Timing and number of samples representative of the distribution system planned for at least one monitoring period of TTHM and HAA5 dual sample monitoring at a number of locations no less than would be required for the system under standard monitoring in §7.9.2 during the historical month of high TTHM. These samples must be taken at locations other than existing §7.0 compliance monitoring locations.

(E) Description of how all requirements will be completed no later than twelve (12) months after you submit your system specific study plan.

(F) Schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed system specific study monitoring (if calibration is complete) and all §7.0 compliance monitoring.

(G) Population served and system type (§5.0 or ground water).

(H) You must retain a complete copy of your system specific study plan submitted under this §7.9.3(a)(2), including any Director modification of your system specific study plan, for as long as you are required to retain your IDSE report under §7.9.3(b)(7).

(iii) If you submit a model that does not fully meet the requirements under §7.9.3(a)(2), you must correct the deficiencies and respond to the Director's inquiries concerning the model. If you fail to correct deficiencies or respond to inquiries to the Director's satisfaction, you must conduct standard monitoring under §7.9.2.

(b) **IDSE Report**. Your IDSE report must include the elements required in §7.9.3(b)(1) through (b)(6). You must submit your IDSE report according to the schedule in §7.9.1(c).

(1) Your IDSE report must include all TTHM and HAA5 analytical results from §7.0 compliance monitoring and all system specific study monitoring conducted during the period of the system specific study presented in a tabular or spreadsheet format acceptable to the Director. If changed from your system specific study plan submitted under §7.9.3(a), your IDSE report must also include a schematic of your distribution system, the population served, and system type (§5.0 or ground water).

(2) If you used the modeling provision under §7.9.3(a)(2), you must include final information for the elements described in §7.9.3(a)(2)(ii), and a 24-hour time series graph of residence time for each §7.10 compliance monitoring location selected.

(3) You must recommend and justify §7.10 compliance monitoring locations and timing based on the protocol in §7.9.6.

(4) Your IDSE report must include an explanation of any deviations from your approved system specific study plan.

(5) Your IDSE report must include the basis (analytical and modeling results) and justification you used to select the recommended §7.10 monitoring locations.

(6) You may submit your IDSE report in lieu of your system specific study plan on the schedule identified in §7.9.1(c) for submission of the system specific study plan if you believe that you have the necessary information by the time that the system specific study plan is due. If you elect this approach, your IDSE report must also include all information required under §7.9.3(a).

(7) You must retain a complete copy of your IDSE report submitted under this section for 10 years after the date that you submitted your IDSE report. If the Director modifies the §7.10 monitoring requirements that you recommended in your IDSE report or if the Director approves alternative monitoring locations, you must keep a copy of the Director's notification on file for 10 years after the date of the Director's notification. You must make the IDSE report and any Director notification available for review by the Director or the public.

7.9.4 **40/30 Certification.**

(a) **Eligibility**. You are eligible for 40/30 certification if you had no TTHM or HAA5 monitoring violations under §7.0 and no individual sample exceeded 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 during an eight consecutive calendar quarter period beginning no earlier than the date specified in the table below.

If your 40/30 certification is due	Then your eligibility for 40/30 certification is based on eight consecutive calendar quarters of §7.0 compliance monitoring results beginning no earlier than[20]
(1) October 1, 2006	January 2004
(2) April 1, 2007	January 2004
(3) October 1, 2007	January 2005
(4) April 1, 2008	January 2005

(b) **40/30 Certification**.

(1) You must certify to the Director that every individual compliance sample taken under §7.0 during the periods specified in paragraph (a) of this section were ≤ 0.040 mg/L for TTHM and ≤ 0.030 mg/L for HAA5, and that you have not had any TTHM or HAA5 monitoring violations during the period specified in §7.9.4(a).

(2) The Director may require you to submit compliance monitoring results, distribution system schematics, and/or recommended §7.10 compliance monitoring locations in addition to your certification. If you fail to submit the requested information, the Director may require standard monitoring under §7.9.2 or a system specific study under §7.9.3.

(3) The Director may still require standard monitoring under §7.9.2 or a system specific study under §7.9.3 even if you meet the criteria in §7.9.4(a).

(4) You must retain a complete copy of your certification submitted under this section for 10 years after the date that you submitted your certification. You must make the certification, all data upon which the certification is based, and any Director notification available for review by the Director or the public.

7.9.5 **Very Small System Waivers.**

(a) If you serve fewer than 500 people and you have taken TTHM and HAA5 samples under §7.0, you are not required to comply with §7.9 unless the Director notifies you that you must conduct standard monitoring under §7.9.2 or a system specific study under §7.9.3.

[20] Unless you are on reduced monitoring under §7.0 and were not required to monitor during the specified period. If you did not monitor during the specified period, you must base your eligibility on compliance samples taken during the 12 months preceding the specified period.

(b) If you have not taken TTHM and HAA5 samples under §7.0 or if the Director notifies you that you must comply with §7.9, you must conduct standard monitoring under §7.9.2 or a system specific study under §7.9.3.

7.9.6 **Stage 2 (§7.10) Compliance Monitoring Location Recommendations.**

(a) Your IDSE report must include your recommendations and justification for where and during what month(s) TTHM and HAA5 monitoring for §7.10 should be conducted. You must base your recommendations on the criteria in §7.9.6(b) through (e).

(b) You must select the number of monitoring locations specified in the table below. You will use these recommended locations as §7.10 routine compliance monitoring locations, unless the Director requires different or additional locations. You should distribute locations throughout the distribution system to the extent possible.

Source Water Type	Population Size Category	Monitoring Frequency[21]	Distribution system monitoring locations			
			Total per monitoring period[22]	Highest TTHM locations	Highest HAA5 locations	Existing §7.0 compliance locations
§5.0						
	< 500	per year	2	1	1	.....
	500-3,300	per quarter	2	1	1	
	3,301-9,999	per quarter	2	1	1	.....
	10,000-49,999	per quarter	4	2	2	1
	50,000-249,999	per quarter	8	3	3	2
	250,000-999,999	per quarter	12	5	5	3
	1,000,000-4,999,999	per quarter	16	6	6	4
	≥ 5,000,000	per quarter	20	8	7	5
Ground Water:						
	< 500	per year	2	1	1	
	500-9,999	per year	2	1	1	
	10,000-99,999	per quarter	4	2	1	1
	1,000,000-4,999,999	per quarter	6	3	2	1
	≥ 5,000,000	per quarter	8	3	3	2

(c) You must recommend §7.10 compliance monitoring locations based on standard monitoring results, system specific study results, and §7.0 compliance monitoring results. You must follow the protocol in §7.9.6(c)(1) through (c)(8). If required to monitor at more than eight locations, you must repeat the protocol as necessary. If you do not have existing

[21] All systems must monitor during month of highest DBP concentrations.

[22] Systems on quarterly monitoring must take dual sample sets every ninety (90) days at each monitoring location, except for §5.0 systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and §5.0 systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one (1) location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location and month,

§7.0 compliance monitoring results or if you do not have enough existing §7.0 compliance monitoring results, you must repeat the protocol, skipping the provisions of §7.9.6(c)(3) and (c)(7) as necessary, until you have identified the required total number of monitoring locations.

(1) Location with the highest TTHM LRAA not previously selected as a §7.10 monitoring location.

(2) Location with the highest HAA5 LRAA not previously selected as a §7.10 monitoring location.

(3) Existing §7.0 average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest HAA5 LRAA not previously selected as a §7.10 monitoring location.

(4) Location with the highest TTHM LRAA not previously selected as a §7.10 monitoring location.

(5) Location with the highest TTHM LRAA not previously selected as a §7.10 monitoring location.

(6) Location with the highest HAA5 LRAA not previously selected as a §7.10 monitoring location.

(7) Existing §7.0 average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest TTHM LRAA not previously selected as a §7.10 monitoring location.

(8) Location with the highest HAA5 LRAA not previously selected as a §7.10 monitoring location.

(d) You may recommend locations other than those specified in §7.9.6(c) if you include a rationale for selecting other locations. If the Director approves the alternate locations, you must monitor at these locations to determine compliance under §7.10.

(e) Your recommended schedule must include §7.10 monitoring during the peak historical month for TTHM and HAA5 concentration, unless the Director approves another month. Once you have identified the peak historical month, and if you are required to conduct routine monitoring at least quarterly, you must schedule §7.10 compliance monitoring at a regular frequency of every 90 days or fewer.

7.10 **Stage 2 Disinfection Byproducts Requirements**

7.10.1 General requirements.

7.10.2 Routine monitoring.

7.10.3 §7.10 monitoring plan.

7.10.4 Reduced monitoring.

7.10.5 Additional requirements for consecutive systems.

7.10.6 Conditions requiring increased monitoring.

7.10.7 Operational evaluation levels.

7.10.8 Requirements for remaining on reduced TTHM and HAA5 monitoring based on subpart L results.

7.10.9 Requirements for remaining on increased TTHM and HAA5 monitoring based on subpart L results.

7.10.10 Reporting and recordkeeping requirements.

7.10.1 **General Requirements.**

(a) **General**. The requirements of §7.10 constitute national primary drinking water regulations. The regulations in §7.10 establish monitoring and other requirements for achieving compliance with maximum contaminant levels based on locational running annual averages (LRAA) for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5), and for achieving compliance with maximum residual disinfectant residuals for chlorine and chloramine for certain consecutive systems.

(b) **Applicability**. You are subject to these requirements if your system is a community water system or a nontransient noncommunity water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.

(c) **Schedule**. You must comply with the requirements in this subpart on the schedule in the following table based on your system type.

If you are this type of system	**You must comply with §7.10 monitoring by:**[23]
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system	
(1) System serving ≥ 100,000	April 1, 2012
(2) System serving 50,000-99,999	October 1, 2012
(3) System serving 10,000-49,999	October 1, 2013
(4) System serving < 10,000	October 1, 2013 if no *Cryptosporidium* monitoring is required under §5.9.2(a)(4) or October 1, 2014 if *Cryptosporidium* monitoring is required under §5.9.2 (a)(4) or (a)(6)
Other systems that are part of a combined distribution system	
(5) Consecutive system or wholesale system	At the same time as the system with the earliest compliance date in the combined distribution system

(6) Your monitoring frequency is specified in §7.10.2(a)(2).

(i) If you are required to conduct quarterly monitoring, you must begin monitoring in the first full calendar quarter that includes the compliance date in the table in §7.10(c).

(ii) If you are required to conduct monitoring at a frequency that is less than quarterly, you must begin monitoring in the calendar month recommended in the IDSE report prepared under §7.9.2 or §7.9.3 or the calendar month identified in the §7.10 monitoring plan developed under §7.10.3 no later than twelve (12) months after the compliance date in this table.

[23] The Director may grant up to an additional twenty-four (24) months for compliance with MCLs and operational evaluaton levels if you require capital improvements to comply with an MCL.

(7) If you are required to conduct quarterly monitoring, you must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters). If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date.

(8) For the purpose of the schedule in §7.10(c), the Director may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The Director may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) **Monitoring and Compliance**.

(1) **Systems Required to Monitor Quarterly**. To comply with the MCLs in §7.1, you must calculate LRAAs for TTHM and HAA5 using monitoring results collected under this subpart and determine that each LRAA does not exceed the MCL. If you fail to complete four consecutive quarters of monitoring, you must calculate compliance with the MCL based on the average of the available data from the most recent four quarters. If you take more than one sample per quarter at a monitoring location, you must average all samples taken in the quarter at that location to determine a quarterly average to be used in the LRAA calculation.

(2) **Systems Required to Monitor Yearly or Less Frequently**. To determine compliance with the MCLs in §7.1, you must determine that each sample taken is less than the MCL. If any sample exceeds the MCL, you must comply with the requirements of §7.10.6. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.

(e) **Violation**. You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

7.10.2 **Routine Monitoring.**

(a) **Monitoring.**

(1) If you submitted an IDSE report, you must begin monitoring at the locations and months you have recommended in your IDSE report submitted under §7.9.6 following the schedule in §7.10.1(c), unless the Director requires other locations or additional locations after its review. If you submitted a 40/30 certification under §7.9.4 or you qualified for a very small system waiver under §7.9.5 or you are a nontransient noncommunity water system serving < 10,000, you must monitor at the location(s) and dates identified in your monitoring plan in §7.5(f), updated as required by §7.10.3.

(2) You must monitor at no fewer than the number of locations identified in the table below.

Source Water Type	Population Size Category	Monitoring Frequency[24]	Distribution system monitoring location per monitoring period[25]
§5.0			
	< 500	per year	2
	500-3,300	per quarter	2
	3,301-9,999	per quarter	2
	10,000-49,999	per quarter	4
	50,000-249,999	per quarter	8
	250,000-999,999	per quarter	12
	1,000,000-4,999,999	per quarter	16
	≥ 5,000,000	per quarter	20
Ground Water			
	< 500	per year	2
	500-9,999	per year	2
	10,000-99,999	per quarter	4
	1,000,000-4,999,999	per quarter	6
	≥ 5,000,000	per quarter	8

(3) If you are an undisinfected system that begins using a disinfectant other than UV light after the dates in §7.9 for complying with the Initial Distribution System Evaluation requirements, you must consult with the Director to identify compliance monitoring locations for §7.10. You must then develop a monitoring plan under §7.10.3 that includes those monitoring locations.

(b) **Analytical Methods**. You must use an approved method listed in §7.4 for TTHM and HAA5 analyses in §7.10. Analyses must be conducted by laboratories that have received certification by EPA or the Director as specified in §7.4.

7.10.3 **§7.10 Monitoring Plan.**

(a) (1) You must develop and implement a monitoring plan to be kept on file for Director and public review. The monitoring plan must contain the elements in §7.10.3(a)(1)(i) through (a)(1)(iv) and be complete no later than the date you conduct your initial monitoring under this subpart.

[24] All systems must monitor during month of highest DBP concentrations.

[25] Systems on quarterly monitoring must take dual sample sets every ninety (90) days at each monitoring location, except for §5.0 systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and §5.0 systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than five hundred (500) people, only one (1) location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

(i) Monitoring locations;

(ii) Monitoring dates;

(iii) Compliance calculation procedures; and

(iv) Monitoring plans for any other systems in the combined distribution system if the Director has reduced monitoring requirements under the Director's authority.

(2) If you were not required to submit an IDSE report under either §7.9.2 or §7.9.3, and you do not have sufficient §7.0 monitoring locations to identify the required number of §7.10 compliance monitoring locations indicated in §7.9.6(b), you must identify additional locations by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. You must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If you have more §7.0 monitoring locations than required for §7.10 compliance monitoring in §7.9.6(b), you must identify which locations you will use for §7.10 compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of §7.10 compliance monitoring locations have been identified.

(b) If you are a §5.0 system serving > 3,300 people, you must submit a copy of your monitoring plan to the Director prior to the date you conduct your initial monitoring under this subpart, unless your IDSE report submitted under §7.9 contains all the information required by this section.

(c) You may revise your monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for Director-approved reasons, after consultation with the Dirtector regarding the need for changes and the appropriateness of changes. If you change monitoring locations, you must replace existing compliance monitoring locations with the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The Director may also require modifications in your monitoring plan. If you are a §5.0 system serving > 3,300 people, you must submit a copy of your modified monitoring plan to the Director prior to the date you are required to comply with the revised monitoring plan.

7.10.4 **Reduced Monitoring.**

(a) You may reduce monitoring to the level specified in the table below any time the LRAA is ≤ 0.040 mg/L for TTHM and ≤ 0.030 mg/L for HAA5 at all monitoring locations. You may only use data collected under the provisions of §7.5 or §7.10 to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be ≤ 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either §7.5(b)(1)(iii) or §7.5(d).

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Source Water Type	Population Size Category	Monitoring Frequency[26]	Distribution system monitoring location per monitoring period
§5.0			
	< 500	----------	monitoring may not be reduced
	500-3,300	per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	3,301-9,999	per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement
	10,000- 49,999	per quarter	2 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs.
	50,000-249,999	per quarter	4 dual sample sets --at the locations with the two highest TTHM and two highest HAA5 LRAAs.
	250,000-999,999	per quarter	6 dual sample sets --at the locations with the three highest TTHM and three highest HAA5 LRAAs.
	1,000,000-4,999,999	per quarter	8 dual sample sets --at the locations with the four highest TTHM and four highest HAA5 LRAAs.
	≥ 5,000,000	per quarter	10 dual sample sets --at the locations with the five highest TTHM and five highest HAA5 LRAAs.
Ground Water			
	< 500	every 3rd year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	500-9,999	per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	10,000-99,999	per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement
	1,000,000-4,999,999	per quarter	2 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs.
	≥ 5,000,000	per quarter	4 dual sample sets --at the locations with the two highest TTHM and two highest HAA5 LRAAs.

(b) You may remain on reduced monitoring as long as the TTHM LRAA ≤ 0.040 mg/L and the HAA5 LRAA ≤ 0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample ≤ 0.060 mg/L and each HAA5 sample ≤ 0.045 mg/L (for systems with annual or less frequent monitoring). In addition, the source water annual average TOC level, before any treatment, must be ≤ 4.0 mg/L at each treatment

[26] Systems on quarterly monitoring must take dual sample sets every 90 days.

plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either §7.5(b)(1)(iii) or §7.5(d).

(c) If the LRAA based on quarterly monitoring at any monitoring location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 or if the annual (or less frequent) sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5, or if the source water annual average TOC level, before any treatment, >4.0 mg/L at any treatment plant treating surface water or ground water under the direct influence of surface water, you must resume routine monitoring under §7.10.2 or begin increased monitoring if §7.10.6 applies.

(d) The Director may return your system to routine monitoring at the Director's discretion.

7.10.5 **Additional Requirements For Consecutive Systems.** If you are a consecutive system that does not add a disinfectant but delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light, you must comply with analytical and monitoring requirements for chlorine and chloramines in §7.4(c) and §7.3(c)(1) and the compliance requirements in §7.6(c)(1) beginning April 1, 2009, unless required earlier by the Director, and report monitoring results under §7.7(c).

7.10.6 **Conditions Requiring Increased Monitoring.**

(a) If you are required to monitor at a particular location annually or less frequently than annually under §7.10.2 or §7.10.4, you must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations if a TTHM sample is >0.080 mg/L or a HAA5 sample is >0.060 mg/L at any location.

(b) You are in violation of the MCL when the LRAA exceeds the MCLs in §7.1, calculated based on four consecutive quarters of monitoring (or the LRAA calculated based on fewer than four quarters of data if the MCL would be exceeded regardless of the monitoring results of subsequent quarters). You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

(c) You may return to routine monitoring once you have conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is ≤ 0.060 mg/L for TTHM and ≤ 0.045 mg/L for HAA5.

7.10.7 **Operational Evaluation Levels.**

(a) You have exceeded the operational evaluation level at any monitoring location where the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by 4 to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average, exceeds 0.060 mg/L.

(b) (1) If you exceed the operational evaluation level, you must conduct an operational evaluation and submit a written report of the evaluation to the Director no later than 90 days after being notified of the analytical result that causes you to exceed the operational evaluation level. The written report must be made available to the public upon request.

(2) Your operational evaluation must include an examination of system treatment and distribution operational practices, including storage tank operations, excess storage

capacity, distribution system flushing, changes in sources or source water quality, and treatment changes or problems that may contribute to TTHM and HAA5 formation and what steps could be considered to minimize future exceedences.

(i) You may request and the Director may allow you to limit the scope of your evaluation if you are able to identify the cause of the operational evaluation level exceedance.

(ii) Your request to limit the scope of the evaluation does not extend the schedule in §7.10.7(b)(1) for submitting the written report. The Director must approve this limited scope of evaluation in writing and you must keep that approval with the completed report.

7.10.8 **Requirements For Remaining On Reduced TTHM and HAA5 Monitoring Based On Stage 1 Results.**

You may remain on reduced monitoring after the dates identified in §7.10.1(c) for compliance with §7.10 only if you qualify for a 40/30 certification under §7.9.4 or have received a very small system waiver under §7.9.5, plus you meet the reduced monitoring criteria in §7.10.4(a), and you do not change or add monitoring locations from those used for compliance monitoring under §7.5. If your monitoring locations under §7.10 differ from your monitoring locations under §7.5, you may not remain on reduced monitoring after the dates identified in §7.10.1(c) for compliance with §7.10.

7.10.9 **Requirements For Remaining On Increased TTHM and HAA5 Monitoring Based On Stage 1 Results.**

If you were on increased monitoring under §7.5(b)(1), you must remain on increased monitoring until you qualify for a return to routine monitoring under §7.10.6(c). You must conduct increased monitoring under §7.10.6 at the monitoring locations in the monitoring plan developed under §7.10.3 beginning at the date identified in §7.10.1(c) for compliance with §7.10 and remain on increased monitoring until you qualify for a return to routine monitoring under §7.10.6(c).

7.10.10 **Reporting and Recordkeeping Requirements.**

(a) **Reporting**

(1) You must report the following information for each monitoring location to the Director within 10 days of the end of any quarter in which monitoring is required:

(i) Number of samples taken during the last quarter.

(ii) Date and results of each sample taken during the last quarter.

(iii) Arithmetic average of quarterly results for the last four quarters for each monitoring location (LRAA), beginning at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter. If the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, you must report this information to the Director as part of the first report due following the compliance date or anytime thereafter that this determination is made. If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date, unless you are required to conduct increased monitoring under §7.10.6.

(iv) Whether, based on §7.1 and §7.10, the MCL was violated at any monitoring location.

(v) Any operational evaluation levels that were exceeded during the quarter and, if so, the location and date, and the calculated TTHM and HAA5 levels.

(2) If you are a §5.0 system seeking to qualify for or remain on reduced TTHM/HAA5 monitoring, you must report the following source water TOC information for each treatment plant that treats surface water or ground water under the direct influence of surface water to the Director within 10 days of the end of any quarter in which monitoring is required:

(i) The number of source water TOC samples taken each month during last quarter.

(ii) The date and result of each sample taken during last quarter.

(iii) The quarterly average of monthly samples taken during last quarter or the result of the quarterly sample.

(iv) The running annual average (RAA) of quarterly averages from the past four quarters.

(v) Whether the RAA exceeded 4.0 mg/L.

(3) The Director may choose to perform calculations and determine whether the MCL was exceeded or the system is eligible for reduced monitoring in lieu of having the system report that information

(b) **Recordkeeping**. You must retain any §7.10 monitoring plans and your §7.10 monitoring results as required by §11.0.

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SECTION 8.0 (RESERVED)

SECTION 9.0 - ASSURANCE OF SAFETY IN PUBLIC SUPPLY

9.1 **General Requirement.** Any person maintaining a PWS shall operate and maintain the water supply facilities so that the water furnished the public is safe and potable.

9.2 **Contamination of Tanks**

(a) **Connected to Unsafe Supplies.** Any person who maintains a PWS connection to a tank which is also supplied with water from a water system found by the Director to be unsafe shall maintain the tank open to atmospheric pressure, and the public water supply pipe shall terminate at least two (2) pipe diameters above the maximum level of water in the tank. The tank overflow shall be of adequate size to fix definitely the maximum level.

(b) **Avoidance of Contamination in Tanks.** Any person who is furnished water from a PWS and maintains a tank supplied only by such water shall have such tank so constructed and maintained to prevent contaminants from gaining access to the tank interior.

9.3 **Connections Between Distribution Systems**

(a) No person shall maintain a physical connection joining a PWS with any other water system, unless such connection is approved by the Director.

(b) It is the responsibility of the PWS to register all existing or proposed connections between the PWS and any other water supply with the Director on or before January 1, 1992 or as they are proposed or discovered, whichever is later.

9.4 **Cross-Connection Control**

(a) **Applicability.** Pursuant to the provisions of §46-13-22 of the General Laws of Rhode Island, as amended, the Department has adopted regulation to protect public water system distribution and transmission infrastructures from contamination through cross-connections. All community and non-transient, non-community public water system are required to comply with the provisions of this subsection and self-certify to the Department of the preparation and implementation of a plan, detailing their cross-connection control program. The containment approach shall be used, requiring the installation of backflow preventers at all newly constructed service connections prior to the provision of water service and at all pre-existing residential and non-residential service connections. This regulation is not intended to replace or infringe on State plumbing code regarding cross-connections downstream of the service connection.

(b) **Cross-Connections.** No actual or potential connections between a public drinking water system and a source of contamination shall be permitted unless a backflow preventer, commensurate with the degree of hazard, is installed in accordance with this section. When feasible, existing cross-connections shall be promptly eliminated. Public water systems may not be designed or constructed in a manner, which creates a cross-connection.

(c) **Required Plan Components.** Each plan must be prepared in accordance with current State approved guidance and shall include, at a minimum, the following ten elements:

(1) **Authority.** As authorized by this regulation, cross-connection control ordinance adopted at the local level establishing legal authority for the public water system to implement their cross-connection control program.

(2) **Policy.** Statement of program purpose and policy regarding cross-connection control.

(3) **Responsibilities.** Outline the responsibilities and requirements of all involved parties (e.g. water system, customers, local and state officials).

(4) **Administration.** Planning and implementation of the program, determination of level of hazard, and suitable timetables for:

(i) Identification. Surveying new and existing service connections, determining levels of hazard, and selecting appropriate backflow preventers by a certified cross-connection surveyor. All preventers shall be equal to or greater than the highest degree of hazard on any internal backflow preventer. Completion of this requirement shall take no longer than five (5) years after the plan certification date.

(ii) Elimination. Completion of necessary corrections or removal of actual or potential cross-connections, taking into consideration the degree of hazard involved and the time required to obtain and to install the appropriate backflow preventer.

(iii) Inspection. Inspection and/or testing of backflow preventers by a certified backflow preventer inspector/tester.

(5) **Required Records.**

(i) Master list of service connections relying upon approved backflow preventers to protect the public water system.

(ii) Inventory information on approved air gaps or backflow preventers to include a description, installation date, history of inspections, tests, and repairs, test results, and the name of the inspector/tester.

(iii) Program summary reports and backflow incident reports.

(6) **Enforcement Policy.** Public water systems are authorized to terminate water service to any customer who fails to complete any corrective action deemed necessary upon due notice or refuses access for the inspection of the service connection by a representative of the system. No more than forty-five (45) days shall be allowed for the correction of a low-level hazard and ten (10) days for a condition involving a moderate or high-level hazard unless an extension is granted by the water supplier. Service shall be immediately terminated if access is refused to any location for the inspection of the service connection or if an immediate hazard is posed.

(7) **Quality Assurance and Control.** A program to include documentation of tester and surveyor certification, selection of field test equipment, test kit calibration, test report contents, and time frames for submission of completed test reports.

(8) **Templates.** Standardized survey forms, reports, and notifications used by the water supplier.

(9) **Public Education.** A program to educate customers on, at a minimum, thermal expansion in closed loop systems and limitations on the protection of water downstream of the service connection.

(10) **Response.** Procedures for responding to backflow incidents.

(d) **Approved References.** The development and implementation of cross-connection control programs must reflect the guidance provided in the most recently published editions of references such as, but not limited to, those listed below:

(1) *Cross Connection Manual*, USEPA.

(2) *Manual of Cross-Connection Control*, USC-FCCCHR

(3) *Recommended Practice for Backflow Prevention and Cross-Connection Control (M14)*, AWWA.

(4) Other references approved by the Director.

(e) **Training and Certification of Personnel.** Any individual conducting work or tests on a backflow preventer, surveying for cross-connections, or drafting (reviewing and approving) plans/programs must hold a current certification from a program recognized by the Director, appropriate to the responsibilities and skill required.

(1) Two (2) functional classes of certification are recognized: Inspector/Tester and Surveyor.

(i) Inspectors/Testers shall have completed a basic level certification course that covers the inspection, cleaning, and basic repair, maintenance, and testing of backflow preventers and are limited to performing these tasks.

(ii) Surveyors shall have completed a basic level certification course that covers surveying facilities for cross-connections, determination of hazard levels, drafting of plans/ programs, and selection of appropriate backflow preventers and are limited to performing these tasks and the approval/disapproval of cross-connections.

(2) Though strongly advised, the program administrator is not required to possess certification in cross-connection control.

(3) All backflow preventers shall be installed by a Rhode Island licensed plumber, except for those installed on fire protection systems, which shall be in accordance with the provisions of the Rhode Island Fire Safety Code.

(f) **Approved Backflow Preventers.** All backflow preventers shall be approved by the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California (FCCCHR-USC) and/or the American Society of Sanitary Engineers (ASSE).

(g) **Certification of Plan Compliance.** Submission of cross-connection control plans to the Director is not required. All community and non-transient, non-community public water systems shall certify to the director that their plan meets or exceeds the requirements of this regulation in accordance with the following schedule:

(1) Community and non-transient, non-community public water systems serving more than five hundred (500) people shall submit certification of compliance no later than June 30, 2009 and implement said plan immediately thereafter.

(2) Community and non-transient, non-community public water systems serving five hundred (500) people or fewer shall submit certification of compliance no later than June 30, 2012 and implement said plan immediately thereafter.

(3) Transient, non-community public water systems are not required to implement cross-connection control programs as described in this subsection but must still comply with cross-connection related requirements of the State plumbing code.

(h) **Dual-Sources.** The potable water distribution system of any building or premises must be connected to a public water supply when available. In the event that a building or premises is serviced by both a public supply and a private water source over which the public water supply system officials do not have sanitary control (i.e. between municipal water and a private well or a reclaimed or recycled water system), direct cross-connections between the two supplies are prohibited. An air gap between the systems shall be maintained at all times. In no event shall

the private source ever supply the distribution system served by the public water supply. All dual-source facilities must be considered a high hazard and have the appropriate backflow preventer installed at the service connection.

(i) **Transfer of Real Estate**. The installation of backflow preventers shall not be made a mandatory condition of a transfer of a residential property constructed prior to July 2, 2007.

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SECTION 10.0 - CORRECTION OF UNSAFE CONDITIONS

10.1 When the water from a PWS is not safe or is subject to contamination, as determined by the Director, the person maintaining such PWS shall take immediate action to correct sanitary defects, improve operation, provide necessary water treatment, or make any other changes or additions deemed necessary by the Director to provide safe water.

10.2 Any person maintaining a water system who is aware of an unsafe condition, that the water is not safe or is subject to contamination, shall notify the Director immediately.

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SECTION 11.0 - REPORTS AS TO PUBLIC SUPPLIES

11.1 Any person maintaining a PWS shall submit or cause to be submitted by operating personnel such reports of operation pertaining to the sanitary quality, treatment and output as may be required by the Director. Such operation reports shall be submitted within ten (10) days after demand and shall be accurate and complete as required by the Director. Violations of maximum contaminant levels shall be reported to the Director within 48 hours after such a determination is made unless otherwise required for specific contaminants.

11.2 It is the responsibility of the water system to collect, have analyzed, and report the results of all water quality samples required by these Regulations. Samples must be collected in accordance with a written sample siting plan. These plans are subject to the Director's review and revision.

11.3 **Reporting Requirements.**

(a) Except where a shorter period is specified in these Regulations, the supplier of water shall report to the Director the results of any test measurement or analysis required by these Regulations within:

(1) The first ten days following the month in which the result is received, or

(2) The first ten days following the end of the required monitoring period as stipulated by the Director, whichever of these is shortest.

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

(c) The supplier of water is not required to report analytical results to the Director in cases where the Rhode Island Department of Health Laboratory performs the analysis and reports the results to the Rhode Island Department of Health – Office of Drinking Water Quality.

(d) The public water system, within 10 days of completing the public notification requirements under Subpart Q of this part for the initial public notice and any repeat notices, must submit to the these Regulations 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.

(e) The water supply system shall submit to the Director within the time stated in the request copies of any records required to be maintained under this section.

11.4 **Record Maintenance.** Any owner or operator of a public water system subject to the provisions of these Regulations shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of microbiological analyses and turbidity analyses made pursuant to these Regulations shall be kept for not less than five (5) years. Records of chemical analyses made pursuant to these Regulations shall be kept for not less than ten (10) years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

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

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.

(e) Copies of public notices issued pursuant to §16.8 and certifications made to the Director pursuant to this section must be kept for three years after issuance.

(f) Copies of monitoring plans developed pursuant to these Regulations shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under §11.4(a), except as specified elsewhere in these Regulations.

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SECTION 12.0 - CERTIFIED LABORATORIES

12.1 For the purpose of determining compliance with these Regulations, only analyses carried out by the Department of Health or in a laboratory certified by the Department of Health, EPA, or by reciprocity with another state will be considered with the exception of alkalinity, calcium, conductivity, disinfectant residual, orthophosphate, pH, silica, temperature and turbidity, which must be carried out by a party approved by the Director.

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SECTION 13.0 - GROUND WATER RULE

13.1 General requirements and applicability.
13.2 Sanitary surveys for ground water systems.
13.3 Ground water source microbial monitoring and analytical methods.
13.4 Treatment technique requirements for ground water systems.
13.5 Treatment technique violations for ground water systems.
13.6 Reporting and recordkeeping for ground water systems.

13.1 General Requirements and Applicability.

(a) **Scope.** The requirements of this section constitute National Primary Drinking Water Regulations.

(b) **Applicability.** This section applies to all public water systems that use ground water except that it does not apply to public water systems that combine all of their ground water with surface water or with ground water under the direct influence of surface water prior to treatment under §5.0. For the purposes of this section, "ground water system" is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.

(c) **General Requirements.** Systems subject to this section must comply with the following requirements:

(1) Sanitary survey information requirements for all ground water systems as described in §13.2.

(2) Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 percent (4-log) treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in §13.3.

(3) Treatment technique requirements, described in §13.4, that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under §13.3, or that have significant deficiencies that are identified by the Director or that are identified by EPA under SDWA section 1445. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this section must implement one or more of the following corrective action options: correct all significant deficiencies; provide an alternate source of water; eliminate the source of contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer.

(4) Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in §13.4(b).

(5) If requested by the Director, ground water systems must provide the Director with any existing information that will enable the Director to perform a hydrogeologic sensitivity assessment. For the purposes of this subpart, "hydrogeologic sensitivity assessment" is a

determination of whether ground water systems obtain water from hydrogeologically sensitive settings.

(d) **Compliance Date:** Ground water systems must comply, unless otherwise noted, with the requirements of this section beginning December 1, 2009.

13.2 **Sanitary Surveys for Ground Water Systems.**

(a) Ground water systems must provide the Director, at the Director's request, any existing information that will enable the Director to conduct a sanitary survey.

(b) For the purposes of this section, a "sanitary survey," as conducted by the Director, includes but is not limited to, an onsite review of the water source(s) (identifying sources of contamination by using results of source water assessments or other relevant information where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water.

(c) The sanitary survey must include an evaluation of the applicable components listed in §13.2(c)(1) through (8):

(1) Source,

(2) Treatment,

(3) Distribution system,

(4) Finished water storage,

(5) Pumps, pump facilities, and controls,

(6) Monitoring, reporting, and data verification,

(7) System management and operation, and

(8) Operator compliance with Director requirements.

13.3 **Ground Water Source Microbial Monitoring and Analytical Methods.**

(a) **Triggered Source Water Monitoring**

(1) **General Requirements.** A ground water system must conduct triggered source water monitoring if the conditions identified in §13.3(a)(1)(i) and (a)(1)(ii) exist.

(i) The system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and

(ii) The system is notified that a sample collected under §16.4(a) is total coliform-positive and the sample is not invalidated under §16.4(f).

(2) **Sampling Requirements.** A ground water system must collect, within 24 hours of notification of the total coliform-positive sample, at least one ground water source sample from each ground water source in use at the time the total coliform-positive sample was collected under §16.4(a), except as provided in §13.3(a)(2)(ii).

(i) The Director may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Director must specify how much time the system has to collect the sample.

(ii) If approved by the Director, systems with more than one ground water source may meet the requirements of §13.3(a)(2) by sampling a representative ground water source or sources. If directed by the Director, systems must submit for Director approval a triggered source water monitoring plan that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under §16.4(a) and that the system intends to use for representative sampling under this paragraph.

(iii) A ground water system serving 1,000 people or fewer may use a repeat sample collected from a ground water source to meet both the requirements of §16.4(d) and to satisfy the monitoring requirements of §13.3 (a)(2) for that ground water source only if the Director approves the use of *E. coli* as a fecal indicator for source water monitoring under §13.3(a). If the repeat sample collected from the ground water source is *E.coli* positive, the system must comply with §13.3 (a)(3).

(3) **Additional Requirements.** If the Director does not require corrective action under §13.4(a)(2) for a fecal indicator-positive source water sample collected under §13.3(a)(2) that is not invalidated under §13.3(d), the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample.

(4) **Consecutive and Wholesale Systems**

(i) In addition to the other requirements of §13.3(a), a consecutive ground water system that has a total coliform-positive sample collected under §16.4(a) must notify the wholesale system(s) within 24 hours of being notified of the total coliform-positive sample.

(ii) In addition to the other requirements of §13.3(a), a wholesale ground water system must comply with §13.3(a)(4)(ii)(A) and (a)(4)(ii)(B).

(A) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under §16.4(a) is total coliform-positive must, within 24 hours of being notified, collect a sample from its ground water source(s) under §13.3(a)(2) and analyze it for a fecal indicator under §13.3(c).

(B) If the sample collected under §13.3(a)(4)(ii)(A) is fecal indicator-positive, the wholesale ground water system must notify all consecutive systems served by that ground water source of the fecal indicator source water positive within 24 hours of being notified of the ground water source sample monitoring result and must meet the requirements of §13.3(a)(3).

(5) **Exceptions to The Triggered Source Water Monitoring Requirements.** A ground water system is not required to comply with the source water monitoring requirements of §13.3(a) if either of the following conditions exists:

(i) The Director determines, and documents in writing, that the total coliform-positive sample collected under §16.4(a) is caused by a distribution system deficiency; or

(ii) The total coliform-positive sample collected under §16.4(a) is collected at a location that meets Director criteria for distribution system conditions that will cause total coliform-positive samples.

(b) **Assessment Source Water Monitoring.** If directed by the Director, ground water systems must conduct assessment source water monitoring that meets Director-determined requirements

for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under §13.3(a)(2) to meet the requirements of §13.3(b). Director-determined assessment source water monitoring requirements may include:

(1) Collection of a total of 12 ground water source samples that represent each month the system provides ground water to the public,

(2) Collection of samples from each well unless the system obtains written Director approval to conduct monitoring at one or more wells within the ground water system that are representative of multiple wells used by that system and that draw water from the same hydrogeologic setting,

(3) Collection of a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used,

(4) Analysis of all ground water source samples using one of the analytical methods listed Appendix 1, §I-D: Analytical Methods For Source Water Monitoring, for the presence of *E. coli* , enterococci, or coliphage,

(5) Collection of ground water source samples at a location prior to any treatment of the ground water source unless the Director approves a sampling location after treatment, and

(6) Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the Director approves an alternate sampling location that is representative of the water quality of that well.

(c) **Analytical Methods.**

(1) A ground water system subject to the source water monitoring requirements of §13.3(a) must collect a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used.

(2) A ground water system must analyze all ground water source samples collected under §13.3(a) using one of the analytical methods listed in Appendix 1, §I-D: Analytical Methods For Source Water Monitoring, for the presence of *E. coli* , enterococci, or coliphage.

(d) **Invalidation of a Fecal Indicator-Positive Ground Water Source Sample.**

(1) A ground water system may obtain Director invalidation of a fecal indicator-positive ground water source sample collected under §13.3(a) only under the conditions specified in §13.3(d)(1)(i) and (ii).

(i) The system provides the Director with written notice from the laboratory that improper sample analysis occurred; or

(ii) The Director determines and documents in writing that there is substantial evidence that a fecal indicator-positive ground water source sample is not related to source water quality.

(2) If the Director invalidates a fecal indicator-positive ground water source sample, the ground water system must collect another source water sample under §13.3(a) within twenty-four (24) hours of being notified by the Director of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods in §13.3(c). The Director may extend the twenty-four (24) hour time limit on a case-by-case basis if the system cannot collect the source water sample within twenty-four (24) hours due to circumstances beyond

its control. In the case of an extension, the Director must specify how much time the system has to collect the sample.

(e) **Sampling Location.**

(1) Any ground water source sample required under §13.3(a) must be collected at a location prior to any treatment of the ground water source unless the Director approves a sampling location after treatment.

(2) If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a Director-approved location to meet the requirements of §13.3(a) if the sample is representative of the water quality of that well.

(f) **New Sources.** If directed by the Director, a ground water system that places a new ground water source into service after November 30, 2009, must conduct assessment source water monitoring under §13.3(b). If directed by the Director, the system must begin monitoring before the ground water source is used to provide water to the public.

(g) **Public Notification.** A ground water system with a ground water source sample collected under §13.3(a) or (b) that is fecal indicator-positive and that is not invalidated under §13.3(d), including consecutive systems served by the ground water source, must conduct public notification under §16.8.2.

(h) **Monitoring Violations.** Failure to meet the requirements of §13.3(a)-(f) is a monitoring violation and requires the ground water system to provide public notification under §16.8.4.

13.4 **Treatment Technique Requirements for Ground Water Systems.**

(a) **Ground Water Systems With Significant Deficiencies or Source Water Fecal Contamination.**

(1) The treatment technique requirements of this section must be met by ground water systems when a significant deficiency is identified or when a ground water source sample collected under §13.3(a)(3) is fecal indicator-positive. For the purposes of this section, significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the Director determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.

(2) If directed by the Director, a ground water system with a ground water source sample collected under §13.3(a)(2), §13.3(a)(4), or §13.3(b) that is fecal indicator-positive must comply with the treatment technique requirements of this section.

(3) When a significant deficiency is identified at a public water system regulated under §5.0 that uses both ground water and surface water or ground water under the direct influence of surface water, the system must comply with provisions of §13.4 except in cases where the Director determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or ground water under the direct influence of surface water.

(4) Unless the Director directs the ground water system to implement a specific corrective action, the ground water system must consult with the Director regarding the appropriate corrective action within 30 days of receiving written notice from the Director of a significant deficiency, written notice from a laboratory that a ground water source sample collected under §13.3(a)(3) was found to be fecal indicator-positive, or direction from the

Director that a fecal indicator-positive sample collected under §13.3(a)(2), §13.3(a)(4), or §13.3(b) requires corrective action.

(5) Within one hundred and twenty (120) days (or earlier if directed by the Director) of receiving written notification from the Director of a significant deficiency, written notice from a laboratory that a ground water source sample collected under §13.3(a)(3) was found to be fecal indicator-positive, or direction from the Director that a fecal indicator-positive sample collected under §13.3(a)(2), §13.3(a)(4), or §13.3(b) requires corrective action, the ground water system must either:

(i) Have completed corrective action in accordance with applicable Director plan review processes or other Director guidance or direction, if any, including Director-specified interim measures; or

(ii) Be in compliance with a Director-approved corrective action plan and schedule subject to the conditions specified in §13.4(a)(5)(ii)(A) and (a)(5)(ii)(B).

(A) Any subsequent modifications to a Director-approved corrective action plan and schedule must also be approved by the Director.

(B) If the Director specifies interim measures for protection of the public health pending Director approval of the corrective action plan and schedule or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the Director.

(6) **Corrective Action Alternatives**. Ground water systems that meet the conditions of §13.4(a)(1) or (a)(2) must implement one or more of the following corrective action alternatives:

(i) Correct all significant deficiencies;

(ii) Provide an alternate source of water;

(iii) Eliminate the source of contamination; or

(iv) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(7) **Special Notice to The Public of Significant Deficiencies or Source Water Fecal Contamination.**

(i) In addition to the applicable public notification requirements of §16.8.2, a community ground water system that receives notice from the Director of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the Director under §13.3(d) must inform the public served by the water system under §16.10(3)(h)(6) of the fecal indicator-positive source sample or of any significant deficiency that has not been corrected. The system must continue to inform the public annually until the significant deficiency is corrected or the fecal contamination in the ground water source is determined by the Director to be corrected under §13.4(a)(5).

(ii) In addition to the applicable public notification requirements of §16.8.2, a non-community ground water system that receives notice from the Director of a significant deficiency must inform the public served by the water system in a manner approved by the Director of any significant deficiency that has not been corrected within 12

months of being notified by the Director, or earlier if directed by the Director. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:

(A) The nature of the significant deficiency and the date the significant deficiency was identified by the Director;

(B) The Director-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed; and

(C) For systems with a large proportion of non-English speaking consumers, as determined by the Director, information in the appropriate language(s) regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.

(iii) If directed by the Director, a non-community water system with significant deficiencies that have been corrected must inform its customers of the significant deficiencies, how the deficiencies were corrected, and the dates of correction under §13.4(a)(7)(ii).

(b) **Compliance Monitoring.**

(1) **Existing Ground Water Sources.** A ground water system that is not required to meet the source water monitoring requirements of this section for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for any ground water source before December 1, 2009, must notify the Director in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the specified ground water source and begin compliance monitoring in accordance with §13.4(b)(3) by December 1, 2009. Notification to the Director must include engineering, operational, or other information that the Director requests to evaluate the submission. If the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source, the system must conduct ground water source monitoring as required under §13.3.

(2) **New Ground Water Sources.** A ground water system that places a ground water source in service after November 30, 2009, that is not required to meet the source water monitoring requirements of this section because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source must comply with the requirements of §13.4(b)(2)(i), (b)(2)(ii) and (b)(2)(iii).

(i) The system must notify the Director in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the Director must include engineering, operational, or other information that the Director requests to evaluate the submission.

(ii) The system must conduct compliance monitoring as required under §13.4(b)(3) of this section within 30 days of placing the source in service.

(iii) The system must conduct ground water source monitoring under §13.3 if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(3) **Monitoring Requirements.** A ground water system subject to the requirements of §§13.4(a), (b)(1) or (b)(2) must monitor the effectiveness and reliability of treatment for that ground water source before or at the first customer as follows:

(i) **Chemical Disinfection.**

(A) **Ground Water Systems Serving Greater Than 3,300 People.** A ground water system that serves greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods specified in §16.2(19)(viii) at a location approved by the Director and must record the lowest residual disinfectant concentration each day that water from the ground water source is served to the public. The ground water system must maintain the Director-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. If there is a failure in the continuous monitoring equipment, the ground water system must conduct grab sampling every four hours until the continuous monitoring equipment is returned to service. The system must resume continuous residual disinfectant monitoring within 14 days.

(B) **Ground Water Systems Serving 3,300 or Fewer People.** A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods specified in §16.2(19)(viii) at a location approved by the Director and record the residual disinfection concentration each day that water from the ground water source is served to the public. The ground water system must maintain the Director-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. The ground water system must take a daily grab sample during the hour of peak flow or at another time specified by the Director. If any daily grab sample measurement falls below the Director-determined residual disinfectant concentration, the ground water system must take follow-up samples every four (4) hours until the residual disinfectant concentration is restored to the Director-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of §13.4(b)(3)(i)(A).

(ii) **Membrane Filtration.** A ground water system that uses membrane filtration to meet the requirements of this section must monitor the membrane filtration process in accordance with all Director-specified monitoring requirements and must operate the membrane filtration in accordance with all Director-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when:

(A) The membrane has an absolute molecular weight cut-off (MWCO), or an alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;

(B) The membrane process is operated in accordance with Director-specified compliance requirements; and

(C) The integrity of the membrane is intact.

(iii) **Alternative Treatment.** A ground water system that uses a Director-approved alternative treatment to meet the requirements of this subpart by providing at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer must:

(A) Monitor the alternative treatment in accordance with all Director-specified monitoring requirements; and

(B) Operate the alternative treatment in accordance with all compliance requirements that the Director determines to be necessary to achieve at least 4-log treatment of viruses.

(c) **Discontinuing Treatment.** A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the Director determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring and analytical methods requirements of §13.3.

(d) Failure to meet the monitoring requirements of §13.4(b) is a monitoring violation and requires the ground water system to provide public notification under §16.8.4.

13.5 **Treatment Technique Violations for Ground Water Systems.**

(a) A ground water system with a significant deficiency is in violation of the treatment technique requirement if, within one hundred and twenty (120) days (or earlier if directed by the Director) of receiving written notice from the Director of the significant deficiency, the system:

(1) Does not complete corrective action in accordance with any applicable Director plan review processes or other Director guidance and direction, including Director specified interim actions and measures, or

(2) Is not in compliance with a Director-approved corrective action plan and schedule.

(b) Unless the Director invalidates a fecal indicator-positive ground water source sample under §13.3(d), a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Director) of meeting the conditions of §13.4(a)(1) or §13.4(a)(2), the system:

(1) Does not complete corrective action in accordance with any applicable Director plan review processes or other Director guidance and direction, including Director-specified interim measures, or

(2) Is not in compliance with a Director-approved corrective action plan and schedule.

(c) A ground water system subject to the requirements of §13.4(b)(3) that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.

(d) A ground water system must give public notification under §16.8.3 for the treatment technique violations specified in §13.5(a), (b) and (c).

13.6 **Reporting and Recordkeeping for Ground Water Systems.**

(a) **Reporting.** In addition to the requirements of §11.0, a ground water system regulated under this section must provide the following information to the Director:

(1) A ground water system conducting compliance monitoring under §13.4(b) must notify the Director any time the system fails to meet any Director-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system must notify the Director as soon as possible, but in no case later than the end of the next business day.

(2) After completing any corrective action under §13.4(a), a ground water system must notify the Director within 30 days of completion of the corrective action.

(3) If a ground water system subject to the requirements of §13.3(a) does not conduct source water monitoring under §13.3(a)(5)(ii), the system must provide documentation to the Director within thirty (30) days of the total coliform positive sample that it met the Director criteria.

(b) **Recordkeeping.** In addition to the requirements of §11.0, a ground water system regulated under this section must maintain the following information in its records:

(1) Documentation of Corrective Actions. Documentation shall be kept for a period of not less than ten years.

(2) Documentation of Notice to the Public as required under §13.4(a)(7). Documentation shall be kept for a period of not less than three (3) years.

(3) Records of decisions under §13.3(a)(5)(ii) and records of invalidation of fecal indicator-positive ground water source samples under §13.3(d). Documentation shall be kept for a period of not less than five (5) years.

(4) For consecutive systems, documentation of notification to the wholesale system(s) of total-coliform positive samples that are not invalidated under §16.4(f). Documentation shall be kept for a period of not less than five (5) years.

(5) For systems, including wholesale systems, that are required to perform compliance monitoring under §13.4(b):

(i) Records of the Director-specified minimum disinfectant residual. Documentation shall be kept for a period of not less than ten years.

(ii) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the Director-prescribed minimum residual disinfectant concentration for a period of more than four (4) hours. Documentation shall be kept for a period of not less than five (5) years.

(iii) Records of Director-specified compliance requirements for membrane filtration and of parameters specified by the Director for Director-approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation shall be kept for a period of not less than five (5) years.

SECTION 14.0 - CONSECUTIVE WATER SYSTEM MONITORING

14.1 These regulations shall also pertain to a PWS which is supplied by another PWS except as specifically modified by the Director and agreed upon by the EPA Administrator.

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SECTION 15.0 - VARIANCES AND EXEMPTIONS

15.1 Variances and exemptions to these Regulations may be granted by the Director in accordance with Chapter 42-35 of the Rhode Island General Laws of 1956, as amended and if deemed applicable by the Director the provisions of Sections 300g-4 and 300g-5 of 42 USC et seq. (Section 1415 variances to regulations promulgated pursuant to the SDWA and Section 1416 exemptions to regulations promulgated pursuant to the SDWA of Public Law 93-523 as amended).

15.1.1 Variances pursuant to §1415 may be granted as follows:

(a) The Director may grant variances from an applicable national primary drinking water regulation to a PWS which, because of characteristics of the raw water sources which are reasonably available to the system, cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulation. A variance may be issued to a system on condition that the system install the best technology, treatment techniques, or other means, which the Director finds are available (taking costs into consideration) and based upon an evaluation satisfactory to the Director that indicates that alternative sources of water are not reasonably available to the system.

Before the Director may grant a variance under §15.1.1(a), the Director must find that the variance will not result in an unreasonable risk to health. If the Director grants a PWS a variance under §15.1.1(a), the Director shall prescribe at the time the variance is granted, a schedule for:

(i) compliance (including increments of progress) by the PWS with each contaminant level requirement with respect to which the variance was granted, and

(ii) implementation by the PWS of such additional control measures as the State may require for each contaminant, subject to such contaminant level requirement, during the period ending on the date compliance with such requirement is required. Before a schedule prescribed pursuant to §15.1.1(a), may take effect, the Director shall provide notice and opportunity for a public hearing on the schedule. A schedule prescribed pursuant to §15.1.1(a), for a PWS granted a variance shall require compliance by the system with each contaminant level requirement with respect to which the variance was granted as expeditiously as practicable.

(b) The Director may grant variances from any provisions of a national primary drinking water regulation which requires the use of a specified treatment technique with respect to a contaminant if the PWS applying for the variance demonstrates to the satisfaction of the Director that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system. A variance granted under §15.1.1(b), shall be conditioned on such monitoring and other requirements as the Director may prescribe.

(c) Before a variance proposed to be granted by the Director under §15.1.1(a) or (b) may take effect, the Director shall provide notice and opportunity for public hearing on the proposed variance. The Director shall promptly notify the Administrator of all variances that are granted. Such notification shall contain the reason for the variance [and in the case of a variance under §15.1.1(a), the basis for the finding required by §15.1.1(a), before the granting of the variance] and documentation of the need for the variance.

(d) Each PWS's variance granted under §15.1.1(a) shall be conditioned upon compliance by the PWS with the schedule prescribed by the Director pursuant to that Subparagraph.

(e) For such variance issued under this Subparagraph, the Director

(1) must document all findings that are required under Section 1415(a) of the SDWA.

(2) If the Director prescribes a schedule pursuant to §15.1.1(a) requiring compliance with a contaminant level for which the variance is granted later than five (5) years from the date of issuance of the variance the Director must

(i) document the rationale for the extended compliance schedule;

(ii) discuss the rationale for the extended compliance schedule in the required public notice and opportunity for public hearing; and

(iii) provide the shortest practicable time schedule feasible under the circumstances.

(f) **Variances for Small Systems**

General Provisions

(1) What is a small system variance?

Small system variances are variances from the requirement to comply with a maximum contaminant level or treatment technique to systems serving fewer than 10,000 persons. The purpose of this subpart is to provide the procedures and criteria for obtaining these variances.

(2) Who can issue a small system variance?

A small system variance under this subpart may only be issued by the Director.

(3) Which size PWSs can receive a small system variance?

(a) The Director may grant a small system variance to PWSs serving 3,300 or fewer persons.

(b) With the approval of the EPA Regional Administrator, the Director may grant a small system variance to PWSs serving more than 3,300 persons but fewer than 10,000 persons.

(c) In determining the number of persons served by the PWS, persons served by consecutive systems must be included. A small system variance granted to a PWS would also apply to any consecutive system served by it.

(4) For which of the regulatory requirements is a small system variance available?

(a) A small system variance is not available under §15.0 for a national primary drinking water regulation for a microbial contaminant (including a bacterium, virus, or other organism) or an indicator or treatment technique for a microbial contaminant.

(b) A small system variance under §15.0 is otherwise only available for compliance with a requirement specifying a maximum contaminant level or treatment technique for a contaminant with respect to which:

(1) a national primary drinking water regulation was promulgated on or after January 1, 1986; and

(2) the Administrator has published a small system variance technology pursuant to Section 1412(b)(15) of the SDWA.

Note to §15.1.1(b)(1): Small system variances are not available for any PWS above the pre-1986 maximum contaminant level even if subsequently revised. If

the agency revises a pre-1986 maximum contaminant level and makes it more stringent, then a variance would be available for that contaminant, but only up to the pre-1986 maximum contaminant level.

(5) When can a small system variance be granted by the Director?

No small system variance can be granted by the Director until the later of the following:

(a) Ninety (90) days after the Director proposed to grant the small system variance;

(b) If the Director is proposing to grant a small system variance to a PWS serving 3,300 or fewer persons and the Administrator objects to the small system variance, the date on which the Director makes the recommended modifications or responds in writing to each objection; or

(c) If the Director is proposing to grant a small system variance to a PWS serving a population more than 3,300 and fewer than 10,000 persons, the date the Administrator approves the small system variance. The Administrator must approve or disapprove the variance within ninety (90) days after it is submitted to the Administrator for review.

Review of Small System Variance Application

(6) What are the responsibilities of the PWS, Director, and the Administrator in ensuring that sufficient information is available and for evaluation of a small system variance application?

(a) A PWS requesting a small system variance must provide accurate and correct information to the Director to issue a small system variance in accordance with this subpart.

(b) Based upon an application for a small system variance and other information, and before a small system variance may be proposed under this subpart, the Director must find and document the following:

(1) The PWS is eligible for a small system variance pursuant to §15.1.1(f)(3) (i.e., the system serves a population of fewer than 10,000 persons) and (f)(4) (i.e., the contaminant for which the small system variance is sought is not excluded from variance eligibility);

(2) The PWS cannot afford to comply, in accordance with the affordability criteria established by the Director, with the national primary drinking water regulation for which a small system variance is sought, including by:

(i) Treatment;

(ii) Alternative sources of water supply;

(iii) Restructuring or consolidation changes, including ownership change and/or physical consolidation with another PWS; or

(iv) Obtaining financial assistance;

(3) The PWS meets the source water quality requirements for installing the small system variance technology;

(4) The PWS is financially and technically capable of installing, operating and maintaining the applicable small system variance technology; and

(5) The terms and conditions of the small system variance, as developed through compliance with §15.1.1(f)(7) ensure adequate protection of human health, considering the following:

(i) The quality of the source water for the PWS; and

(ii) Removal efficiencies and expected useful life of the small system variance technology.

(7) What terms and conditions must be included in a small system variance?

(a) The Director must clearly specify enforceable terms and conditions of a small system variance.

(b) The terms and conditions of a small system variance issued under this subpart must include, at a minimum, the following requirements:

(1) Proper and effective installation, operation, and maintenance of the applicable small system variance technology taking into consideration any relevant source water characteristics and any other site-specific conditions that may affect proper and effective operation and maintenance of the technology;

(2) Monitoring requirements, for the contaminant for which a small system variance is sought; and

(3) Any other terms or conditions that are necessary to ensure adequate protection of public health, which may include:

(i) Public education requirements; and

(ii) Source water protection requirements.

(c) The Director must establish a schedule for the PWS to comply with the terms and conditions of the small system variance which must include, at a minimum, the following requirements:

(1) Increments of progress, such as milestone dates for the PWS to apply for financial assistance and begin capital improvements;

(2) Quarterly reporting to the Director of the PWS's compliance with the terms and conditions of the small system variance;

(3) Schedule for the Director to review the small system variance under §15.1.1(d); and

(4) Compliance with the terms and conditions of the small system variance as soon as practicable but not later than three (3) years after the date on which the small system variance is granted. The Director may allow up to two (2) additional years if the Director determines that additional time is necessary for the PWS to:

(i) Complete necessary capital improvements to comply with the small system variance technology, secure an alternative source of water, or restructure or consolidate; or

(ii) Obtain financial assistance.

(d) The Director must review each small system variance granted not less often than every five (5) years after the compliance date established in the small system variance to determine whether the PWS continues to meet the eligibility criteria and remains

eligible for the small system variance and is complying with the terms and conditions of the small system variance. If the PWS would no longer be eligible for a small system variance, the Director must determine whether continuing the variance is in the public interest. If the Director finds that continuing the variance is not in the public interest, the variance must be withdrawn.

Public Participation

(8) What public notice is required before the Director proposes to issue a small system variance?

(a) At least fifteen (15) days before the date of proposal, and at least thirty (30) days prior to a public meeting to discuss the proposed small system variance, the Director, or PWS as directed by the Director, must provide notice to persons served by the PWS. For billed customers, identified in §15.1.1(a)(1), this notice must include the information listed in §15.1.1(c).

For other persons regularly served by the system, identified in §15.1.1(a)(2), the notice shall include the information identified in §15.1.1(d). Notice must be provided to all persons served by:

(1) Direct mail or other home delivery to billed customers or other service connections; and

(2) Any other method reasonably calculated to notify, in a brief and concise manner, other persons regularly served by the system. Such methods may include publication in a local newspaper, posting in public places, or delivery to community organizations.

(b) At the time of proposal, the Director must publish a notice in a newspaper or newspapers of wide circulation in the State. This notice shall include the information listed in §15.1.1(c).

(c) The notice in §§15.1.1(a)(1) and (b) must include, at a minimum, the following:

(1) Identification of the contaminant(s) for which a small system variance is sought;

(2) A brief statement of the health effects associated with the contaminant(s) for which a small system variance is sought using language in §16.10;

(3) The address and telephone number at which interested persons may obtain further information concerning the contaminant and the small system variance;

(4) A brief summary, in easily understandable terms, of the terms and conditions of the small system variance;

(5) A description of the consumer petition process under §15.1.1(f)(10) and information on contacting the EPA Regional Office;

(6) A brief statement announcing the public meeting required under §15.1.1(f)(9)(a), including a statement of the purpose of the meeting, information regarding the time and location for the meeting and the address and telephone number at which interested persons may obtain further information concerning the meeting; and

(7) In communities with a large proportion of non-English-speaking residents, as determined by the Director, information in the appropriate language regarding the content and importance of the notice.

(d) The notice in §15.1.1(a)(2) must provide sufficient information to alert readers to the proposed variance and direct them where to receive additional information.

(e) At his option, the Director or the Administrator may choose to issue separate notices or additional notices related to the proposed small system variance, provided that the requirements in §§15.1.1(a) through (d) are satisfied.

(f) Prior to promulgating the final variance, the Director must respond in writing to all significant public comments received relating to the small system variance. Response to public comment and any other documentation supporting the issuance of a variance must be made available to the public after final promulgation.

(9) What are the public meeting requirements associated with the proposal of a small system variance?

(a) The Director must provide for at least one (1) public meeting on the small system variance no later than fifteen (15) days after the small system variance is proposed.

(b) At the time of the public meeting, the Director must prepare and make publicly available, in addition to the information listed in §15.1.1(f)(8)(c) either:

(1) The proposed small system variance, if the public meeting occurs after proposal of the small system variance; or

(2) A draft of the proposed small system variance, if the public meeting occurs prior to proposal of the proposed small system variance.

(c) Notice of the public meeting must be provided in the manner required under §15.1.1(f)(8) at least thirty (30) days in advance of the public meeting. This notice must be provided by the Director or the PWS as directed by the Director.

(10) How can a person served by the PWS obtain EPA review of a small system variance proposed by the Director?

(a) Any person served by the PWS may petition the Administrator to object to the granting of a small system variance within 30 days after the Director proposes to grant a small system variance for a PWS.

(b) The Administrator must respond to a petition filed by any person served by the PWS and determine whether to object to the small system variance no later than 60 days after the receipt of the petition.

<u>EPA Review and Approval of Small System Variances</u>

(11) What procedures allow the Administrator to object to a proposed small system variance or overturn a granted small system variance for a PWS serving 3,300 or fewer persons?

(a) At the time the Director proposes to grant a small system variance under this subpart, the Director must submit to the Administrator the proposed small system variance and all supporting information, including any written public comments received prior to proposal.

(b) The Administrator may review and object to any proposed small system variance within ninety (90) days of receipt of the proposed small system variance. The Administrator must notify the Director in writing of each basis for the objection and propose a modification to the small system variance to resolve the concerns of the Administrator. The Director must make the recommended modification, respond in

writing to each objection, or withdraw the proposal to grant the small system variance.

(c) If the Director issues the small system variance without resolving the concerns of the Administrator, the Administrator may overturn the decision to grant the variance if the Administrator determines that the Director's decision does not comply with the Safe Drinking Water Act or this rule.

(12) What EPA action is necessary when the Director proposes to grant a small system variance to a PWS serving a population of more than 3,300 and fewer than 10,000 persons?

(a) At the time the Director proposes to grant a small system variance to a PWS serving a population of more than 3,300 and fewer than 10,000 persons, the Director must submit the proposed small system variance and all supporting information, including public comments received prior to proposal, to the Administrator.

(b) The Administrator must approve or disapprove the small system variance within ninety (90) days of receipt of the proposed small system variance and supporting information. The Administrator must approve the small system variance if it meets each requirement within the Act and this rule.

(c) If the Administrator disapproves the small system variance, the Administrator must notify the Director in writing of the reasons for disapproval and the small system variance does not become effective. The Director may resubmit the small system variance for review and approval with modifications to address the objections stated by the Administrator.

15.1.2 **Exemptions Pursuant to §1416 of the Safe Drinking Water Act**

(a) Exemptions may be granted by the Director from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable national primary drinking water regulation upon a finding that:

(1) Due to compelling factors (which may include economic factors, including qualification of the PWS as a system serving a disadvantaged community), the PWS is unable to comply with such contaminant level or treatment technique requirement or to implement measures to develop an alternative source of water supply;

(2) The PWS was in operation on the effective date of such contaminant level or treatment technique requirement or for a system that was not in operation by that date, only if no reasonable alternative source of drinking water is available to such new system;

(3) The granting of the exemption will not result in an unreasonable risk to health; and

(4) Management or restructuring changes (or both) cannot reasonably be made that will result in compliance or, if compliance cannot be achieved, improve the quality of the drinking water.

(b) If the Director grants a PWS an exemption under §15.1.2(a), the exemption shall include a schedule which includes the items listed in this Paragraph. Before a schedule prescribed by the Director pursuant to this subsection may take effect, the Director shall provide notice and opportunity for a public hearing on the schedule.

(1) The Director shall prescribe, at the time the exemption is granted, a schedule for:

(A) Compliance (including increments of progress or measures to develop an alternative source of water supply) by the PWS with each contaminant level requirement or treatment technique requirement with respect to which the exemption was granted, and

(B) Implementation by the PWS of such control measures as the Director may require for each contaminant, subject to such contaminant level requirement or treatment technique requirement, during the period ending on the date compliance with such requirement is required.

(2) A schedule prescribed pursuant to this subsection for a PWS granted an exemption under §15.1.2(a) shall require the following:

(A) Compliance by the system with each contaminant level and treatment technique requirement with respect to which the exemption was granted as expeditiously as practicable but not later than three (3) years after the otherwise applicable compliance date.

(B) No exemption shall be granted unless the PWS establishes that the system is taking all practicable steps to meet the standard; and

(i) the system cannot meet the standard without capital improvements which cannot be completed prior to the otherwise applicable compliance date;

(ii) 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 assistance is reasonably likely to be available within the period of the exemption; or

(iii) the system has entered into an enforceable agreement to become a part of a regional PWS.

(C) In the case of a system which does not serve more than a population of 3,300 and which needs financial assistance for the necessary improvements, an exemption granted under clause (i) or (ii) of §15.1.2(b)(2)(B) may be renewed for one (1) or more additional two (2)-year periods, but not to exceed a total of 6 years, if the system establishes that it is taking all practicable steps to meet the requirements of §15.1.2(b)(2)(B).

(D) **Limitation** - A PWS may not receive an exemption under this Section if the system was granted a variance under §15.1.1.

(3) Each PWS's exemption granted by the Director under §15.1.2(a) shall be conditioned upon compliance by the PWS with the schedule prescribed pursuant to this subsection.

(c) The Director shall promptly notify the Administrator of the granting of all exemptions. Such notification shall contain the reasons for the exemption and document the need for the exemption.

(d) The Director must document all findings that are required under §1416 of the Act:

(1) Before finding that management and restructuring changes cannot be made, the Director must consider the following measures, and the availability of State Revolving Loan Fund assistance, or any other Federal or State program, that is reasonably likely to be available within the period of the exemption to implement these measures:

(A) Consideration of rate increases, accounting changes, the appointment of a State-certified operator under the State's Operator Certification program, contractual agreements for joint operation with one (1) or more PWSs;

(B) Activities consistent with the State's Capacity Development Strategy to help the PWS acquire and maintain technical, financial, and managerial capacity to come into compliance; and

(C) Ownership changes, physical consolidation with another PWS, or other feasible and appropriate means of consolidation which would result in compliance;

(2) The Director must consider the availability of an alternative source of water, including the feasibility of partnerships with neighboring PWSs, as identified by the PWS or by the Director consistent with the Capacity Development Strategy.

15.2 Variances or exemptions from Maximum Contaminant Level (MCL) to total coliforms or from any of the treatment technique requirements of §5.0 contained herein will not be granted.

15.2.1 Exceptions to §15.2 with respect to the MCL for total coliforms can be granted if the system can demonstrate to the Director that:

A. the violation of the total coliform MCL is due to a persistent growth of total coliforms in the distribution system;

B. no fecal or pathogenic contamination exists;

C. no treatment lapse or deficiency has occurred;

D. no problem in the operation or maintenance of the distribution system exists.

15.3 Variances and exemptions from the maximum contaminant levels for organic and inorganic contaminants, radionuclides and the treatment technique for lead and copper.

(a) Community water systems and non-transient, non-community water systems shall be required to install and/or use any treatment method identified in §§16.1(t), 16.2(c) and 16.5(h) as a condition for granting a variance except as provided in §15.3(a)(1). If, after the systems's installation of the treatment method, the system cannot meet the MCL, that system shall be eligible for a variance.

(1) If a system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment methods identified in §§16.1(t), 16.2(c) and 16.5(h) would only achieve a de minimis reduction in contaminants, the Director 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.

(2) If the Director determines that a treatment method identified in §15.3(a)(1) is technically feasible, the system will be required to install and/or use that treatment method in connection with a compliance schedule. The Director's determination shall be based upon studies by the system and other relevant information.

15.4 In addition to the requirements of §15.3, a PWS may be required to use bottled water, point-of-use devices, point-of-entry devices or other means as a condition of granting a variance or an exemption to avoid an unreasonable risk to health. The Director may require a PWS to use bottled water and point-of-use devices or other means, but not point-of-entry devices, as a condition for granting an exemption from corrosion control treatment requirements for lead and copper in §§6.81

and 6.82 to avoid an unreasonable risk to health. The Director may require a PWS to use point-of-entry devices as a condition for granting an exemption for the source water and lead service line replacement requirements for lead and copper under §6.83 or §6.84 to avoid an unreasonable risk to health.

(a) A PWS that uses bottled water as a condition for receiving a variance or an exemption from the requirements of §§16.1, 16.2(a) 16.2(b) and 16.5 or an exemption from the requirements of §§6.81-6.84, must use bottled water that is approved by the Director.

(b) In requiring the use of a point-of-entry device as a condition for granting an exemption from the treatment requirements for lead and copper under §6.83 or §6.84, the Director must be assured that use of the device will not cause increased corrosion of lead and copper bearing materials located between the device and the tap that could increase contaminant levels at the tap.

15.5 At the discretion of the Director, nitrate levels not to exceed twenty (20) mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the Director that:

(a) Such water will not be available to children under six (6) months of age; and

(b) The non-community water system is meeting the public notification requirements under §16.8.9, including continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and

(c) Local and state public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and

(d) No adverse health effects shall result.

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SECTION 16.0 COMMUNITY WATER SYSTEM REQUIREMENTS

16.1 **Inorganic Chemicals**

Detection Limits For Inorganic Contaminants

Contaminant	MCL (mg/l)	Methodology	Detection limit (mg/l)
Antimony	0.006	Atomic Absorption; Furnace	0.003
		Atomic Absorption; Platform	0.0008[5]
		ICP-Mass Spectrometry	0.0004
		Hydride-Atomic Absorption	0.001
Arsenic	0.010[6]	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform-Stabilized Temperature	0.0005[7]
		Atomic Absorption; Gaseous Hydride	0.001
		ICP-Mass Spectrometry	0.0014[8]
Asbestos	7 MFL[1]	Transmission Electron Microscopy	0.01 MFL
Barium	2	Atomic Absorption; furnace technique	0.002
		Atomic Absorption; direct aspiration	0.1
		Inductively Coupled Plasma	0.002 (0.001)
Beryllium	0.004	Atomic Absorption; Furnace	0.0002
		Atomic Absorption; Platform	0.00002[5]
		Inductively Coupled Plasma[2]	0.0003
		ICP-Mass Spectrometry	0.0003
Cadmium	0.005	Atomic Absorption; furnace technique	0.0001
		Inductively Coupled Plasma	0.001
Chromium	0.1	Atomic Absorption; furnace technique	0.001
		Inductively Coupled Plasma	0.007 (0.001)

Contaminant	MCL (mg/l)	Methodology	Detection limit (mg/l)
Cyanide	0.2	Distillation, Spectrophotometric[3]	0.02
		Distillation, Automated, Spectrophotometric[3]	0.005
		Distillation, Amenable, Spectrophotometric[4]	0.02
		Distillation, Selective Electrode[3, 4]	0.05
		UV, Distillation, Spectrophotometric[9]	0.0005
		Micro Distillation, Flow Injection, Spectrophotometric[3]	0.0006
		Ligand Exchange with Amperometry[4]	0.0005
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	none	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0006[5]
		Inductively Coupled Plasma[2]	0.005
		ICP-Mass Spectrometry	0.0005
Nitrate	10 (as N)	Manual Cadmium Reduction	0.01
		Automated Hydrazine Reduction	0.01
		Automated Cadmium Reduction	0.05
		Ion Selective Electrode	1
Nitrate	10 (as N)	Ion Chromatography	0.01
		Capillary Ion Electrophoresis	0.076
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
		Capillary Ion Electrophoresis	0.103
Selenium	0.05	Atomic Absorption; furnace	0.002
		Atomic Absorption; gaseous hydride	0.002
Thallium	0.002	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0007[5]
		ICP-Mass Spectrometry	0.0003

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

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

[3] Screening method for total cyanides.

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

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

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

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

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

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

(a) Community water systems shall conduct monitoring to determine compliance with the MCLs specified in this Section. Monitoring shall be conducted as follows:

(1) Groundwater systems shall take a minimum of one (1) sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point) beginning in the initial compliance period. 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.

(2) Surface water systems shall take a minimum of one (1) sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point) beginning in the initial compliance period. The system shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

Note: For purpose of this Paragraph, surface water systems include systems with a combination of surface and ground sources.

(3) If a system draws water from more than one (1) source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(4) The Director may reduce the total number of samples which must be analyzed by allowing the use of compositing. Composite samples from a maximum of five (5) 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.

(i) 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 which exceeded one-fifth of the MCL in the composite sample. Detection limits for each analytical method are found in §16.1 above.

(ii) If the population served by the system is > 3,300 persons, then compositing may only be permitted by the Director at sampling points within a single system. In systems

serving < 3,300 persons, the Director may permit compositing among different systems provided the 5-sample limit is maintained.

(iii) If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the Director within fourteen (14) days after completing analysis of the composite sample, provided the holding time of the sample is not exceeded.

(5) The frequency of monitoring for asbestos shall be in accordance with §16.1(b); the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be in accordance with §16.1(c); the frequency of monitoring for nitrate shall be in accordance with §16.1(d); and the frequency of monitoring for nitrite shall be in accordance with §16.1(e).

(b) The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos specified in §16.1 above) shall be conducted as follows:

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

(2) If the system believes it is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply to the Director for a waiver of the monitoring requirement in §16.1(b)(1). If the Director grants the waiver, the system is not required to monitor.

(3) The Director may grant a waiver based on a consideration of the following factors:

(i) Potential asbestos contamination of the water source, and

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

(4) A waiver remains in effect until the completion of the three-year compliance period. Systems not receiving a waiver must monitor in accordance with the provisions of §16.1(b)(1).

(5) A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one (1) sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

(6) A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of §16.1(a).

(7) A system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one (1) sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

(8) A system which exceeds the maximum contaminant levels shall monitor quarterly beginning in the next quarter after the violation occurred.

(9) The Director may decrease the quarterly monitoring requirement to the frequency specified in §16.1(b)(1) provided the Director has determined that the system is reliably and consistently below the maximum contaminant level. In no case can the Director make this determination unless a groundwater system takes a minimum of two (2) quarterly samples

and a surface (or combined surface/ground) water system takes a minimum of four (4) quarterly samples.

(10) If monitoring data collected after January 1, 1990 is generally consistent with the requirements of §16.1 above then the Director may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(c) The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in §16.1 for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, thallium and selenium shall be as follows:

(1) Groundwater systems shall take one (1) sample at each sampling point during each compliance period. Surface water systems (or combines surface/ground) shall take one (1) sample annually at each sampling point.

(2) The system may apply to the Director for a waiver from the monitoring frequencies specified in §16.1(c)(1). The Director may grant a PWS a waiver for monitoring of cyanide, provided that the Director determines that the system is not vulnerable due to lack of any industrial source of cyanide.

(3) A condition of the waiver shall require that a system shall take a minimum of one (1) sample while the waiver is effective. The term during which the waiver is effective shall not exceed one (1) compliance cycle (i.e., nine (9) years).

(4) The Director may grant a waiver provided surface water systems have monitored annually for at least three (3) years and groundwater systems have conducted a minimum of three (3) rounds of monitoring. (At least one (1) sample shall have been taken since January 1, 1990). Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the maximum contaminant level. Systems that use a new water source are not eligible for a waiver until three (3) rounds of monitoring from the new source have been completed.

(5) In determining the appropriate reduced monitoring frequency, the Director shall consider:

(i) Reported concentrations from all previous monitoring;

(ii) The degree of variation in reported concentrations; and

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

(6) A decision by the Director to grant a waiver shall be made in writing and shall set forth the basis for the determination. The determination may be initiated by the Director or upon an application by the PWS. The PWS shall specify the basis for its request. The Director shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.

(7) Systems which exceed the maximum contaminant levels as calculated in §16.1(i) shall monitor quarterly beginning in the next quarter after the violation occurred.

(8) The Director may decrease the quarterly monitoring requirement to the frequencies specified in §§16.1(c)(1) and (c)(2) provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case can the Director make this

determination unless a groundwater system takes a minimum of two (2) quarterly samples and a surface water system take a minimum of four (4) quarterly samples.

(9) All new water systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL of all contaminants listed in §16.1 within a period of time specified by the Director. The system must also comply with the initial sampling frequencies specified by the Director to ensure a system can demonstrate compliance with the MCL. Routine and increase monitoring frequencies shall be conducted in accordance with the requirements in this Section.

(d) All PWSs (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrate in §16.1.

(1) Community and non-transient, non-community water systems served by groundwater systems shall monitor annually; systems served by surface water shall monitor quarterly beginning January 1, 1993.

(2) For community and non-transient, non-community water systems, the repeat monitoring frequency for groundwater systems shall be quarterly for at least one (1) year following any one (1) sample in which the concentration is greater than or equal to fifty percent (50%) of the MCL. The Director may allow a groundwater system to reduce the sampling frequency to annually after four (4) consecutive quarterly samples are reliably and consistently less than the MCL.

(3) For community and non-transient, non-community water systems, the Director may allow a surface water system to reduce the sampling frequency to annually if all analytical results from four (4) consecutive quarters are < 50 percent of the MCL. A surface water system shall return to quarterly monitoring if any sample is greater than or equal to fifty percent (50%) of the MCL.

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

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

(e) All PWSs (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrite in §16.1 above.

(1) All PWSs shall take a minimum of one (1) sample at each sampling point in each compliance period.

(2) After the initial sample, systems where an analytical result for nitrite is < fifty percent (50%) of the MCL shall monitor at the frequency specified by the Director.

(3) For community, non-transient, non-community, and transient non-community water systems, the repeat monitoring frequency for any water system shall be quarterly for at least one (1) year following any one (1) sample in which the concentration is > fifty percent (50%) of the MCL. The Director may allow a system to reduce the sampling frequency to annually after determining the system is reliably and consistently less than the MCL.

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

(f) **Confirmation Samples**:

(1) Where the results of sampling for asbestos, antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium indicate an exceeding of the maximum contaminant level, the Director may require that one (1) additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two (2) weeks) at the same sampling point.

(2) Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within twenty-four (24) hours of the system's receipt of notification of the analytical results of the first sample. Systems unable to comply with the twenty-four (24)-hour sampling requirement must immediately notify persons served by the PWS in accordance with §16.8.2 and meet other Tier 1 public notification requirements under §16.8 or §17.6 of this part. Systems exercising this option must take and analyze a confirmation sample within two (2) weeks of notification of the analytical results of the first sample.

(3) If a required confirmation sample is taken for any contaminant, then the results of the initial and confirmation sample shall be averaged. The resulting average shall be used to determine the system's compliance in accordance with §16.1(i). The Director has the discretion to delete results of obvious sampling errors.

(g) The Director may require more frequent monitoring than specified in §§16.1(b), (c), (d) and (e) or may require confirmation samples for positive and negative results at his/her discretion.

(h) Systems may apply to the Director to conduct more frequent monitoring than the minimum monitoring frequencies specified in this Section.

(i) Compliance with §16.1 shall be determined based on the analytical result(s) obtained at each sampling point.

(1) For systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium is determined by a running annual average at any sampling point. If the average at any sampling point is greater than the MCL, then the system is out of compliance. If any one (1) sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any sample below the method detection limit shall be calculated at zero for the purpose of determining the annual average. Beginning January 22, 2004, if a system fails to collect the required number of samples, compliance (average concentration) will be based on the number of samples collected.

(2) For systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the Director, the determination of compliance will be based on the annual average of the initial MCL exceedance and any Director-required confirmation samples. Beginning January 22, 2004, if a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(3) Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one (1) sample if the levels of these contaminants are below the MCLs. If the levels of

nitrate and/or nitrite exceed the MCLs in the initial sample, a confirmation sample is required in accordance with §16.1(f)(2), and compliance shall be determined based on the average of the initial and confirmation samples.

(4) Effective January 23, 2006, arsenic sampling results will be reported to the nearest 0.001 mg/L.

(j) Sample collection and analyses for the purpose of determining compliance with arsenic shall be conducted using the requirements specified in Appendix 1.

(1) Analyses for all community water systems utilizing surface water sources shall be repeated at yearly intervals.

(2) Analyses for all community water systems utilizing only ground water sources shall be repeated at three-year intervals.

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

(4) Until January 23, 2006, the maximum contaminant level for arsenic is 0.05 mg/L and applies to community water systems only. For analyses and determination of compliance with the 0.05 mg/L maximum contaminant level for arsenic, use the requirements of §16.1. Beginning January 23, 2006, the MCL for arsenic for community and non-transient, non-community water systems is 0.010 mg/L.

(k) If the result of an analysis made under §16.1(j) indicates that the arsenic concentration exceeds the maximum contaminant level, the supplier of the water shall report to the Director within seven (7) days and initiate three (3) additional analyses at the same sampling point within one (1) month.

(l) When the average of four (4) analyses made pursuant to §16.1(k), rounded to the same number of significant figures as the maximum contaminant level for arsenic exceeds the maximum contaminant level, the supplier of water shall notify the Director pursuant to §11.2 and give notice to the public pursuant to §16.8. Monitoring after public notification shall be at a frequency designated by the Director and shall continue until the maximum contaminant level has not been exceeded in two (2) successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(m) Reserved

(n) Reserved

(o) If a PWS has a distribution system separable from other parts of the distribution system with no interconnections, the Director may allow the system to give public notice to only the area served by that portion of the system which is out of compliance.

(p) Each PWS shall monitor at the time designated by the Director during each compliance period.

(q) **Mechanical Fluoride Adjustment - Monitoring Frequency and Reporting Requirements**

(i) For each source where the fluoride concentration is mechanically adjusted, a fluoride determination of the treated water shall be made and recorded daily by the water purveyor. Fluoride analysis shall be conducted in accordance with Appendix 1. Results shall be reported monthly to the Director within ten (10) days after the end of the month.

(ii) Failure to comply with the requirements of §16.1(q) is not subject to the public notice requirements of §16.8.

(r) **Monitoring Protocol for Sodium.** Each community system will sample each of its active sources at the entry point of the source into the distribution system, following any treatment provided to one (1) or more sources of water, as follows:

(1) Surface water sources shall be sampled during the months of January, February, and March of each calendar year:

(2) Six (6) consecutive biweekly samples may be composited into a single sample. Compositing must be done at the laboratory. (Groundwater sources shall be sampled annually during the months of March or April.)

(3) Samples shall be analyzed for sodium. Results shall be reported to the Director within ten (10) days after determination. Sodium sampling requirements may be modified or waived at the discretion of the Director.

(s) **Analytical Techniques** - Inorganic chemical analyses shall be made in accordance with Appendix 1 of these Regulations. With respect to Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Nickel and Thallium.

(t) **BAT for Inorganic Contaminants.** The following are hereby identified as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for inorganic contaminants identified in this Section, except fluoride:

BAT For Inorganic Contaminants Listed in Section 16.1

Chemical Name	BAT(s)
Antimony	2,7
Arsenic [4,5]	1,2,5,6,7,9,126
Asbestos	2,3,8
Barium	5,6,7,9
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,62,7
Cyanide	5,7,10
Mercury	21,4,61,71
Nickel	5,6,7
Nitrate	5,7,9
Nitrite	5,7
Selenium	1,23,6,7,9
Thallium	1,5

BAT For Inorganic Contaminants Listed in Section 16.1

Chemical Name	BAT(s)

[1] BAT only if influent Hg concentrations <10µg/L.
[2] BAT for Chromium III only.
[3] BAT for Selenium IV only.
[4] BATs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.
[5] BATs for arsenic become effective January 23, 2006.
[6] To obtain high removals, iron to arsenic ratio must be at least 20:1.

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

(u) The Director hereby identifies in the following table the affordable technology, treatment technique, or other means available to systems serving 10,000 persons or fewer for achieving compliance with the maximum contaminant level for arsenic effective January 23, 2006:

Small System Compliance Technologies (SSCTS)[1] for Arsenic[2]

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

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

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

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

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

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

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

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

16.2 **Organic Chemicals**

(a) **Maximum Contaminant Levels For Organic Contaminants**

Contaminant	MCL (mg/L)
Alachlor	0.002
Aldicarb	reserved
Aldicarb sulfoxide	reserved
Aldicarb sulfone	reserved
Altrazine	0.003
Carbofuran	0.04
Chlordane	0.002
Dibromochloropropane	0.0002
2,4-D	0.07
Ethylene dibromide	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Lindane	0.0002
Methoxychlor	0.04
Polychlorinated biphenyls	0.0005
Pentachlorophenol	0.001
Toxaphene	0.003
2,4,5-TP	0.05
Benzo[a]pyrene	0.0002
Dalapon	0.2
Di(2-ethylhexyl) adipate	0.4
Di(2-ethylhexyl) phthalate	0.006
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Glyphosate	0.7
Hexacholorbenzene	0.001
Hexachlorocyclopentadiene	0.05
Oxamyl (Vydate)	0.2
Picloram	0.5
Simazine	0.004
2,3,7,8-TCDD (Dioxin)	3x10-8

Analysis of the contaminants listed in §16.2(a) for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows except that monitoring for the contaminants aldicarb, aldicarb sulfoxide and aldicarb sulfone shall be conducted in accordance with §16.7:

(1) Groundwater systems shall take a minimum of one (1) sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(2) Surface water systems shall take a minimum of one (1) sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point.) Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

Note: For purposes of this Paragraph, surface water systems include systems with a combination of surface and ground sources.

(3) If the system draws water from more than one (1) source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources if being used).

(4) **Monitoring Frequency:**

(i) Each community and non-transient non-community water system shall take four (4) consecutive quarterly samples for each contaminant listed in §16.2(a) during each compliance period beginning with the initial compliance period.

(ii) Systems serving more than 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of two (2) quarterly samples in one (1) year during each repeat compliance period.

(iii) Systems serving less than or equal to 3,300 persons which do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of one (1) sample during each repeat compliance period.

(5) Each community and non-transient non-community water system may apply to the Director for a waiver from the requirement of §16.2(h)(4). A system must reapply for a waiver for each compliance period.

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

(i) Previous analytical results.

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

(iii) The environmental persistence and transport of the pesticide or PCBs.

(iv) 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.

(v) Elevated nitrate levels at the water supply source.

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

(7) If an organic contaminant listed in §16.2(a) is detected (as defined by §16.2(a)(17)) in any sample, then:

(i) Each system must monitor quarterly at each sampling point which resulted in a detection.

(ii) The Director may decrease the quarterly monitoring requirement specified in §16.2(a)(7)(i) provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the Director make this determination unless a groundwater system takes a minimum of two (2) quarterly samples and a surface water system takes a minimum of four (4) quarterly samples.

(iii) After the Director determines the system is reliably and consistently below the maximum contaminant level the Director may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.

(iv) Systems which have three (3) consecutive annual samples with no detection of a contaminant may apply to the Director for a waiver as specified in §16.2(a)(6).

(v) If monitoring results in detection of one (1) or more of certain related contaminants (aldicarb, aldicarb sulfone, aldicarb sulfoxide and heptachlor, heptachlor epoxide), than subsequent monitoring shall analyze for all related contaminants.

(8) Systems which violate the requirements of §16.2(a) as determined by §16.2(a)(11) must monitor quarterly. After a minimum of four (4) quarterly samples show the system is in compliance and the Director determines the system is reliably and consistently below the MCL, as specified in §16.2(a)(11), the system shall monitor at the frequency specified in §16.2(a)(7)(iii).

(9) The Director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Director, the result must be averaged with the first sampling result and the average used for the compliance determination as specified by (§16.2(a)(11). The Director has discretion to delete results of obvious sampling errors from this calculation.

(10) The Director may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five (5) sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within fourteen (14) days of sample collection.

(i) If the concentration in the composite sample is greater than or equal to 0.0005 mg/L for any contaminant listed in §16.2(a), then a follow-up sample must be taken within fourteen (14) days at each sampling point included in the composite and be analyzed for that contaminant.

(ii) If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these duplicates instead of resampling. The duplicate must be analyzed and the results reported to the Director within fourteen (14) days of collection.

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

(11) Compliance with §16.2(a) shall be determined based on the analytical results obtained at each sampling point. If one (1) sampling point is in violation of an MCL, the system is in violation of the MCL.

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

(ii) Systems monitoring annually or less frequently whose sample result exceeds the regulatory detection level as defined by §16.2(a)(17) must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one (1) year of quarterly sampling.

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

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

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

(vi) If a PWS has a distribution system separable from other parts of the distribution system with no interconnections, the Director may allow the system to give public notice to only that area served by that portion of the system which is out of compliance.

(12) Analysis for the contaminants listed in §16.2(a) shall be conducted using the EPA methods or their equivalent as approved by EPA and as described in Appendix 1.

(13) If monitoring data collected after January 1, 1990, is generally consistent with the requirements of §16.2(a) then the Director may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period.

(14) The Director may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctuations in concentration due to seasonal use, changes in water source).

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

(16) Each PWS shall monitor at the time designated by the Director within each compliance period.

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

Contaminant	Detection limit (mg/L)
Alachlor	0.0002
Aldicarb	0.0005
Aldicarb sulfoxide	0.0005
Aldicarb sulfone	0.0008
Atrazine	0.0001
Benzo[a]pyrene	0.00002
Carbofuran	0.0009
Chlordane	0.0002
Dalapon	0.001
Dibromochloropropane (DBCP)	0.00002

Contaminant	Detection limit (mg/L)
Di (2-ethylhexyl) adipate	0.0006
Di (2-ethylhexyl) phthalate	0.0006
Dinoseb	0.0002
Diquat	0.0004
2,4-D	0.0001
Endothall	0.009
Endrin	0.00001
Ethylene dibromide (EDB)	0.00001
Glyphosate	0.006
Heptachlor	0.00004
Heptachlor epoxide	0.00002
Hexachlorobenzene	0.0001
Hexachlorocyclopentadiene	0.0001
Lindane	0.00002
Methoxychlor	0.0001
Oxamyl	0.002
Picloram	0.0001
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)	0.0001
Pentachlorophenol	0.00004
Simazine	0.00007
Toxaphene	0.001
2,3,7,8-TCDD (Dixon)	0.000000005
2,4,5-TP (Silvex)	0.0002

(18) Notwithstanding §§16.2(b)(1) through (17), monitoring for endrin shall be as follows: Each active drinking water source maintained by a water purveyor shall be analyzed for endrin at least once every three (3) years.

(19) [**DELETED**]

(20) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL in §16.2(a) within a period of time specified by the Director. The system must also comply with the initial sampling frequencies specified by the Director to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this Section beginning January 22, 2004.

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(b) **Volatile Organic Chemicals**

Maximum contaminant levels for certain volatile organic chemicals:

Contaminant	MCL (mg/L)
(1) Vinyl Chloride	0.002
(2) Benzene	0.005
(3) Carbon Tetrachloride	0.005
(4) 1,2-Dichloroethane	0.005
(5) Trichloroethylene	0.005
(6) p-Dichlorobenzene	0.075
(7) 1,1-Dichloroethylene	0.007
(8) 1,1,1-Trichloroethane	0.2
(9) cis-1,2-Dichloroethylene	0.07
(10) 1,2-Dichloropropane	0.005
(11) Ethylbenzene	0.7
(12) Monochlorobenzene	0.1
(13) o-Dichlorobenzene	0.6
(14) Styrene	0.1
(15) Tetrachloroethylene	0.005
(16) Toluene	1
(17) trans-1,2-Dichloroethylene	0.1
(18) Xylenes (total)	10
(19) Dichloromethane	0.005
(20) 1,2,4-Trichlorobenzene	0.07
(21) 1,1,2-Trichloroethane	0.005

Beginning with the initial compliance period, analysis of the contaminants listed in §16.2(b)(1) through (21) for the purpose of determining compliance with the maximum contaminant level shall be conducted as follows:

(22) Groundwater systems shall take a minimum of one (1) sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

(23) Surface water systems (or combined surface/ground) shall take a minimum of one (1) sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

(24) If the system draws water from more than one (1) source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources if being used).

(25) Each community and non-transient, non-community water system shall take four (4) consecutive quarterly samples for each contaminant listed in §§16.2(b)(2) through (21) during each compliance period, beginning in the initial compliance period.

(26) If the initial monitoring for contaminants listed in §§16.2(b)(1) through (8) and the monitoring for the contaminants listed in §§16.2(b)(9) through (21) as allowed in

§16.2(b)(37) has been completed by December 31, 1992, and the system did not detect any contaminant listed in §§16.2(b)(1) through (21), than each ground and surface water system shall take one (1) sample annually beginning with the initial compliance period.

(27) After a minimum of three (3) years of annual sampling, the Director may allow groundwater systems with no previous detection of any contaminant listed in §16.2(b) to take one (1) sample during each compliance period.

(28) Each community and non-transient groundwater system which does not detect a contaminant listed in §§16.2(b)(1) through (21) may apply to the Director for a waiver from the requirements of §§16.2(b)(26) and (27) after completing the initial monitoring. (For the purposes of this Section, detection is defined as greater than or equal to 0.0005 mg/L). A waiver shall be effective for no more than six (6) years (two (2) compliance periods). The Director may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene.

(29) The Director may grant a waiver after evaluating the following factor(s):

(i) Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone influence of the system. If a determination by the Director reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted.

(ii) If previous use of the contaminant is unknown or it has been used previously, then the factors below shall be used to determine whether a waiver is granted.

(A) Previous analytical results;

(B) The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities;

(C) The environmental persistence and transport of the contaminants;

(D) The number of persons served by the PWS and the proximity of a smaller system to a larger system; and

(E) 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;

(30) As a condition of the waiver a groundwater system must take one (1) sample at each sampling point during the time the waiver is effective (i.e., one (1) sample during two (2) compliance periods or six (6) years) and update its vulnerability assessment considering the factors listed in §16.2(b)(29). Based on this vulnerability assessment the Director must reconfirm that the system is non-vulnerable. If the Director does not make this reconfirmation within three (3) years of the initial determination, then the waiver is invalidated and the system is required to sample annually as specified in §16.2(b)(26).

(31) Each community and non-transient surface water system which does not detect a contaminant listed in §§16.2(b)(1) through (21) may apply to the Director for a waiver from the requirements of §16.2(b)(26) after completing the initial monitoring. Composite samples from a maximum of five (5) sampling points are allowed, provided that the detection limit of

the method used for analysis is less than one-fifth of the MCL. Systems meeting this criterion must be determined by the Director to be non-vulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the Director (if any).

(32) If a contaminant listed in §§16.2(b)(2) through (21) is detected at a level exceeding 0.0005 mg/L in any sample, then:

(i) The system must monitor quarterly at each sampling point which resulted in a detection.

(ii) The Director may decrease the quarterly monitoring requirement specified in §16.2(b)(32)(i) provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the Director make this determination unless a groundwater system takes a minimum of two (2) quarterly samples and a surface water system takes a minimum of four (4) quarterly samples.

(iii) If the Director determines that the system is reliably and consistently below the MCL, the Director may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter(s) which previously yielded the highest analytical result.

(iv) Systems which have three (3) consecutive annual samples with no detection of a contaminant may apply to the Director for a waiver as specified in §16.2(b)(28).

(v) Groundwater systems which have detected one (1) or more of the following two-carbon organic compounds: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene shall monitor quarterly for vinyl chloride. A vinyl chloride sample shall be taken at each sampling point at which one (1) or more of the two (2) carbon organic compounds was detected. If the results of the first analysis do not detect vinyl chloride, the Director may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one (1) sample during each compliance period. Surface water systems are required to monitor for vinyl chloride as specified by the Director.

(33) Systems which violate the requirements of §§16.2(b)(1) through (21), as determined by §16.2(b)(36), must monitor quarterly. After a minimum of four (4) consecutive quarterly samples which show the system is in compliance as specified in §16.2(b)(36), the system and the Director determines the system and the Director determines that the system is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and time specified in §16.2(b)(32)(iii).

(34) The Director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Director, the result must be average with the first sampling result and the average is used for the compliance determination as specified by §16.2(b)(36). The Director has discretion to delete results of obvious sampling errors from this calculation.

(35) The Director may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five (5) sampling points are allowed provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within fourteen (14) days of sample collection.

(i) If the concentration in the composite sample detects one (1) or more contaminants listed in §16.2(b), then a follow-up sample must be taken within fourteen (14) days at each sampling point included in the composite, and be analyzed for that contaminant.

(ii) If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these duplicates instead of resampling. The duplicate must be analyzed and the results reported to the Director within fourteen (14) days of collection.

(iii) If the populations served by the system is >3,300 persons, then compositing may only be permitted by the Director at sampling points within a single system. In systems serving ≤3,300 persons, the Director may permit compositing among different systems provided the 5-sample limit is maintained.

(36) Compliance with §§16.2(b)(1) through (21) shall be determined based on the analytical results obtained at each sampling point. If one (1) sampling point is in violation of an MCL, the system is in violation of the MCL.

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

(ii) Systems monitoring annually or less frequently whose sample result exceeds the MCL must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one (1) year of quarterly sampling.

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

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

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

(vi) If a PWS has a distribution system separable from other parts of the distribution system with no interconnections, the Director may allow the system to give public notice to only that area served by that portion of the system which is out of compliance.

(37) Analysis for the contaminants listed in §§16.2(b)(1) through (21) shall be conducted using EPA methods or their equivalent as approved by EPA and as specified in Appendix 1.

(38) The Director may allow the use of monitoring data collected after January 1, 1988, for purposes of initial monitoring compliance. If the data is generally consistent with the other requirements in this Section, the Director may use this data (i.e., a single sample rather than four (4) quarterly samples) to satisfy the initial monitoring requirement of §16.2(b)(4). Systems which use grand fathered samples and did not detect any contaminant listed in §§16.2(b)(1) through (21) shall begin monitoring annually in accordance with §16.2(b)(26) beginning with the initial compliance period.

(39) The Director may increase required monitoring where necessary to detect variations within the system.

(40) Each PWS shall monitor at the time designated by the Director within each compliance period.

(41) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL in §§16(b)(1) through (21) within a period of time specified by the Director. The system must also comply with the initial sampling frequencies specified by the Director to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this Section beginning January 22, 2004.

(42) Reserved.

(43) Bottled water may be used on a temporary basis to avoid an unreasonable risk to health. If bottled water is used, it must be obtained from an approved source. A PWS shall not use bottled water to achieve compliance with a maximum contaminant level listed in §16.2(b) unless required by the Director as a condition for granting an exemption and providing there are reasonable assurances that the bottled water will not exceed maximum contaminant levels.

(44) Compliance with a maximum contaminant level shall be achieved by installation of central treatment using BAT as stipulated in §16.2(c). Point-of-use or point-of-entry devices may be used only as a condition for obtaining a variance from the requirement for adoption of central treatment providing the devices and a monitoring plan for their maintenance are approved by the Director prior to their installation, and that every building connected to the water system has a device installed, maintained and adequately monitored by the PWS.

(45) Reserved.

(c) **BAT For Organic Contaminants.** The following table identifies granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in §§16.2(a) and (b):

BAT FOR ORGANIC CONTAMINANTS LISTED IN §§16.2(a) and (b)

CAS No.	CONTAMINANT	GAC	PTA	OX
15972-60-8	Alachlor	X		
116-06-3	Aldicarb	X		
1646-88-4	Aldicarb sulfone	X		
1646-87-3	Aldicarb sulfoxide	X		
1912-24-9	Atrazine	X		
71-43-2	Benzene	X	X	
50-32-8	Benzo[a]pyrene	X		
1563-66-2	Carbofuran	X		
56-23-5	Carbon tetrachloride	X	X	
57-74-9	Chlordane	X		
75-99-0	Dalapon	X		
94-75-7	2,4-D	X		
103-23-1	Di(2-ethylhexyl) adipate	X	X	
117-81-7	Di (2-ethylhexyl) phthalate	X		
96-12-8	Dibromochloropropane (DBCP)	X	X	
95-50-1	o-Dichlorobenzene	X	X	
106-46-7	para-Dichlorobenzene	X	X	
107-06-2	1,2-Dichloroethane	X	X	
75-35-4	1,1-Dichloroethylene	X	X	

BAT FOR ORGANIC CONTAMINANTS LISTED IN §§16.2(a) and (b)

CAS No.	CONTAMINANT	GAC	PTA	OX
156-59-2	cis-1,2-Dichloroethylene	X	X	
156-60-5	trans-1,2-Dichloroethylene	X	X	
75-09-2	Dichloromethane		X	
78-87-5	1,2-Dichloropropane	X	X	
88-85-7	Dinoseb	X		
85-00-7	Diquat	X		
145-73-3	Endothall	X		
72-20-8	Endrin	X		
100-41-4	Ethylbenzene	X	X	
106-93-4	Ethylene Dibromide (EDB)	X	X	
1071-83-6	Gylphosate			X
76-44-8	Heptachlor	X		
1024-57-3	Heptachlor epoxide	X		
118-74-1	Hexachlorobenzene	X		
77-47-3	Hexachlorocyclopentadiene	X	X	
58-89-9	Lindane	X		
72-43-5	Methoxychlor	X		
108-90-7	Monochlorobenzene	X	X	
23135-22-0	Oxamyl (Vydate)	X		
87-86-5	Pentachlorophenol	X		
1918-02-1	Picloram	X		
1336-36-3	Polychlorinated biphenyls (PCB)	X		
122-34-9	Simazine	X		
100-42-5	Styrene	X	X	
1746-01-6	2,3,7,8-TCDD (Dioxin)	X		
127-18-4	Tetrachloroethylene	X	X	
108-88-3	Toluene	X	X	
8001-35-2	Toxaphene	X		
93-72-1	2,4,5-TP (Silvex)	X		
120-82-1	1,2,4-Trichlorobenzene	X	X	
71-55-6	1,1,1-Trichloroethane	X	X	
79-00-5	1,1,2-Trichloroethane	X	X	
79-01-6	Trichloroethylene	X	X	
75-01-4	Vinyl chloride		X	
1330-20-7	Xylene	X	X	

(d) **Treatment Techniques For Acrylamide and Epichlorohydrin.** Each PWS must certify annually in writing to the Director (using third party or manufacturer's certification) 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)

Certifications can rely on manufacturers or third parties, as approved by the Director.

16.3 **Turbidity**

(a) **Applicability**

(1) The maximum contaminant level for turbidity applies only to surface water sources. The turbidity of the water shall be determined and recorded daily by the water purveyor and measured at a representative entry point into the distribution system.

(2) The requirements in §§16.3(a) and (b) apply to unfiltered systems until December 30, 1991 unless the Director has determined prior to that date, in writing pursuant to Section 5 that filtration is required. The requirements in this Section apply to filtered systems until June 29, 1993. The requirements in this Section apply to unfiltered systems that the Director has determined in writing pursuant to §5.0 must install filtration, until June 29, 1993 or until filtration is installed, whichever is later.

(b) **Maximum Contaminant Level for Turbidity.** The maximum contaminant level for turbidity shall not exceed a monthly average of 1 turbidity unit (TU). A turbidity monthly average of two (2) turbidity units may be acceptable provided it is demonstrated the higher turbidities did not interfere with disinfection, and a residual disinfection was maintained throughout the distribution system and did not interfere with microbiological determinations. An average of five (5) turbidity units shall not be exceeded for any two (2) consecutive days.

(c) **Analytical Techniques.** Turbidity measurements shall be made in accordance with Appendix 1.

(d) A PWS that uses surface water or ground water under the direct influence of surface water, as defined in §1.0 and does not practice filtration in compliance with §5.4, must collect at least one (1) sample near the first service connection each day the turbidity level of the source water measured as specified in §5.0, exceeds 1 NTU. This sample must be analyzed for the presence of total coliforms. When one (1) or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within twenty-four (24) hours of the first excedence, unless the Director determines that the system, for logistical reasons outside of the system's control cannot have the sample analyzed within thirty (30) hours of collection. Sample results from this coliform monitoring must be included in determining compliance with the MCL for total coliforms in §16.4(c).

16.4 **Microbiological**

(a) **Routine Monitoring.** Community water systems must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. These plans are subject to the Director's review and revision. The monitoring frequency for total coliforms for community water systems is based on the population served by the system as follows:

Total Coliform Monitoring Frequency For Community Water Systems

Population Served	Minimum Number of Samples per Month
25 to 1,000[1]	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40

Total Coliform Monitoring Frequency For Community Water Systems

Population Served	Minimum Number of Samples per Month
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

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

(1) The Director may reduce the monitoring frequency of a community water system serving 25-1000 persons in a written directive to not less than one (1) sample per quarter if:

(i) A sanitary survey conducted in the past five (5) years shows that the system is supplied solely by a protected ground water source and is free of sanitary defects, and

(ii) Said water system has no history of total coliform contamination in its current configuration.

(2) The PWS must collect samples at regular time intervals throughout the month, EXCEPT: a system which uses groundwater not under the direct influence of surface water as determined by the Director, and serves 4,900 persons or less, may collect all required samples on a single day, if they are taken from different sites.

(3) A PWS that uses surface water or ground water under the direct influence of surface water, as determined by the Director, and does not practice filtration in compliance with §5.0 must:

(i) Collect at least one (1) sample near the first service connection each day the turbidity level exceeds 1 NTU. This sample must be analyzed for the presence of total coliforms.

(ii) When one (1) or more turbidity measurements exceed 1 NTU, the system must collect the coliform sample within twenty-four (24) hours of the first exceedence unless the Director determines that the system for logistical reasons outside the system's control cannot have the sample analyzed within 30 hours of collection. Sample results must be included in determining compliance with the MCL for total coliforms, as indicated in §16.4 (c).

(b) **Analytical Methodology.** Coliform organism examinations shall be made in accordance with Appendix 1.

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

(2) A PWS need only determine the presence or absence of total coliforms: a determination of total coliform density is not required.

(3) If any routine or repeat sample is total coliform positive, the system must analyze the culture medium to determine if fecal coliforms are present. The system may test for *E. Coli* in lieu of fecal coliforms.

The Director has the discretion to allow a PWS, on a case-by-case basis, to forgo fecal coliform or *E. Coli* testing on a total coliform positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. Coli*-positive. Accordingly, the system must notify the Director as specified in §16.4(e) and the provisions of §16.4(c)(6)(C) apply.

(c) **Maximum Contaminant Levels (MCLs) for Microbiological Contaminants**

(1) The goal for total coliforms (including fecal coliforms and *Escherichia Coli*) is ZERO.

(2) The following constitute the best technology treatment techniques, or other means available for achieving compliance with the MCL:

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

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

(C) Proper maintenance of the distribution system;

(D) Filtration and/or disinfection of surface water as described in §5.0; and

(E) The development and implementation of an approved wellhead protection program, or watershed protection plan, if applicable.

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

(4) A PWS must determine compliance with the MCL for total coliforms for each month in which it is required to monitor for total coliforms.

(5) Special purpose samples such as those taken to determine disinfection practices, shall not be used to determine compliance with the MCL for total coliforms. Repeat samples must be used in determination of the monthly MCL compliance.

(6) The following constitutes a violation of the MCL for total coliforms:

(A) If a system collects at least forty (40) samples per month, the system is not in compliance with the MCL for total coliforms if more than 5.0 percent of the samples collected during the month are total coliform positive.

(B) If a system collects less than forty (40) samples per month, the system is not in compliance with the MCL for total coliforms if more than one (1) sample is total coliform positive.

(C) *If any repeat sample is fecal coliform or *E. Coli* positive.

(D) *If any repeat sample is total coliform positive following a fecal coliform or *E. Coli* positive routine sample.

*For purposes of public notification requirements discussed in §16.8, this is a violation that may pose an acute health risk.

(7) The Director must be notified of any total coliform MCL violation by the end of the day on which the system learns of the violation or by the end of the next business day if state offices are closed.

(d) **Repeat Monitoring.** If a routine sample is total coliform-positive, the PWS must collect a set of repeat samples for each total coliform positive within twenty-four (24) hours of being notified of the positive result as follows:

(1) > 1 routine sample/month: three (3) repeat samples
(Total volume collected must be at least three hundred (300) ml)

(2) 1 or < 1 routine sample/month: four (4) repeat samples
(Total volume collected must be at least four hundred (400) ml)

(3) The Director may extend the twenty-four (24) hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within twenty-four (24) hours that is beyond its control. In the case of an extension, the Director will specify how much time the system has to collect the repeat samples.

(4) At least one (1) repeat sample must be collected from the sampling tap where the original positive sample was taken; at least one (1) repeat sample within: five (5) service connections upstream; and one (1) repeat sample within five (5) service connections downstream. If a total coliform-positive sample is at the end of the distribution system, or one (1) away from the end of the distribution system, the Director may waive the requirement to collect at least one (1) repeat sample upstream or downstream of the original sampling site.

(5) These repeat samples must be collected on the same day, except that the Director may allow a system with a single service connection to collect the required set of repeat samples over a four-day period or to collect a larger volume repeat sample(s) in one (1) or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one (1) routine sample/month).

(6) If one (1) or more repeat sample in the set is total coliform-positive, the PWS must collect an additional set of repeat samples as described in this Section. The system must repeat this process until either total coliforms are not detected in one (1) complete set of repeat samples, or the system determines that the MCL for total coliforms has been exceeded and notifies the Director.

(7) Results of all routine and repeat samples not invalidated by the Director must be included in determining compliance with the MCL for total coliforms in §16.4 c).

(8) Any system collecting fewer than five (5) routine samples per month must collect at least five (5) samples during the month following repeat sampling for total coliform positive samples. The Director can waive this requirement on a case by case basis.

(A) The Director may waive the requirement to collect five (5) routine samples the next month the system provides water to the public if the Director performs a site visit before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the Director to determine whether additional monitoring and/or any corrective action is needed.

(B) The Director may waive the requirement to collect five (5) routine samples the next month the system provides water to the public if the Director has determined in writing why the sample was total coliform positive and establishes that the system has corrected

the problem or will correct the problem before the end of the next month the system serves water to the public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem. The Director will not waive the requirement to collect five (5) routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. Under §16.4(d), a system must still take at least one (1) routine sample before the end of the next month it serves water to the public and use it to determine compliance with the MCL for total coliforms in §16.4.

(e) **Fecal Coliforms/*E. Coli* Testing.** If any routine or repeat sample is total coliform positive, the system must analyze the culture medium to determine if fecal coliforms are present. The system may test for *E. Coli* in lieu of fecal coliforms. If either are present, the system must notify the Director by the end of that day or the next business day if state offices are closed.

(f) **Invalidation of Samples**

(1) A total coliform sample invalidated under §16.4(e) does not count towards meeting the minimum monitoring requirements of §16.4.

(2) The Director will invalidate a total coliform-positive sample and document same in writing only if:

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

(ii) The Director determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem.

(iii) The Director has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. (In this case, the system must still collect all repeat samples required.)

(3) A total coliform-positive sample will not be invalidated solely on the grounds that all repeat samples are total coliform negative.

(4) A laboratory must invalidate a total coliform sample, unless total coliforms are detected, only if:

(i) The sample produces a turbid culture in the absence of gas production using the method cited in §16.4(b)(4)(a);

(ii) The sample produces a turbid culture in the absence of an acid reaction; using the method cited in §16.4(b)(4)(c).

(iii) It exhibits confluent growth , or produces colonies too numerous to count, using the method cited in §16.4(b)(4)(b).

(5) If a laboratory invalidates a sample for the above reasons, the system must collect another sample from the same location as the original sample within twenty-four (24) hours of being notified of the result. The system must continue to re-sample within twenty-four (24) hours and have the samples analyzed until it obtains a valid result. The Director may extend the twenty-four (24) hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within twenty-four (24) hours that is beyond its control. In the

case of a extension, the Director will specify how much time the system has to collect the repeat samples.

(g) **Sanitary Surveys:**

(1) Systems must undergo another sanitary survey every five (5) years, except that non-community water systems using only protected and disinfected ground water as defined by the Director must undergo subsequent sanitary surveys at least every ten (10) years after the initial sanitary survey. Sanitary surveys conducted by the Director may be used to meet the sanitary survey requirements of this section

(2) A PWS is responsible for making all necessary facilities, personnel and records available so that a sanitary survey may be completed.

(3) Deficiencies listed in a sanitary survey are considered to be unsafe conditions and must be addressed as provided for in §10.0 of these Regulations.

(h) **Reporting Requirements:**

(1) The supplier of water must report to the Director any failure to comply with any drinking water regulation within forty-eight (48) hours, except where different reporting is specified in these Regulations.

(2) A PWS which has exceeded the MCL for total coliforms must report the violation to the Director no later than the end of the next business day, and notify the public in accordance with §16.8.

(3) A PWS which has failed to comply with a coliform monitoring requirement, including the sanitary survey must report the monitoring violation to the Director within ten (10) days after the system discovers the violation, and notify the public in accordance with §16.8.

16.5 **Radioactivity**

(a) **Monitoring and Compliance Requirements for Gross Alpha Particle Activity, Radium-226, Radium-228 and Uranium.**

(1) Community water systems must conduct initial monitoring to determine compliance with §16.5(b) and (c) by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, and uranium in drinking water, "detection limit" is defined as in Appendix 1 Section II D(3).

(i) Applicability and sampling location for existing community water systems or sources - All existing community water systems using ground water, surface water or systems using both ground and surface water (for the purpose of this Section hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the Director has designated a distribution system location, in accordance with §16.5 (a)(2)(ii)(C).

(ii) Applicability and sampling location for new community water systems or sources - All new community water systems or community water systems that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after initiating use of the source. Community water systems must conduct more frequent monitoring when ordered by the Director in the event of possible

contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.

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

(i) Systems without acceptable historical data, as defined in §16.5(a)(2)(ii), must collect four (4) consecutive quarterly samples at all sampling points before December 31, 2007.

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

(A) To satisfy initial monitoring requirements, a community water system having only one (1) entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

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

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

(iii) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the Director may waive the final two (2) quarters of initial monitoring for a sampling point if the results of the samples from the previous two (2) quarters are below the detection limit.

(iv) If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until the system has results from four (4) consecutive quarters that are at or below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the Director.

(3) **Reduced Monitoring.** Beginning January 1, 2008, the Director may allow community water systems to reduce the future frequency of monitoring from once every three (3) years to once every six (6) or nine (9) years at each sampling point, based on the following criteria.

(i) If the average of the initial monitoring results for each contaminant (i.e., gross alpha particle activity, uranium, radium-226, or radium-228) is below the detection limit specified in Table B in Appendix 1, the system must collect and analyze for that contaminant using at least one (1) sample at that sampling point every nine (9) years.

(ii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below 1/2 the MCL, the system must collect and analyze for that contaminant using at least one (1) sample at that sampling point every six (6) years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below 1/2 the MCL, the system must collect and analyze for that contaminant using at least one (1) sample at that sampling point every six (6) years.

(iii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above 1/2 the MCL but at or below the MCL, the system must collect and analyze at least one (1) sample at that sampling point every three (3) years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above 1/2 the MCL but at or below the MCL, the system must collect and analyze at least one (1) sample at that sampling point every three (3) years.

(iv) Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine (9) year monitoring period, and the sample result is above 1/2 MCL, then the next monitoring period for that sampling point is three (3) years).

(v) If a system has a monitoring result that exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until the system has results from four (4) consecutive quarters that are below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the Director.

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

(5) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed 5 pCi/l. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/l. The gross alpha measurement shall have a confidence interval of 95% (1.65σ, 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 will be used to determine compliance and the future monitoring frequency.

(b) **Maximum Contaminant Level for Gross Alpha Particle Activity and Radium-226 and Radium-228**

Contaminant	Picocuries per Liter(pCi/l)
Radium-226 and Radium-228 Combined[1]	5
Gross alpha particle activity[2]	15

[1] The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

[2] Including radium-226 but excluding radon and uranium

(c) **Maximum Contaminant Level for Uranium.** The maximum contaminant level for uranium is 30 µg/L.

(d) **Maximum Contaminant Level for Manmade Beta Particle and Photon Emitters.** The average annual concentration of manmade beta particle and photon emitters shall not meet or exceed an annual dose equivalent to the total body or any internal organ of 4 millirems/year.

(1) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or any internal organ dose equivalents must be calculated on the basis of 2 liter per day drinking water intake using the 168 hour data list in "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(2) If two (2) or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any internal organ shall not exceed 4 mrem/year.

TABLE A. Average Annual Concentrations Assumed to Produce a Total Body or Any Internal Organ Dose of 4 millirem/year

Radionuclide	Critical Organ	pCi/l
Tritium	total body	20,000
Strontium-90	bone marrow	8

(e) **Monitoring and Compliance Requirements For Beta Particle and Photon Radioactivity.** For the purposes of monitoring for beta particle and photon radioactivity in drinking water, "detection limit" is defined as in Appendix 1 Section II D (3). To determine compliance with the maximum contaminant levels in §16.5(d) for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

(1) Community water systems (both surface and ground water) designated by the Director as vulnerable must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each

entry point to the distribution system (hereafter called a sampling point), beginning within one (1) quarter after being notified by the Director. Systems already designated by the Director must continue to sample until the Director reviews and either reaffirms or removes the designation.

(i) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the Director may reduce the frequency of monitoring at that sampling point to once every 3 years. Systems must collect all samples required in §16.5(e)(1) during the reduced monitoring period.

(ii) For systems in the vicinity of a nuclear facility, the Director may allow the community water system to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the Director determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with §16.5(e)(1).

(2) Community water systems (both surface and ground water) designated by the Director as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one (1) quarter after being notified by the Director. Systems already designated by the Director as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the Director reviews and either reaffirms or removes the designation.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three (3) monthly samples. The former is recommended.

(ii) For iodine-131, a composite of five (5) consecutive daily samples shall be analyzed once each quarter. As ordered by the Director, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four (4) consecutive quarterly samples or analysis of four (4) quarterly samples. The latter procedure is recommended.

(iv) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L (screening level), the Director may reduce the frequency of monitoring at that sampling point to every 3 years. Systems must collect all samples required in §16.5(e)(2) during the reduced monitoring period.

(v) For systems in the vicinity of a nuclear facility, the Director may allow the community water system to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the Director determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with §16.5(e)(2).

(3) Community water systems designated by the Director to monitor for beta particle and photon radioactivity can not apply to the Director for a waiver from the monitoring frequencies specified in §16.5(e)(1) or (e)(2).

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

(5) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and summed to determine compliance with §16.5(d), using the formula in §16.5(d)(1). Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(6) Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in §16.5(d) beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of 3 monthly samples, that the MCL is being met. Systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in §16.5(e)(1)(i) or (e)(2)(iv).

(f) **General Monitoring and Compliance Requirements for Radionuclides.**

(1) The Director may require more frequent monitoring than specified in §§16.5(a) and (e), or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

(2) Each PWS shall monitor at the time designated by the Director during each compliance period.

(3) **Compliance**: Compliance with §16.5(b) through (d) will be determined based on the analytical result(s) obtained at each sampling point. If one (1) sampling point is in violation of an MCL, the system is in violation of the MCL.

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

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

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

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

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

(vi) To judge compliance with the maximum contaminant levels listed in §§16.5(b), (c) and (d), 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.

(4) The Director has the discretion to delete results of obvious sampling or analytic errors.

(5) If the MCL for radioactivity set forth in §§16.5(b), (c) or (d) is exceeded, the operator of a community water system must give notice to the Director pursuant to §11.0 and to the public as required by §16.8.

(6) Where monitoring results exceed the MCLs specified in §§16.5(b), (c) or (d), compliance shall be achieved by installation of central treatment which is approved by the Director. Point of use or point of entry devices may be used only as a condition of a variance from §16.5(f) and only if a plan for their maintenance and operation is approved by the Director and every building connected to the water system has a device installed and adequately monitored by the PWS. Requirements for approval of use of non-centralized treatment are contained in §§4.4 and 4.5 of these Regulations.

(g) **Compliance Dates for Combined Radium-226 and -228, Gross Alpha Particle Activity, Gross Beta Particle and Photon Radioactivity and Uranium:** Community water systems must comply with the MCLs listed in §§16.5 (b), (c) and (d) beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of §16.5 and Appendix 1. Compliance with reporting requirements for the radionuclides under §§11.0 and 16.8 is required on December 8, 2003.

(h) **Best Available Technologies (BATs) for Radionuclides.** The Director hereby identifies as indicated in the following table the best technology available for achieving compliance with the maximum contaminant levels for combined radium-226 and -228, uranium, gross alpha particle activity and beta particle and photon radioactivity.

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

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

(i) **Small Systems Compliance Technologies List for Radionuclides**

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

Unit Technologies	Limitations (see footnotes)	Operator Skill Level Required[1]	Raw Water Quality Range and Considerations[1]
1. Ion exchange (IE)	(a)	Intermediate	All ground waters.
2. Point of use (POU[2]) IE	(b)	Basic	All ground waters.
3. Reverse osmosis (RO)	(c)	Advanced	Surface waters usually require pre-filtration.
4. POU[2] RO	(b)	Basic	Surface waters usually require pre-filtration.
5. Lime softening	(d)	Advanced	All waters.
6. Green sand filtration	(e)	Basic	
7. Co-precipitation with Barium sulfate	(f)	Intermediate to Advanced	Ground waters with suitable water quality.
8. Electrodialysis/ electrodialysis reversal		Basic to Intermediate	All ground waters.
9. Pre-formed hydrous Manganese oxide filtration.	(g)	Intermediate	All ground waters.
10.Activated alumina	(a), (h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency.
11.Enhanced coagulation/ filtration	(i)	Advanced	Can treat a wide range of water qualities.

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

[2] A POU, or ''point-of-use'' technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one (1) tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes:

Technologies for Radionuclides:

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

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

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

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

[e] Removal efficiencies can vary depending on water quality.

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

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

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

[i] Assumes modification to a coagulation/filtration process already in place.

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

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

Note: [1] Numbers correspond to those technologies found listed in Table C of §16.5(i) above.

16.6 [DELETED]

16.7 [DELETED]

16.8 **Public Notification of Drinking Water Violations**

16.8.1 General public notification requirements.

16.8.2 Tier 1 Public Notice–Form, manner and frequency of notice.

16.8.3 Tier 2 Public Notice–Form, manner and frequency of notice.

16.8.4 Tier 3 Public Notice–Form, manner and frequency of notice.

16.8.5 Content of the public notice.

16.8.6 Notice to new billing units or new customers.

16.8.7 Special notice of the availability of unregulated contaminant monitoring results.

16.8.8 Special notice for exceedance of the SMCL for fluoride.

16.8.9 Special notice for nitrate exceedances above MCL by non-community water systems (NCWS), where granted permission by the Director under 40 CFR 141.11(d)

16.8.10 Notice by the Director on behalf of the PWS.

16.8.11 Reporting.

16.8.12 Special notice for repeated failure to conduct monitoring of the source water for *Cryptosporidium* and for failure to determine bin classification or mean *Cryptosporidium* level

Appendix A to §16.8 – NPDWR Violations and Other Situations Requiring Public Notice

Appendix B to §16.8 – Standard Health Effects Language for Public Notification

Appendix C to §16.8 – List of Acronyms Used in Public Notification Regulation

16.8.1 **General Public Notification Requirements**

(a) **Who must give public notice?** Each owner or operator of a PWS (community water systems, non-transient, non-community water systems and transient non-community water systems) must give notice for all violations of National Primary Drinking Water Regulations (NPDWR) and for other situations, as listed in Table 1. The term "NPDWR violations" is used in these Regulations to include violations of the maximum contaminant level (MCL), maximum residual disinfection level (MRDL), treatment technique (TT), monitoring requirements and testing procedures in

these Regulations. Appendix A to this Section identifies the tier assignment for each specific violation or situation requiring a public notice.

Table 1 to §16.8.1 – Violation Categories and Other Situations Requiring a Public Notice

(1)	**NPDWR violations:** (i) Failure to comply with an applicable maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL). (ii) Failure to comply with a prescribed treatment technique (TT). (iii) Failure to perform water quality monitoring, as required by the drinking water regulations. (iv) Failure to comply with testing procedures as prescribed by a drinking water regulation.
(2)	**Variance and exemptions under sections 1415 and 1416 of SDWA:** (i) Operation under a variance or an exemption. (ii) Failure to comply with the requirements of any schedule that has been set under a variance or exemption.
(3)	**Special public notices:** (i) Occurrence of a waterborne disease outbreak or other waterborne emergency. (ii) Exceedance of the nitrate MCL by non-community water systems (NCWS), where granted permission by the Director under Section 15.5 of this part. (iii) Exceedance of the secondary maximum contaminant level (SMCL) for fluoride. (iv) Availability of unregulated contaminant monitoring data. (v) Other violations and situations determined by the Director to require a public notice under this subpart, not already listed in Appendix A.

(b) **<u>What type of public notice is required for each violation or situation</u>?** Public notice requirements are divided into three (3) tiers, to take into account the seriousness of the violation or situation and of any potential adverse health effects that may be involved. The public notice requirements for each violation or situation listed in Table 1 of this Section are determined by the tier to which it is assigned. Table 2 of this Section provides the definition of each tier. Appendix A of this subpart identifies the tier assignment for each specific violation or situation.

Table 2 to §16.8.1 – Definition of Public Notice Tiers

(1)	**Tier 1 Public Notice** – required for NPDWR violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure.
(2)	**Tier 2 Public Notice** – required for all other NPDWR violations and situations with potential to have serious adverse effects on human health.
(3)	**Tier 3 Public Notice** – required for all other NPDWR violations and situations not included in Tier 1 and Tier 2.

(c) **<u>Who must be notified</u>?**

(1) Each PWS must provide public notice to persons served by the water system, in accordance with this subpart. PWSs that sell or otherwise provide drinking water to other PWSs (i.e., to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice to the persons it serves.

(2) If a PWS has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system, the Director may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission by the Director for limiting distribution of the notice must be granted in writing.

(3) A copy of the notice must also be sent to the Director, in accordance with the requirements under §16.8.11.

16.8.2 **Tier 1 Public Notice–Form, Manner and Frequency of Notice**

(a) **Which violations or situations require a Tier 1 public notice?** Table 1 of this Section lists the violation categories and other situations requiring a Tier 1 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

Table 1 to §16.8.2 – Violation Categories and Other Situations Requiring a Tier 1 Public Notice

(1)	Violation of the MCL for total coliforms when fecal coliform or *E. Coli* are present in the water distribution system (as specified in §16.4(c)), or when the water system fails to test for fecal coliforms or *E. Coli* when any repeat sample tests positive for coliform (as specified in §16.4(e));
(2)	Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, as defined in §16.1, or when the water system fails to take a confirmation sample within 24 hours of the system's receipt of the first sample showing an exceedance of the nitrate or nitrite MCL, as specified in §16.1(f)(2);
(3)	Exceedance of the nitrate MCL by non-community water systems, where permitted to exceed the MCL by the Director under §16.8.9, as required under §15.5;
(4)	Violation of the MRDL for chlorine dioxide, as defined in §7.2(a), when one (1) or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system, as specified in §7.6(c)(2)(i);
(5)	Violation of the turbidity MCL under §16.3, where the Director determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
(6)	Violation of the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), or Long Term 1 Interim Enhanced Surface Water Treatment Rule (LT1ESWTR), §5.0 of these Regulations, treatment technique requirements resulting from a single exceedance of the maximum allowable turbidity limit (as identified in Appendix A), where the Director determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
(7)	Occurrence of a waterborne disease outbreak, as defined in §1.0, or other waterborne emergency (such as a failure or significant interruption in key water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination);
(8)	Detection of *E. coli* , enterococci, or coliphage in source water samples as specified in §13.3(a) and §13.3(b);
(9)	Other violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the Director either in its regulations or on a case-by-case basis.

(b) **When is the Tier 1 public notice to be provided? What additional steps are required?** PWSs must:

(1) Provide a public notice as soon as practical but no later than 24 hours after the system learns of the violation;

(2) Initiate consultation with the Director as soon as practical, but no later than 24 hours after the PWS learns of the violation or situation, to determine additional public notice requirements; and

(3) Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the Director. Such requirements may include the timing, form, manner, frequency and content of repeat notices (if any) and other actions designed to reach all persons served.

(c) **What is the form and manner of the public notice?** PWSs must provide the notice within 24 hours in a form and manner reasonably calculated to reach all persons served. The form and manner used by the PWS are to fit the specific situation, but must be designed to reach residential, transient and non-transient users of the water system. In order to reach all persons served, water systems are to use, at a minimum, one (1) or more of the following forms of delivery:

(1) Appropriate broadcast media (such as radio and television);

(2) Posting of the notice in conspicuous locations throughout the area served by the water system;

(3) Hand delivery of the notice to persons served by the water system; or

(4) Another delivery method approved in writing by the Director.

16.8.3 **Tier 2 Public Notice-Form, Manner, and Frequency of Notice**

(a) **Which violations or situations require a Tier 2 public notice?** Table 1 of this Section lists the violation categories and other situations requiring a Tier 2 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

Table 1 to §16.8.3 – Violation Categories and Other Situations Requiring a Tier 2 Public Notice

(1)	All violations of the MCL, MRDL and treatment technique requirements, except where a Tier 1 notice is required under §16.8.2(a) or where the Director determines that a Tier 1 notice is required;
(2)	Violations of the monitoring and testing procedure requirements, where the Director determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation; and
(3)	Failure to comply with the terms and conditions of any variance or exemption in place.
(4)	Failure to take corrective action or failure to maintain at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer under §13.4(a).

(b) **When is the Tier 2 public notice to be provided?**

(1) A PWS must provide the public notice as soon as practical, but no later than 30 days after the system learns of the violation. If the public notice is posted, the notice must remain in place

for as long as the violation or situation persists, but in no case for less than seven (7) days, even if the violation or situation is resolved. The Director may, in appropriate circumstances, allow additional time for the initial notice of up to three (3) months from the date the system learns of the violation. It is not appropriate for the Director to grant an extension to the 30-day deadline for any unresolved violation or to allow across-the-board extensions by rule or policy for other violations or situations requiring a Tier 2 public notice. Extensions granted by the Director must be in writing.

(2) The PWS must repeat the notice every three (3) months as long as the violation or situation persists, unless the Director determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstance may the repeat notice be given less frequently than once per year. It is not appropriate for the Director to allow less frequent repeat notice for an MCL violation under the Total Coliform Rule or a treatment technique violation under the Surface Water Treatment Rule or Interim Enhanced Surface Water Treatment Rule (§5.0). It is also not appropriate for the Director to allow through its rules or policies across-the-board reductions in the repeat notice frequency for other ongoing violations requiring a Tier 2 repeat notice. The Director's determinations allowing repeat notices to be given less frequently than once every three (3) months must be in writing.

(3) For the turbidity violations specified in this Paragraph, PWSs must consult with the Director as soon as practical but no later than 24 hours after the PWS learns of the violation, to determine whether a Tier 1 public notice under §16.8.2(a) 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 notice of the violation within the next 24 hours (i.e., no later than 48 hours after the system learns of the violation), following the requirements under §§16.8.2(b) and (c). Consultation with the Director is required for:

(i) Violation of the turbidity MCL under §16.3; or

(ii) Violation of the SWTR, IESWTR or LT1ESWTR (§5.0) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit.

(c) **What is the form and manner of the Tier 2 public notice?** PWSs must provide the initial public notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

(1) Unless directed otherwise by the Director in writing, community water systems must provide notice by:

(i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the PWS; and

(ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in §16.8.3(c)(1)(i). Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places served by the system or on the Internet; or delivery to community organizations.

(2) Unless directed otherwise by the Director in writing, non-community water systems must provide notice by:

(i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(ii) Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in §16.8.3(c)(2)(i). Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

16.8.4 **Tier 3 Public Notice–Form, Manner, and Frequency of Notice**

(a) **Which violations or situations require a Tier 3 public notice?** Table 1 of this Section lists the violation categories and other situations requiring a Tier 3 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

Table 1 to §16.8.4 – Violation Categories and Other Situations Requiring a Tier 3 Public Notice

(1)	Monitoring violations, except where a Tier 1 notice is required under §16.8.2 or where the Director determines that a Tier 2 notice is required;
(2)	Failure to comply with a testing procedure established in these Regulations, except where a Tier 1 notice is required under §16.8.2(a) or where the Director determines that a Tier 2 notice is required;
(3)	Operation under a variance granted under §1415 or an exemption granted under §1416 of the Safe Drinking Water Act (Section 15);
(4)	Availability of unregulated contaminant monitoring results, as required under §16.8.7; and
(5)	Exceedance of the fluoride secondary maximum contaminant level (SMCL), as required under §16.8.8.

(b) **When is the Tier 3 public notice to be provided?**

(1) A PWS must provide the public notice not later than one (1) year after the PWS learns of the violation or situation or begins operating under a variance or exemption. Following the initial notice, the PWS must repeat the notice annually for as long as the violation, variance, exemption, or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, exemption, or other situation persists, but in no case less than seven (7) days (even if the violation or situation is resolved).

(2) Instead of individual Tier 3 public notices, a PWS may use an annual report detailing all violations and situations that occurred during the previous twelve (12) months, as long as the timing requirements of §16.8.4(b)(1) are met.

(c) **What is the form and manner of the Tier 3 public notice?** A PWS must provide the initial notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

(1) Unless directed otherwise by the Director in writing, community water systems must provide notice by:

(i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the PWS; and

(ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in §16.8.4(c)(1)(i). Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places or on the Internet; or delivery to community organizations.

(2) Unless directed otherwise by the Director in writing, non-community water systems must provide notice by:

(i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(ii) Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in §16.8.4(c)(2)(i). Such persons may include those who may not see a posted notice because the notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

(d) **In what situations may the Consumer Confidence Report be used to meet the Tier 3 public notice requirements?** For community water systems, the Consumer Confidence Report (CCR) required under §16.10 of these Regulations may be used as a vehicle for the initial Tier 3 public notice and all required repeat notices, as long as:

(1) The CCR is provided to persons served no later than 12 months after the system learns of the violation or situation as required under §16.8.4(b);

(2) The Tier 3 notice contained in the CCR follows the content requirements under Section 16.8.5; and

(3) The CCR is distributed following the delivery requirements under §16.8.4(c).

16.8.5 **Content of the Public Notice**

(a) **What elements must be included in the public notice for violations of National Primary Drinking Water Regulations (NPDWR) or other situations requiring a public notice?** When a PWS violates a NPDWR or has a situation requiring public notification, each public notice must include the following elements:

(1) A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);

(2) When the violation or situation occurred;

(3) Any potential adverse health effects from the violation or situation, including the standard language under §§16.8.5(d)(1) or (d)(2), whichever is applicable;

(4) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;

(5) Whether alternative water supplies should be used;

(6) What actions consumers should take, including when they should seek medical help, if known;

(7) What the system is doing to correct the violation or situation;

(8) When the water system expects to return to compliance or resolve the situation;

(9) The name, business address and phone number of the water system owner, operator, or designee of the PWS as a source of additional information concerning the notice; and

(10) A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under §16.8.5(d)(3), where applicable.

(b) **<u>What elements must be included in the public notice for a PWS operating under a variance or exemption</u>?**

(1) If a PWS has been granted a variance or an exemption, the public notice must contain:

(i) An explanation of the reasons for the variance or exemption;

(ii) The date on which the variance or exemption was issued;

(iii) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(iv) A notice of any opportunity for public input in the review of the variance or exemption.

(2) If a PWS violates the conditions of a variance or exemption, the public notice must contain the ten (10) elements listed in §16.8.5(a).

(c) **<u>How is the public notice to be presented</u>?**

(1) Each public notice required by §16.8.5:

(i) Must be displayed in a conspicuous way when printed or posted;

(ii) Must not contain overly technical language or very small print;

(iii) Must not be formatted in a way that defeats the purpose of the notice;

(iv) Must not contain language which nullifies the purpose of the notice.

(2) Each public notice required by §16.8.5 must comply with multilingual requirements, as follows:

(i) For a PWS serving a large proportion of non-English speaking consumers, as determined by the Director, the public notice must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the notice or to request assistance in the appropriate language.

(ii) In cases where the Director has not determined what constitutes a large proportion of non-English speaking consumers, the PWS must include in the public notice the same information as in §16.8.5(c)(2)(i), where appropriate to reach a large proportion of non-English speaking persons served by the water system.

(d) **What standard language must a PWS include in their public notice?** PWSs are required to include the following standard language in their public notice:

(1) Standard health effects language for MCL or MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption. PWSs must include in each public notice the health effects language specified in Appendix B to this subpart corresponding to each MCL, MRDL, and treatment technique violation listed in Appendix A to this subpart, and for each violation of a condition of a variance or exemption.

(2) Standard language for monitoring and testing procedure violations. PWSs must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in Appendix A to this 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.

(3) Standard language to encourage the distribution of the public notice to all persons served. PWSs must include in their notice the following language (where applicable):

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail

16.8.6 **Notice to New Billing Units or New Customers**

(a) **What is the requirement for community water systems?** Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

(b) **What is the requirement for non-community water systems?** Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

16.8.7 **Special Notice of the Availability of Unregulated Contaminant Monitoring Results**

(a) **When is the special notice to be given?** The owner or operator of a community water system or non-transient, non-community water system is required to monitor under 40 CFR 141.40. They must notify persons served by the system of the availability of the results of such sampling no later than 12 months after the monitoring results are known.

(b) **What is the form and manner of the special notice?** The form and manner of the public notice must follow the requirements for a Tier 3 public notice prescribed in §§16.8.4(c), (d)(1) and (d)(3). The notice must also identify a person and provide the telephone number to contact for information on the monitoring results.

16.8.8 **Special Notice for Exceedance of 2 mg/L Fluoride**

(a) **When is the special notice to be given?** Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of 2 mg/L (determined by the last single sample

taken in accordance with §16.1), but do not exceed the maximum contaminant level (MCL) of 4 mg/L for fluoride (as specified in §16.1), must provide the public notice in §16.8.8(c) to persons served. Public notice must be provided as soon as practical but no later than 12 months from the day the water system learns of the exceedance. A copy of the notice must also be sent to all new billing units and new customers at the time service begins, and to the Director. The PWS must repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice must remain in place for as long as the SMCL is exceeded, but in no case less than seven (7) days (even if the exceedance is eliminated). On a case-by-case basis, the Director may require an initial notice sooner than 12 months and repeat notices more frequently than annually.

(b) **What is the form and manner of the special notice?** The form and manner of the public notice (including repeat notices) must follow the requirements for a Tier 3 public notice in §§16.8.4(c) and (d)(1) and (d)(3).

(c) **What mandatory language must be contained in the special notice?** The notice must contain the following language, including the language necessary to fill in the blanks:

This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine (9) years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/L) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your community water system [name] has a fluoride concentration of [insert value] mg/L.

Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine (9) should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water.

Drinking water containing more than 4 mg/L of fluoride (the U.S. Environmental Protection Agency's drinking water standard) can increase your risk of developing bone disease. Your drinking water does not contain more than 4 mg/L of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed 2 mg/L because of this cosmetic dental problem.

For more information, please call [name of water system contact] of [name of community water system] at [phone number]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call NSF International at 1-877-8-NSF-HELP."

16.8.9 **Special Notice for Nitrate Exceedances Above MCL by Non-community Water Systems (NCWS), where Granted Permission by the Director Under §15.5.**

(a) **When is the special notice to be given?** The owner or operator of a non-community water system granted permission by the Director under §15.5 to exceed the nitrate MCL must provide notice to persons served according to the requirements for a Tier 1 notice under §16.8.2(a) and (b).

(b) **What is the form and manner of the special notice?** Non-community water systems granted permission by the Director to exceed the nitrate MCL under §15.5 must provide continuous posting of the fact that nitrate levels exceed 10 mg/L and the potential health effects of exposure,

according to the requirements for Tier 1 notice delivery under §16.8(2(c) and the content requirements under §16.8.5.

16.8.10 **Notice by Director on Behalf of the PWS**

(a) **May the Director give the notice on behalf of the PWS?** The Director may give the notice required by this subpart on behalf of the owner and operator of the PWS if the Director complies with the requirements of this subpart.

(b) **What is the responsibility of the PWS when notice is given by the Director?** The owner or operator of the PWS remains responsible for ensuring that the requirements of this subpart are met.

16.8.11 The PWS, within ten (10) days of completing the public notification requirements under this part for the initial public notice and any repeat notices, must submit to the Director a certification that it has fully complied with the public notification regulations. The PWS 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 issued pursuant to this Section and certifications made to the Director pursuant to this Section must be kept for three (3) years after issuance.

16.8.12 **Special notice for repeated failure to conduct monitoring of the source water for *Cryptosporidium* and for failure to determine bin classification or mean *Cryptosporidium* level.**

(a) **When is the special notice for repeated failure to monitor to be given?** The owner or operator of a community or non-community water system that is required to monitor source water under §5.9.1 must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any 3 months of monitoring as specified in §5.9.1(c). The notice must be repeated as specified in §16.3(b).

(b) **When is the special notice for failure to determine bin classification or mean *Cryptosporidium* level to be given?** The owner or operator of a community or non-community water system that is required to determine a bin classification under §5.9.11, or to determine mean *Cryptosporidium* level under §5.9.13, must notify persons served by the water system that the determination has not been made as required no later than 30 days after the system has failed report the determination as specified in §5.9.11(e) or §5.9.13(a), respectively. The notice must be repeated as specified in §16.3(b). The notice is not required if the system is complying with a Director-approved schedule to address the violation.

(c) **What is the form and manner of the special notice?** The form and manner of the public notice must follow the requirements for a Tier 2 public notice prescribed in §16.3(c). The public notice must be presented as required in §16.5(c).

(d) **What mandatory language must be contained in the special notice?** The notice must contain the following language, including the language necessary to fill in the blanks.

(1) The special notice for repeated failure to conduct monitoring must contain the following language:

We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at the (treatment plant name) is sufficient to adequately remove *Cryptosporidium* from your drinking water. We are required to complete this monitoring and make this determination by (required bin

determination date). We ``did not monitor or test'' or ``did not complete all monitoring or testing'' on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate *Cryptosporidium* removal. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, (date). For more information, please call (name of water system contact) of (name of water system) at (phone number).

(2) The special notice for failure to determine bin classification or mean *Cryptosporidium* level must contain the following language:

We are required to monitor the source of your drinking water for *Cryptosporidium* in order to determine by (date) whether water treatment at the (treatment plant name) is sufficient to adequately remove *Cryptosporidium* from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of (date). For more information, please call (name of water system contact) of (name of water system) at (phone number).

(3) Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

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APPENDIX A TO §16.8
NPDWR VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE [1]

MCL/MRDL/TT violations[2]			Monitoring & testing procedure violations	
Contaminant	**Tier of public notice required**	**Citation**	**Tier of public notice required**	**Citation**
I. Violations of National Primary Drinking Water Regulations (NPDWR)[3]				
A. Microbiological Contaminants				
1. Total coliform	2	16.4(c)	3	16.4
2. Fecal coliform/*E. Coli*	1	16.4(c)	1, 3[4]	16.4
3. Turbidity MCL	2	16.3	3	16.3
4. Turbidity MCL (average of 2 days' samples >5 NTU)	2, 1[5]	16.3	3	16.3
5. Turbidity (for TT violations resulting from a single exceedance of maximum allowable turbidity level)	2, 1[6]	5.2.5(2) 5.2.7 5.4.2(1)(b) 5.4.2(2)(c) 5.4.3(2) 5.4.4(2) 5.4.5	3	5.6 5.7
6. Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. allowable turbidity level (TT).	2	5.0–5.8	3	5.5
7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. turbidity level (TT)	2	5.1 5.2 5.3.7 5.4.2(1) 5.4.2(2) 5.4.5	3	5.3.7 5.7.1(1)(b) 5.8.2(4)
8. Filter Backwash Recycling Rule violations	2	5.1.5 5.8.4	3	5.1.5 5.8.4
9. Long Term 1 Enhanced Surface Water Treatment Rule violations	2	5.1 5.2 5.3.7 5.4.2(1) 5.4.2(2) 5.4.5	3	5.3.7 5.7.1(1)(b) 5.8.2(4)
10. Long Term 2 Enhanced Surface Water Treatment Rule violations	2	5.9.11 - 5.9.21	2[22], 3	5.9.2 - 5.9.6 and 5.9.9 - 5.9.10
11. Ground Water Rule violations	2	13.5	3	13.2(h), 13.4(d)
B. Inorganic Chemicals (IOCs)				
1. Antimony	2	16.1	3	16.1
2. Arsenic	2	16.1(j)(4)[8]	3	16.1(a) and (c)[11]
3. Asbestos (fibers >10 μm)	2	16.1	3	16.1
4. Barium	2	16.1	3	16.1
5. Beryllium	2	16.1	3	16.1

MCL/MRDL/TT violations[2]			Monitoring & testing procedure violations	
Contaminant	**Tier of public notice required**	**Citation**	**Tier of public notice required**	**Citation**
6. Cadmium	2	16.1	3	16.1
7. Chromium (total)	2	16.1	3	16.1
8. Cyanide	2	16.1	3	16.1
9. Fluoride	2	16.1	3	16.1
10. Mercury (inorganic)	2	16.1	3	16.1
11. Nitrate	1	16.1	1, 3[12]	16.1
12. Nitrite	1	16.1	1, 3[12]	16.1
13. Total Nitrate and Nitrite	1	16.1	3	16.1
14. Selenium	2	16.1	3	16.1
15. Thallium	2	16.1	3	16.1
C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L)				
1. Lead and Copper Rule (TT)	2	6.8–6.85	3	6.86–6.89
D. Synthetic Organic Chemicals (SOCs)				
1. 2,4-D	2	16.2(a)	3	16.2(a)
2. 2,4,5-TP (Silvex)	2	16.2(a)	3	16.2(a)
3. Alachlor	2	16.2(a)	3	16.2(a)
4. Atrazine	2	16.2(a)	3	16.2(a)
5. Benzo(a)pyrene (PAHs)	2	16.2(a)	3	16.2(a)
6. Carbofuran	2	16.2(a)	3	16.2(a)
7. Chlordane	2	16.2(a)	3	16.2(a)
8. Dalapon	2	16.2(a)	3	16.2(a)
9. Di (2-ethylhexyl) adipate	2	16.2(a)	3	16.2(a)
10. Di (2-ethylhexyl) phthalate	2	16.2(a)	3	16.2(a)
11. Dibromochloropropane	2	16.2(a)	3	16.2(a)
12. Dinoseb	2	16.2(a)	3	16.2(a)
13. Dioxin (2,3,7,8-TCDD)	2	16.2(a)	3	16.2(a)
14. Diquat	2	16.2(a)	3	16.2(a)
15. Endothall	2	16.2(a)	3	16.2(a)
16. Endrin	2	16.2(a)	3	16.2(a)
17. Ethylene dibromide	2	16.2(a)	3	16.2(a)
18. Glyphosate	2	16.2(a)	3	16.2(a)
19. Heptachlor	2	16.2(a)	3	16.2(a)
20. Heptachlor epoxide	2	16.2(a)	3	16.2(a)
21. Hexachlorobenzene	2	16.2(a)	3	16.2(a)
22. Hexachlorocyclo-pentadiene	2	16.2(a)	3	16.2(a)
23. Lindane	2	16.2(a)	3	16.2(a)
24. Methoxychlor	2	16.2(a)	3	16.2(a)
25. Oxamyl (Vydate)	2	16.2(a)	3	16.2(a)
26. Pentachlorophenol	2	16.2(a)	3	16.2(a)

MCL/MRDL/TT violations[2]			Monitoring & testing procedure violations	
Contaminant	**Tier of public notice required**	**Citation**	**Tier of public notice required**	**Citation**
27. Picloram	2	16.2(a)	3	16.2(a)
28. Polychlorinated biphenyls (PCBs)	2	16.2(a)	3	16.2(a)
29. Simazine	2	16.2(a)	3	16.2(a)
30. Toxaphene	2	16.2(a)	3	16.2(a)
E. Volatile Organic Chemicals (VOCs)				
1. Benzene	2	16.2(b)	3	16.2(b)
2. Carbon tetrachloride	2	16.2(b)	3	16.2(b)
3. Chlorobenzene (monochlorobenzene)	2	16.2(b)	3	16.2(b)
4. o-Dichlorobenzene	2	16.2(b)	3	16.2(b)
5. p-Dichlorobenzene	2	16.2(b)	3	16.2(b)
6. 1,2-Dichloroethane	2	16.2(b)	3	16.2(b)
7. `1,1-Dichloroethylene	2	16.2(b)	3	16.2(b)
8. cis-1,2-Dichloroethylene	2	16.2(b)	3	16.2(b)
9. trans-1,2-Dichloroethylene	2	16.2(b)	3	16.2(b)
10. Dichloromethane	2	16.2(b)	3	16.2(b)
11. 1,2-Dichloropropane	2	16.2(b)	3	16.2(b)
12. Ethylbenzene	2	16.2(b)	3	16.2(b)
13. Styrene	2	16.2(b)	3	16.2(b)
14. Tetrachloroethylene	2	16.2(b)	3	16.2(b)
15. Toluene	2	16.2(b)	3	16.2(b)
16. 1,2,4-Trichlorobenzene	2	16.2(b)	3	16.2(b)
17. 1,1,1-Trichloroethane	2	16.2(b)	3	16.2(b)
18. 1,1,2-Trichloroethane	2	16.2(b)	3	16.2(b)
19. Trichloroethylene	2	16.2(b)	3	16.2(b)
20. Vinyl chloride	2	16.2(b)	3	16.2(b)
21. Xylenes (total)	2	16.2(b)	3	16.2(b)
F. Radioactive Contaminants				
1. Beta/photon emitters	2	16.5(c)	3	16.5
2. Alpha emitters	2	16.5(b)	3	16.5
3. Combined radium (226 & 228)	2	16.5(b)	3	16.5
4. Uranium	2[9]	16.5(c)	3[10]	16.5(a) and Appendix 1, Section D
G. Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs).[13]				
1. Total trihalomethanes (TTHMs)	2	16.2(a)[14] 7.1(a)	3	16.2(a) (19)
2. Haloacetic Acids (HAA5)	2	7.1(a)	3	7.5(a)–(b)

MCL/MRDL/TT violations[2]			Monitoring & testing procedure violations	
Contaminant	**Tier of public notice required**	**Citation**	**Tier of public notice required**	**Citation**
3. Bromate	2	7.1(a)	3	7.5(a)–(b)
4. Chlorite	2	7.1(a)	3	7.5(a)–(b)
5. Chlorine (MRDL)	2	7.2(a)	3	7.5(a)–(b)
6. Chloramine (MRDL)	2	7.2(a)	3	7.5 (a), (c)
7. Chlorine dioxide (MRDL), where any 2 consecutive daily samples at entrance to distribution system only are above MRDL	2	7.2(a) 7.6(c)(3)	2, 3[15]	7.5(a), (c) 7.6(c)(2)
8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL	1[16]	7.2(a) 7.6(c)(3)	1	7.5(a), (c) 7.6(c)(2)
9. Control of DBP precursors– TOC (TT)	2	7.8(a)–(b)	3	7.5 (9)(d)
10. Bench marking and disinfection profiling	N/A	N/A	3	5.3.7
11. Development of monitoring plan	N/A	N/A	3	7.5(8)
H. Other Treatment Techniques				
1. Acrylamide (TT)	2	16.2(d)	N/A	N/A
2. Epichlorohydrin (TT)	2	16.2(d)	N/A	N/A
II. Unregulated Contaminant Monitoring [17]				
A. Unregulated contaminants	N/A	N/A	3	40 CFR 141-40
B. Nickel	N/A	N/A	3	16.1
III. Public Notification for Variances and Exemptions:				
A. Operation under a variance or exemption	3	1415, 1416[18]	N/A	N/A
B. Violation of conditions of a variance or exemption	2	1415, 1416 142.307[19]	N/A	N/A
IV. Other Situations Requiring Public Notification:				
A. Fluoride secondary maximum contaminant level (SMCL) exceedance	3	16.8.8	N/A	N/A
B. Exceedance of nitrate MCL for non-community systems, as allowed by Director	1	15.5	N/A	N/A
C. Availability of unregulated contaminant monitoring data	3	16.8.7	N/A	N/A
D. Waterborne disease outbreak	1	Section 1 5.2.7 B.2	N/A	N/A
E. Other waterborne emergency[20]	1	N/A	N/A	N/A
F. Source Water Sample Positive for GWR Fecal indicators: *E. coli*, enterococci, or coliphage	1	13.3(g)	N/A	N/A

MCL/MRDL/TT violations[2]			Monitoring & testing procedure violations	
Contaminant	**Tier of public notice required**	**Citation**	**Tier of public notice required**	**Citation**
G. Other situations as determined by the Director	1, 2, 3[21]	N/A	N/A	N/A

Appendix A – Endnotes

1. Violations and other situations not listed in this table (e.g., reporting violations and failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the Director. The Director may, at their option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under §§16.8.2(a) and 16.8.3(a).
2. MCL – Maximum contaminant level, MRDL – Maximum residual disinfectant level, TT – Treatment technique
3. The term Violations of National Primary Drinking Water Regulations (NPDWR) is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.
4. Failure to test for fecal coliform or *E. Coli* is a Tier 1 violation if testing is not done after any repeat sample tests positive for coliform. All other total coliform monitoring and testing procedure violations are Tier 3.
5. Systems that violate the turbidity MCL of 5 NTU based on an average of measurements over two (2) consecutive days must consult with the Director within 24 hours after learning of the violation. Based on this consultation, the Director may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the Director in the 24-hour period, the violation is automatically elevated to Tier 1.
6. Systems with treatment technique violations involving a single exceedance of a maximum turbidity limit under the Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR), or the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) are required to consult with the Director within 24 hours after learning of the violation. Based on this consultation, the Director may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the Director in the 24-hour period, the violation is automatically elevated to Tier 1.
7. Most of the requirements of the Interim Enhanced Surface Water Treatment Rule (63 FR 69477) (Sections 141.170-141.171, 141.173-141.174) become effective January 1, 2002 for §5.0 systems (surface water systems and ground water systems under the direct influence of surface water) serving at least 10,000 persons. However, Section 141.172 has some requirements that become effective as early as April 16, 1999. The Surface Water Treatment Rule remains in effect for systems serving at least 10,000 persons even after 2002; the Interim Enhanced Surface Water Treatment Rule adds additional requirements and does not in many cases supercede the SWTR.
8. The arsenic MCL citations are effective January 23, 2006. Until then, refer to §16.1 (j)(4) and (l).
9. The uranium MCL Tier 2 violation citations are effective December 8, 2003 for all community water systems.
10. The uranium MCL Tier 3 violation citations are effective December 8, 2003 for all community water systems.
11. The arsenic Tier 3 violation MCL citations are effective January 23, 2006. Until then, refer to §16.1 (a) and (j).
12. Failure to take a confirmation sample within 24 hours for nitrate or nitrite after an initial sample exceeds the MCL is a Tier 1 violation. Other monitoring violations for nitrate are Tier 3.

13 §5.0 community and non-transient, non-community systems serving ≥ 10,000 must comply with new DBP MCLs, disinfectant MRDLs, and related monitoring requirements beginning January 1, 2002. All other community and non-transient non-community systems must meet the MCLs and MRDLs beginning January

1, 2004. §5.0 transient non-community systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. §5.0 transient non-community systems serving fewer than 10,000 persons and using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

14. §7.3(b)(1) and §§7.5(a)-(b) apply until the requirements of §7.10 take effect under the schedule in §7.10.1
15. Failure to monitor for chlorine dioxide at the entrance to the distribution system the day after exceeding the MRDL at the entrance to the distribution system is a Tier 2 violation.
16. If any daily sample taken at the entrance to the distribution system exceeds the MRDL for chlorine dioxide and one (1) or more samples taken in the distribution system the next day exceed the MRDL, Tier 1 notification is required. Failure to take the required samples in the distribution system after the MRDL is exceeded at the entry point also triggers Tier 1 notification.
17. Some water systems must monitor for certain unregulated contaminants listed in 40 CFR 141.40.
18. This citation refers to Sections 1415 and 1416 of the Safe Drinking Water Act. Sections1415 and 1416 require that "a schedule prescribed for a PWS granted a variance [or exemption] shall require compliance by the system..."
19. In addition to Sections 1415 and 1416 of the Safe Drinking Water Act, 40 CFR 142.307 specifies the items and schedule milestones that must be included in a variance for small systems.
20. Other waterborne emergencies require a Tier 1 public notice under §16.8.2(a) for situations that do not meet the definition of a waterborne disease outbreak given in Section 1 but that still have the potential to have serious adverse effects on health as a result of short-term exposure. These could include outbreaks not related to treatment deficiencies, as well as situations that have the potential to cause outbreaks, such as failures or significant interruption in water treatment processes, natural disasters that disrupt the water supply or distribution system, chemical spills, or unexpected loading of possible pathogens into the source water.
21. The Director may place other situations in any tier they believe appropriate, based on threat to public health.

22 Failure to collect three or more samples for *Cryptosporidium* analysis is a Tier 2 violation requiring special notice as specified in §16.8.12. All other monitoring and testing procedure violations are Tier 3.

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APPENDIX B TO §16.8
STANDARD HEALTH EFFECTS LANGUAGE FOR PUBLIC NOTIFICATION

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR)			
A. Microbiological Contaminants			
1a. Total coliform	Zero	See footnote 3	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/*E. Coli*	Zero	Zero	Fecal coliforms and *E. Coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short- term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children and people with severely compromised immune systems.
1c. Fecal indicators (GWR): i. *E. coli* ii. Enterococci iii. Coliphage	 Zero None None	 TT TT TT	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1d. Ground Water Rule (GWR) TT violations	None	TT	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.
2a. Turbidity (MCL[4])	None	1 NTU[5] 5 NTU	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2b. Turbidity (SWTR TT)[6]	None	TT[7]	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2c. Turbidity (IESWTR TT and LT1ESWTR TT)[8]	None	TT	Turbidity has no health effects. However, turbidity can interfere with disinfection and

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
			provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
B. Surface Water Treatment Rule (SWTR) and Interim Enhanced Surface Water Treatment Rule (IESWTR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and the Filter Backwash Recycling Rule (FBRR) violations			
3. *Giardia lamblia* (SWTR/IESWTR/LT1ESWTR) 4. Viruses (SWTR/IESWTR/LT1ESWTR) 5. Heterotrophic plate count (HPC) bacteria[9] (SWTR/IESWTR/LT1ESWTR) 6. *Legionella* (SWTR/IESWTR/LT1ESWTR) 7. *Cryptosporidium* (IESWTR/FBRR/LT1ESWTR)	Zero	TT[10]	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
C. Inorganic Chemicals (IOCs)			
8. Antimony	0.006	0.006	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9. Arsenic[11]	Zero	0.010	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
10. Asbestos (>10 µm)	7 MFL[12]	7 MFL	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
11. Barium	2	2	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
12. Beryllium	0.004	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	0.005	0.005	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
15. Cyanide	0.2	0.2	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
16. Fluoride	4.0	4.0	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine (9) years old. Mottling, also known as dental flurosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth, before they erupt from the gums.
17. Mercury (inorganic)	0.002	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	10	10	Infants below the age of six (6) months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.
19. Nitrite	1	1	Infants below the age of six (6) months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.
20. Total Nitrate and Nitrite	10	10	Infants below the age of six (6) months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
21. Selenium	0.05	0.05	Selenium is an essential nutrient. However some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
22. Thallium	0.0005	0.002	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
D. Lead and Copper Rule			
23. Lead	Zero	TT[13]	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
24. Copper	1.3	TT[14]	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
			could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
E. Synthetic Organic Compounds (SOCs)			
25. 2,4-D	0.07	0.07	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5-TP (Silvex)	0.05	0.05	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	Zero	0.002	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, experience anemia, or may have an increased risk of getting cancer.
28. Atrazine	0.003	0.003	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
29. Benzo(a)pyrene (PAHs)	Zero	0.0002	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties or may have an increased risk of getting cancer.
30. Carbofuran	0.04	0.04	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
31. Chlordane	Zero	0.002	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver, or nervous system, and may have an increased risk of getting cancer.
32. Dalapon	0.2	0.2	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
33. Di (2-ethylhexyl) adipate	0.4	0.4	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties.
34. Di(2-ethylhexyl) phthalate	Zero	0.006	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Zero	0.0002	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	0.007	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
37. Dioxin (2,3,7,8-TCDD)	Zero	3×10^{-8}	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
38. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	0.1	0.1	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
40. Endrin	0.002	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	Zero	0.00005	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
42. Glyphosate	0.7	0.7	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
43. Heptachlor	Zero	0.0004	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
44. Heptachlor epoxide	Zero	0.0002	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
45. Hexachlorobenzene	Zero	0.001	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
46. Hexachlorocyclopentadiene	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
47. Lindane	0.0002	0.0002	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
48. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	0.2	0.2	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
50. Pentachlorophenol	Zero	0.001	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
			liver or kidneys, and may have an increased risk of getting cancer.
51. Picloram	0.5	0.5	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
52. Polychlorinated biphenyls (PCBs)	Zero	0.0005	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
53. Simazine	0.004	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	Zero	0.003	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
F. Volatile Organic Chemicals (VOCs)			
55. Benzene	Zero	0.005	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
56. Carbon tetrachloride	Zero	0.005	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
57. Chlorobenzene (monochlorobenzene)	0.1	0.1	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys
58. o-Dichlorobenzene	0.6	0.6	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
59. p-Dichlorobenzene	0.075	0.075	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
60. 1,2-Dichloroethane	Zero	0.005	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
61. 1,1-Dichloroethylene	0.007	0.007	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
62. cis-1,2-Dichloroethylene	0.07	0.07	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
63. trans-1,2-Dichloroethylene	0.1	0.1	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	Zero	0.005	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
65. 1,2-Dichloropropane	Zero	0.005	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
66. Ethylbenzene	0.7	0.7	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
67. Styrene	0.1	0.1	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
68. Tetrachloroethylene	Zero	0.005	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
69. Toluene	1	1	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
70. 1,2,4-Trichlorobenzene	0.07	0.07	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
71. 1,1,1-Trichloroethane	0.2	0.2	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
72. 1,1,2-Trichloroethane	0.003	0.005	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
73. Trichloroethylene	Zero	0.005	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
74. Vinyl chloride	Zero	0.002	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
75. Xylenes (total)	10	10	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
G. Radioactive Contaminants			
76. Beta/photon emitters	Zero	4 mrem/yr[15]	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
77. Alpha emitters (Gross alpha)	Zero	15 pCi/L[17]	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
78. Combined radium (226 & 228)	Zero	5 pCi/L	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
79. Uranium[17]	Zero	30 µg/L	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
H. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals: Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA also sets standards for controlling the levels of disinfectants and DBPs in drinking water, which include trihalomethanes (THMs) and haloacetic acids (HAAs).[18]			
80. Total trihalomethanes (TTHMs)	N/A	0.080[19,20]	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
81. Haloacetic Acids (HAA5)	N/A	0.060[21]	Some people who drink water containing HAAs in excess of the MCL over many years may have an increased risk of developing cancer.
82. Bromate	Zero	0.010	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of developing cancer.
83. Chlorite	0.8	1.0	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant mothers who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
84. Chlorine	4 (MRDLG)[22]	4.0 (MRDL)[23]	Some people who contact drinking water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
85. Chloramines	4 (MRDLG)	4.0 (MRDL)	Some people who contact drinking water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
			MRDL could experience stomach discomfort or anemia.
86a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant mothers who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. Add for public notification only: The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
86b. Chlorine dioxide, where one (1) or more distribution system sample(s) are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant mothers who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. Add for public notification only: The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
87. Control of DBP precursors (TOC)	None	TT	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection by products. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs), which may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
I. Other Treatment Techniques			
88. Acrylamide	Zero	TT	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
89. Epichlorohydrin	Zero	TT	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

Appendix B – Endnotes

1. MCLG–Maximum contaminant level goal.
2. MCL–Maximum contaminant level.
3. For water systems analyzing at least 40 samples per month, no more than 5.0 percent of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one (1) sample per month may be positive for total coliforms.
4. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule, and the 2001 Long Term 1 Enhanced Surface Water Treatment Rule. The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 5 NTU for systems that are required to filter but have not yet installed filtration (40 CFR 141.13).
5. NTU–Nephelometric turbidity unit.
6. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule, and the 2001 Long Term 1 Enhanced Surface Water Treatment Rule. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95 percent of samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the Director.
7. TT–Treatment technique.
8. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule (SWTR), the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR) and the 2001 Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). For systems subject to the IESWTR (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the IESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the Director. For systems subject to the LT1ESWTR (systems serving fewer than 10,000 people, using surface water or ground water under the influence of surface water) that use conventional or direct filtration, after January 1, 2005 the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the LT1ESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the Director.
9. The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful. HPC is simply an alternative method of determining disinfectant residual levels. The number of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.
10. SWTR, IESWTR and LT1ESWTR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.
11. These arsenic values (MCL, MCLG) are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.
12. Millions of fibers per liter.
13. Action Level=0.015 mg/L.
14. Action Level=1.3 mg/L.
15. Millirems per year.

16. Picocuries per liter.
17. The uranium MCL is effective December 8, 2003 for all community water systems.
18. Surface water systems and ground water systems under the direct influence of surface water are regulated under §5.0. §5.0 community and non-transient non-community systems serving ≥10,000 must comply with §7.0 DBP MCLs and disinfectant maximum residual disinfectant levels (MRDLs) beginning January 1, 2002. All other community and non-transient non-community systems must comply with subpart L DBP MCLs and disinfectant MRDLs beginning January 1, 2004. §5.0 transient non-community systems serving ≥10,000 that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. All other transient non-community systems that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.
19. Community and non-transient non-community systems must comply with §7.10 TTHM and HAA5 MCLs of 0.080 mg/L and 0.060 mg/L, respectively (with compliance calculated as a locational running annual average) on the schedule in §7.10.1.
20. The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.
21. The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.
22. MRDLG–Maximum residual disinfectant level goal.
23. MRDL–Maximum residual disinfectant level.

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APPENDIX C TO §16.8
LIST OF ACRONYMS USED IN PUBLIC NOTIFICATION REGULATION

CCR Consumer Confidence Report

CWS Community Water System

DBP Disinfection Byproduct

EPA Environmental Protection Agency

GWR Ground Water Rule

FBRR Filter Backwash Recycling Rule

HPC Heterotrophic Plate Count

IESWTR Interim Enhanced Surface Water Treatment Rule

IOC Inorganic Chemical

LCR Lead and Copper Rule

LT1ESWTR Long Term 1 Enhanced Surface Water Treatment Rule

MCL Maximum Contaminant Level

MCLG Maximum Contaminant Level Goal

MRDL Maximum Residual Disinfectant Level

MRDLG Maximum Residual Disinfectant Level Goal

NCWS Non-Community Water System

NPDWR National Primary Drinking Water Regulation

NTNCWS Non-Transient Non-Community Water System

NTU Nephelometric Turbidity Unit

OGWDW Office of Ground Water and Drinking Water

OW Office of Water

PN Public Notification

PWS PWS

SDWA Safe Drinking Water Act

SMCL Secondary Maximum Contaminant Level

SOC Synthetic Organic Chemical

SWTR Surface Water Treatment Rule

TCR Total Coliform Rule

TT Treatment Technique

TWS Transient Non-Community Water System

VOC Volatile Organic Chemical

16.9 **Records**

(a) Records of analyses shall be maintained by the water purveyor. The records of each sample analyzed to comply with these Regulations shall contain the following information:

(1) The time, date and place of sampling and the name of the sample collector;

(2) The sampling point and the reason for collection;

(3) Date analysis started and completion date if more than one (1) day is needed;

(4) Name of laboratory and person responsible for performing the analysis;

(5) The analytical technique or method used;

(6) The results of the analysis.

(b) Records of microbiological examinations shall be readily available for at least five (5) years.

(c) Records of organic and inorganic chemical, radiological and turbidity analyses shall be readily available for at least ten (10) years.

(d) Any written document relating to a sanitary survey of a PWS shall be kept for at least ten (10) years. Records of action taken to correct a violation of these Regulations shall be kept for at least three (3) years after the last action taken with respect to the particular violation involved.

(e) Records concerning a variance or exemption granted to a system shall be kept for at least five (5) years following the expiration date of such variance or exemption.

(f) Copies of monitoring plans developed pursuant to these Regulations shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under this section, except as specified elsewhere in these Regulations.

16.10 **Consumer Confidence Reports**

16.10.1 **Purpose and Applicability of this Subpart**

(a) This subpart establishes the minimum requirements for the content of annual reports that community water systems must deliver to their customers. These reports must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner.

(b) Notwithstanding the provisions of §2.0, this subpart applies only to community water systems.

(c) 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.

(d) For the purpose of this subpart, detected means: at or above the levels prescribed by §16.1 for inorganic contaminants, at or above the levels prescribed by §16.2(b)(28) for the contaminants listed in §16.2(b), at or above the levels prescribed by §7.4 for the contaminants listed in §16.2(a), at or above the levels prescribed by §7.4 for the contaminants or contaminant groups listed in §7.0, and at or above the levels prescribed by Appendix 1-Section II D. for radioactive contaminants.

16.10.2 **Effective Dates**

(a) [**DELETED**].

(b) Each existing community water system must deliver a consumer confidence report by July 1, 2000, and subsequent reports by July 1 annually thereafter. The first report must contain data collected during, or prior to, calendar year 1999 as prescribed in §16.10.3(d)(3). Each report thereafter must contain data collected during, or prior to, the previous calendar year.

(c) A new community water system must deliver its first report by July 1 of the year after its first full calendar year in operation and annually thereafter.

(d) A community water system that sells water to another community water system must deliver the applicable information required in §16.10.3 to the buyer system:

(1) No later than April 1, 2000, and by April 1 annually thereafter or

(2) On a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

16.10.3 **Content of the Reports**

(a) Each community water system must provide to its customers an annual report that contains the information specified in this Section and Section 16.10.4.

(b) **Information on the source of the water delivered:**

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

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

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

(2) If a source water assessment has been completed, the report must notify consumers of the availability of this information and the means to obtain it. In addition, systems are encouraged to highlight in the report significant sources of contamination in the source water area if they have readily available information. Where a system has received a source water assessment from the Department, the report must include a brief summary of the system's susceptibility to potential sources of contamination, using language provided by the Department or written by the operator.

(c) **Definitions:**

(1) Each report must include the following definitions:

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

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

(2) A report for a community water system operating under a variance or an exemption issued under §15.0 of these Regulations (excepting a variance pursuant to the requirements of §3.0 - New Water Sources) must include the following definition: Variances and Exemptions: State or EPA permission not to meet an MCL or a treatment technique under certain conditions.

(3) A report that contains data on contaminants that EPA regulates using any of the following terms must include the applicable definitions:

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

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

(iii) Maximum residual disinfectant level goal or MRDLG: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

(iv) Maximum residual disinfectant level or MRDL: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that the addition of a disinfectant is necessary for control of microbial contaminants.

(d) **Information on Detected Contaminants:**

(1) This subsection specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*). It applies to:

(i) Contaminants subject to a MCL, action level, maximum residual disinfectant level, or treatment technique (regulated contaminants).

(ii) Contaminants for which monitoring is required by §16.6 (unregulated contaminants); and

(iii) Disinfection byproducts or microbial contaminants for which monitoring is required by the Information Collection Rule, 40 CFR 141.142 and 141.143 except as provided under §16.10.3(e)(1), and which are detected in the finished water.

(2) The data relating to these contaminants must be displayed in one (1) table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report must be displayed separately.

(3) The data must be derived from data collected to comply with EPA and State monitoring, and analytical requirements during calendar year 1999 for the first report and subsequent calendar years thereafter except that:

(i) Where a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) must include the date and results of the most recent sampling and the report must include a brief statement indicating that the datum presented in the report are from the most recent testing done in accordance with the regulations. No data older than five (5) years need be included.

(ii) Results of monitoring in compliance with the Information Collection Rule, 40 CFR 141.142 and 141.143 need only be included for than five (5) years from the date of last sample or until any of the detected contaminants becomes regulated and subject to routine monitoring requirements, whichever comes first.

(4) For detected regulated contaminants (listed in Appendix A to §16.10), the table(s) must contain:

(i) The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in Appendix A to §16.10);

(ii) The MCLG for that contaminant expressed in the same units as the MCL;

(iii) If there is no MCL for a detected contaminant, the table must indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the

report must include the definitions for treatment technique and/or action level, as appropriate, specified in §16.10.3(c)(3);

(iv) For contaminants subject to an MCL, except turbidity and total coliforms, the highest contaminant level used to determine compliance with the MCL and the range of detected levels, as follows[27]:

(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 by calculating a running annual average of all samples taken at a monitoring location: the highest average of any of the monitoring locations and the range of all monitoring locations expressed in the same units as the MCL. For the MCLs for TTHM and HAA5 in §7.0, systems must include the highest locational running annual average for TTHM and HAA5 and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5 MCL, the system must include the locational running annual averages for all locations that exceed the MCL.

(C) When compliance with the MCL is determined on a systemwide basis by calculating a running annual average of all samples at all monitoring locations: the average and range of detection expressed in the same units as the MCL. The system is required to include individual sample results for the IDSE conducted under §7.9 when determining the range of TTHM and HAA5 results to be reported in the annual consumer confidence report for the calendar year that the IDSE samples were taken.

(v) For turbidity

(A) When it is reported pursuant to §16.3: The highest average monthly value.

(B) When it is reported pursuant to the requirements of §5.2: the highest monthly value. The report should include an explanation of the reasons for measuring turbidity.

(C) When it is reported pursuant to §5.4: The highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in §5.4 for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity.

(vi) For lead and copper: the 90th percentile value of the most recent round of sampling and the number of sampling sites exceeding the action level;

(vii) For total coliform:

(A) The highest monthly number of positive samples for systems collecting fewer than forty (40) samples per month; or

(B) The highest monthly percentage of positive samples for systems collecting at least forty (40) samples per month;

(viii) For fecal coliform:

[27] Note to §16.10.3(d)(4)(iv): When rounding of results to determine compliance with the MCL is allowed by the regulations, rounding should be done prior to multiplying the results by the factor listed in Appendix A to §16.10;

(A) The total number of positive samples; and

(B) The likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report must include one (1) or more of the typical sources for that contaminant listed in Appendix A to §16.10 which are most applicable to the system.

(5) If a community water system distributes water to its customers from multiple hydraulically independent distribution systems that are fed by different raw water sources, the table should contain a separate column for each service area and the report should identify each separate distribution system. Alternatively, systems could produce separate reports tailored to include data for each service area.

(6) The table(s) must clearly identify any data indicating violations of MCLs, MRDLs, or treatment techniques and the report must contain a clear and readily understandable explanation of the violation including: the length of the violation, the potential adverse health effects and actions taken by the system to address the violation. To describe the potential health effects, the system must use the relevant language of Appendix A to §16.10.

(7) For detected unregulated contaminants for which monitoring is required (except *Cryptosporidium*), the table(s) must contain the average and range at which the contaminant was detected. The report may include a brief explanation of the reasons for monitoring for unregulated contaminants.

(e) **Information on *Cryptosporidium*, Radon, and Other Contaminants:**

(1) If the system has performed any monitoring for *Cryptosporidium*, including monitoring performed to satisfy the requirements of [RESERVED for future rulemaking 40 CFR 141.143 equivalent], which indicates that *Cryptosporidium* may be present in the source water or the finished water, the report must include:

(i) A summary of the results of the monitoring; and

(ii) An explanation of the significance of the results.

(2) If the system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report must include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results.

(3) If the system has performed additional monitoring which indicates the presence of other contaminants in the finished water, the system is strongly encouraged to report any results which may indicate a health concern. To determine if results may indicate a health concern, it is recommended that systems find out if EPA has proposed an NPDWR or issued a health advisory for that contaminant by calling the Safe Drinking Water Hotline (800-426-4791). Detects above a proposed MCL or health advisory level are considered to indicate possible health concerns. For such contaminants, it is recommended that the report include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results noting the existence of a health advisory or a proposed regulation.

(f) **Compliance with NPDWR:** In addition to the requirements of §16.10.3(d), 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, and the steps the system has taken to correct the violation.

(1) Monitoring and reporting of compliance data;

(2) Filtration and disinfection prescribed by §5.0. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report must include the following language as part of the explanation of potential adverse health effects: Inadequately treated water may contain disease causing organisms. These organisms include bacteria, viruses and parasites which can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

(3) Lead and copper control requirements prescribed by §6.0. For systems which fail to take one (1) or more actions prescribed by §§6.80(d), 6.81, 6.82, 6.83 or 6.84, the report must include the applicable language of Appendix A to §16.10 for lead, copper, or both.

(4) Treatment techniques for Acrylamide and Epichlorohydrin prescribed by §16.2(d). For systems which violate the requirements of §16.2(d), the report must include the relevant language from Appendix A to §16.10.

(5) Recordkeeping of Compliance Data

(6) Special monitoring requirements prescribed by §§16.6, 16.7 and 16.1(r); and

(7) Violation of the terms of a variance, an exemption, or an administrative or judicial order.

(g) **Variances and Exemptions:** If a system is operating under the terms of a variance or an exemption issued under Sec. 1415 or 1416 of SDWA, the report must contain:

(1) An explanation of the reasons for the variance or exemption;

(2) The date on which the variance or exemption was issued;

(3) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(4) A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

(h) **Additional Information**

(1) The report must contain a brief explanation regarding contaminants which may reasonably be expected to be found in drinking water including bottled water. This explanation may include the language of §16.10.3(h)(1)(i) through (iii) or systems may use their own comparable language. The report also must include the language of §16.10.3(h)(1)(iv).

(i) The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

(ii) Contaminants that may be present in source water include:

(A) Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

(B) Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

(C) Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff and residential uses.

(D) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff and septic systems.

(E) Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

(iii) In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by PWSs. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

(iv) Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791).

(2) The report must include the telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report.

(3) In communities with a large proportion of non-English speaking residents, as determined by the Director, the report must contain information in the appropriate language(s) regarding the importance of the report or contain a telephone number or address where such residents may contact the system to obtain a translated copy of the report or assistance in the appropriate language.

(4) The report must include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.

(5) The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.

(6) **<u>Systems required to comply with §13.0</u>.**

(i) Any ground water system that receives notice from the Director of a significant deficiency or notice from a laboratory of a fecal indicator-positive ground water source sample that is not invalidated by the Director under §13.3(d) must inform its customers of any significant deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive ground water source sample in the next report. The system must continue to inform the public annually until the Director determines that particular significant deficiency is corrected or the fecal contamination in the ground water source is addressed under §13.4(a). Each report must include the following elements:

(A) The nature of the particular significant deficiency or the source of the fecal contamination (if the source is known) and the date the significant deficiency was identified by the Director or the dates of the fecal indicator-positive ground water source samples;

(B) If the fecal contamination in the ground water source has been addressed under §13.4(a) and the date of such action;

(C) For each significant deficiency or fecal contamination in the ground water source that has not been addressed under §13.4(a), the Director-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed; and

(D) If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the Director under §13.3(d), the potential health effects using the health effects language of Appendix A to §16.10.

(ii) If directed by the Director, a system with significant deficiencies that have been corrected before the next report is issued must inform its customers of the significant deficiency, how the deficiency was corrected, and the date of correction under §16.10(3)(h)(6)(i).

16.10.4 **Required Additional Health Information**

(a) All reports must prominently display the following language:

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

(b) Ending in the report due by July 1, 2001, a system which detects arsenic at levels above 0.025 mg/L, but below the 0.05 mg/L, and beginning in the report due by July 1, 2002, a system that detects arsenic above 0.005 mg/L and up to and including 0.010 mg/L:

(1) Must include in its report a short informational statement about arsenic, using language such as: While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

(2) May write its own educational statement, but only in consultation with the Director.

(c) A system which detects nitrate at levels above five (5) mg/L but below the MCL:

(1) Must include a short informational statement about the impacts of nitrate on children using language such as: Nitrate in drinking water at levels above ten (10) ppm is a health risk for infants of less than six (6) months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of

rainfall or agricultural activity. If you are caring for an infant you should ask advice from your health care provider.

(2) May write its own educational statement, but only in consultation with the Director.

(d) Every report must include the following lead-specific information:

(1) A short informational statement about lead in drinking water and its effects on children. The statement must include the following information:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. [NAME OF UTILITY] is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for thirty (30) seconds to two (2) minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

(2) A system may write its own educational statement, but only in consultation with the Director.

(e) Community water systems that detect TTHM above 0.080 mg/L, but below the MCL in §16.2(a), as an annual average, monitored and calculated under the provisions of §16.2(a)(49) must include health effects language for TTHMs prescribed by Appendix A to §16.10.

(f) Beginning in the report due by July 1, 2003 and ending January 22, 2006, a community water system that detects arsenic above 0.010 mg/L and up to and including 0.05 mg/L must include the arsenic health effects language prescribed by Appendix B to §16.8.

16.10.5 **Report Delivery and Recordkeeping**

(a) Except as provided in §16.10.5(h), each community water system must mail or otherwise directly deliver one (1) copy of the report to each customer.

(b) The system must make a good faith effort to reach consumers who do not get water bills, using means recommended by the Director. It is expected that an adequate good faith effort will be tailored to the consumers who are served by the system but are not bill-paying customers, such as renters or workers. A good faith effort to reach consumers would include a mix of methods appropriate to the particular system such as: Posting the reports on the Internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings or large private employers; delivery to community organizations.

(c) No later than the date the system is required to distribute the report to its customers, each community water system must mail a copy of the report to the Director, followed within three (3) months by 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 Director.

(d) No later than the date the system is required to distribute the report to its customers, each community water system must deliver the report to any other agency or clearinghouse identified by the Director.

(e) Each community water system must make its reports available to the public upon request.

(f) Each community water system serving 100,000 or more persons must post its current year's report to a publicly-accessible web site on the Internet.

(g) Any system subject to this §16.10.5 must retain copies of its consumer confidence report for no less than three (3) years.

(h) **Special Delivery Requirement for Community Water Systems Serving a Population of 10,000 or More**. Any community water system serving a population of 10,000 or more shall directly deliver a full copy of the Consumer Confidence Report to each household within the water system's service area that receives water from that system. The method of delivery shall be determined by the water system but can include delivery via either: (a) postal patron mailing; or (b) a community newsletter that is directly delivered to each household; or (c) a community calendar that is directly delivered to each household or (d) any other method that will directly reach each household within the water system's service area that receives water from that system. In the event that within the service area there are buildings with five (5) or more residential units, the system will not be required to deliver directly to each of these units. Instead, the water system shall mail multiple copies of the report to building manager or other appropriate individual, noting that the reports should be distributed to residents and/or posted in a common area. Additionally, colleges and universities will be exempted from §16.10.5(h).

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Appendix A to §16.10. – Regulated Contaminants

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Microbiological contaminants:						
Total Coliform Bacteria	MCL: (systems that collect > 40 samples/ month) 5% of monthly samples are positive; (systems that collect < 40 samples/month) 1 positive monthly sample.		MCL: (systems >40 samples /month) 5% of monthly samples are positive; (systems that collect <40 samples/ month) 1 positive monthly sample	0	Naturally present in the environment.	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
Fecal coliform and *E. Coli*	0		0	0	Human and animal fecal waste.	Fecal coliforms and *E. Coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely-compromised immune systems.
Fecal Indicators (enterococci or coliphage)	TT		TT	N/A	Human and animal fecal waste.	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
Total organic carbon (ppm)	TT		TT	N/A	Naturally present in the environment.	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection by products. These byproducts include trihalomethanes

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
						(THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
Turbidity (NTU)	TT		TT	N/A	Soil runoff.	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
Radioactive contaminants: Beta/photon emitters (mrem/ yr)	4 mrem/yr		4.	0	Decay of natural and man-made deposits.	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon radioactivity in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha emitters (pCi/l)	15 pCi/l		15	0	Erosion of natural deposits.	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined radium (pCi/l)	5 pCi/l		5	0	Erosion of natural deposits.	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium (ug/L)	0.030	1000	30	0	Erosion of natural deposits.	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Inorganic contaminants:						
Antimony (ppb)	0.006	1000	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder.	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
Arsenic (ppb)	1 0.010	1000	10[1]	0[1]	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
Asbestos (MFL)	7 MFL		7	7	Decay of asbestos cement water mains; Erosion of natural deposits.	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
Barium (ppm)	2		2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
Beryllium (ppb)	0.004	1000	4	4	Discharge from metal refineries and coal-burning factories; Discharge from electrical, aerospace, and defense industries.	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
Cadmium (ppb)	0.005	1000	5	5	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints.	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
Chromium (ppb)	0.1	1000	100	100	Discharge from steel and pulp mills; Erosion of natural deposits.	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Copper (ppm)	AL=1.3		AL=1.3	1.3	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
Cyanide (ppb)	0.2	1000	200	200	Discharge from steel/metal factories Discharge from plastic and fertilizer factories.	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
Fluoride (ppm)	4.		4.	4.	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine (9) years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
Lead (ppb)	AL=0.015	1000	AL=15	0	Corrosion of household plumbing systems; Erosion of natural deposits.	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
Mercury [inorganic] (ppb)	0.002	1000	2	2	Erosion of natural deposits; Discharge from refineries and factories; Runoff from	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
					landfills; Runoff from cropland.	
Nitrate (ppm)	10		10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.	Infants below the age of six (6) months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Nitrite (ppm)	1		1	1	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.	Infants below the age of six (6) months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Selenium (ppb)	0.05	1000	50	50	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines.	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
Thallium (ppb)	0.002	1000	2	0.5	Leaching from ore-processing sites; Discharge from electronics, glass, and drug factories.	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
Synthetic organic contaminants including pesticides and herbicides:						
2,4-D (ppb)	0.07	1000	70	70	Runoff from herbicide used on row crops.	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
2,4,5-TP [Silvex] (ppb)	0.05	1000	50	50	Residue of banned herbicide.	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
Acrylamide	TT		TT	0	Added to water during sewage/wastewater	Some people who drink water containing high levels of acrylamide over a long

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
					treatment.	period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
Alachlor (ppb)	0.002	1000	2	0	Runoff from herbicide used on row crops.	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
Atrazine (ppb)	0.003	1000	3	3	Runoff from herbicide used on row crops	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
Benzo(a)pyrene [PAH] (nanograms/l)	0.0002	1,000,000	200	0	Leaching from linings of water storage tanks and distribution lines.	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
Carbofuran (ppb)	0.04	1000	40	40	Leaching of soil fumigant used on rice and alfalfa.	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
Chlordane (ppb)	0.002	1000	2	0	Residue of banned termiticide.	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
Dalapon (ppb)	0.2	1000	200	200	Runoff from herbicide used on rights of way.	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
Di(2-ethylhexyl) adipate (ppb)	0.4	1000	400	400	Discharge from chemical factories.	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
						reproductive difficulties.
Di(2-ethylhexyl) phthalate (ppb).	0.006	1000	6	0	Discharge from rubber and chemical factories.	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
Dibromochloropropane (ppt)	0.0002	1,000,000	200	0	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards.	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer.
Dinoseb (ppb)	0.007	1000	7	7	Runoff from herbicide used on soybeans and vegetables.	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
Diquat (ppb)	0.02	1000	20	20	Runoff from herbicide use.	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
Dioxin [2,3,7,8-TCDD] (ppq).	0.00000003	1,000,000, 000	30	0	Emissions from waste incineration and other combustion; Discharge from chemical factories.	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
Endothall (ppb)	0.1	1000	100	100	Runoff from herbicide use.	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
Endrin (ppb)	0.002	1000	2	2	Residue of banned insecticide.	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
Epichlorohydrin	TT		TT	0	Discharge from industrial chemical factories; An impurity of some water treatment chemicals.	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Ethylene dibromide (ppt)	0.00005	1,000,000	50	0	Discharge from petroleum refineries.	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
Glyphosate (ppb)	0.7	1000	700	700	Runoff from herbicide use	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
Heptachlor (ppt)	0.0004	1,000,000	400	0	Residue of banned pesticide.	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
Heptachlor epoxide (ppt)	0.0002	1,000,000	200	0	Breakdown of heptachlor.	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
Hexachlorobenzene (ppb)	0.001	1000	1	0	Discharge from metal refineries and agricultural chemical factories.	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
Hexachlorocyclopentadiene (ppb)	0.05	1000	50	50	Discharge from chemical factories.	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
Lindane (ppt)	0.0002	1,000,000	200	200	Runoff/ leaching from insecticide used on cattle, lumber, gardens.	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
Methoxychlor (ppb)	0.04	1000	40	40	Runoff/ leaching from insecticide used on	Some people who drink water containing methoxychlor in excess of the MCL over

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
					fruits, vegetables, alfalfa, livestock.	many years could experience reproductive difficulties.
Oxamyl [Vydate] (ppb)	0.2	1000	200	200	Runoff/leaching from insecticide used on apples, potatoes and tomatoes.	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
PCBs [Polychlorinated biphenyls] (ppt)	0.0005	1,000,000	500	0	Runoff from landfills; Discharge of waste chemicals.	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
Pentachlorophenol (ppb)	0.001	1000	1	0	Discharge from wood preserving factories.	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
Picloram (ppb)	0.5	1000	500	500	Herbicide runoff	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
Simazine (ppb)	0.004	1000	4	4	Herbicide runoff	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood
Toxaphene (ppb)	0.003	1000	3	0	Runoff/leaching from insecticide used on cotton and cattle.	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
Volatile organic contaminants:						
Benzene (ppb)	0.005	1000	5	0	Discharge from factories; Leaching from gas storage tanks and landfills	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
						an increased risk of getting cancer.
Bromate (ppb)	0.010	1000	10	0	By-product of drinking water chlorination.	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
Carbon tetrachloride (ppb)	0.005	1000	5	0	Discharge from chemical plants and other industrial activities.	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
Chloramines (ppm)	MRDL = 4		MRDL = 4	MRDLG = 4	Water additive used to control microbes.	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
Chlorine (ppm)	MRDL = 4		MRDL = 4	MRDLG = 4	Water additive used to control microbes.	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
Chlorite (ppm)	1		1	0.8	By-product of drinking water chlorination.	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
Chloride dioxide (ppb)	MRDL = .8	1000	MRDL = 800	MRDLG = 800	Water additive used to control microbes.	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
						dioxide in excess of the MRDL. Some people may experience anemia.
Chlorobenzene (ppb)	.1	1000	100	100	Discharge from chemical and agricultural chemical factories.	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
o-Dichlorobenzene (ppb)	0.6	1000	600	600	Discharge from industrial chemical factories.	Some people who drink water containing o- dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
p-Dichlorobenzene (ppb)	0.075	1000	75	75	Discharge from industrial chemical factories.	Some people who drink water containing p- dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
1,2-Dichloroethane (ppb)	0.005	1000	5	0	Discharge from industrial chemical factories.	Some people who drink water containing 1,2- dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene (ppb)	0.007	1000	7	7	Discharge from industrial chemical factories.	Some people who drink water containing 1,1- dichloroethylene in excess of the MCL over many years could experience problems with their liver.
cis-1,2-Dichloroethylene (ppb)	0.07	1000	70	70	Discharge from industrial chemical factories.	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
trans-1,2-Dichloroethylene (ppb)	0.1	1000	100	100	Discharge from industrial chemical factories.	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
Dichloromethane (ppb)	0.005	1000	5	0	Discharge from pharmaceutical and chemical factories.	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
1,2-Dichloropropane (ppb)	0.005	1000	5	0	Discharge from industrial chemical factories.	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
Ethylbenzene (ppb)	0.7	1000	700	700	Discharge from petroleum refineries.	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
Haloacetic Acids (HAA) (ppb).	0.060	1000	60	N/A	By-product of drinking water disinfection.	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
Styrene (ppb)	.1	1000	100	100	Discharge from rubber and plastic factories; Leaching from landfills.	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
Tetrachloroethylene (ppb)	0.005	1000	5	0	Discharge from factories and dry cleaners.	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
1,2,4-Trichlorobenzene (ppb)	0.07	1000	70	70	Discharge from textile-finishing factories.	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
1,1,1-Trichloroethane (ppb)	0.2	1000	200	200	Discharge from metal degreasing sites and other factories.	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
1,1,2-Trichloroethane (ppb)	0.005	1000	5	3	Discharge from industrial chemical factories.	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
Trichloroethylene (ppb)	0.005	1000	5	0	Discharge from metal degreasing sites and	Some people who drink water containing trichloroethylene in excess of the MCL

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
					other factories.	over many years could experience problems with their liver and may have an increased risk of getting cancer.
TTHMs [Total trihalomethanes] (ppb)	0.10/0.080	1000	100/80	N/A	By-product of drinking water chlorination.	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.
Toluene (ppm)	1		1	1	Discharge from petroleum factories.	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
Vinyl Chloride (ppb)	0.002	1000	2	0	Leaching from PVC piping; Discharge from plastics factories.	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Xylenes (ppm)	10		10	10	Discharge from petroleum factories; Discharge from chemical factories.	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

[1] These arsenic values (MCL, MCLG) are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.

Key:
AL= Action Level
MCL= Maximum Contaminant Level
MCLG= Maximum Contaminant Level Goal
MFL= million fibers per liter
MRDL= Maximum Residual Disinfectant Level
MRDLG= Maximum Residual Disinfectant Level Goal
mrem/year= millirems per year (a measure of radiation absorbed by the body)
N/A= Not Applicable
NTU= Nephelometric Turbidity Units (a measure of water clarity)
pCi/l= picocuries per liter (a measure of radioactivity)
ppm= parts per million, or milligrams per liter (mg/l)
ppb= parts per billion, or micrograms per liter (µg/l)
ppt= parts per trillion, or nanograms per liter
ppq= parts per quadrillion, or picograms per liter
TT= Treatment Technique

SECTION 17.0 - NON-COMMUNITY WATER SYSTEM REQUIREMENTS

17.1 **Microbiological**

(a) **Routine monitoring:** PWSs must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. At least one (1) representative sample shall be collected each calendar quarter when the system is in operation. These plans are subject to review and revision by the Director.

Monitoring Frequency For total coliforms for non-community water systems is as follows:

(i) A non-community water system using only ground water and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public.

(ii) A non-community water systems using only ground water, and serving more than 1000 persons during any month must monitor at the same frequency as a like-sized community water system, as specified in §16.4(a).

(iii) A non-community water system using surface water in total or in part, must monitor at the same frequency as a like-sized community water system as specified in §16.4(a).

(iv) A non-community water system using ground water under the direct influence of surface water, as determined by the Director, in total or in part must monitor at the same frequency as a like-sized community water system, as specified in §16.4(a), within six (6) months of said determination by the Director.

(b) The following requirements for PWSs found in §16.4 also apply to non-community water systems. This includes Sections:

16.4(a)(2) and (3)	Routine Monitoring;
16.4(b)	Analytical Methodology;
16.4(c)	Maximum Contaminant Levels for Microbiological Contaminants;
16.4(d)	Repeat Monitoring;
16.4(e)	Fecal Coliforms/*E. Coli* testing;
16.4(f)	Invalidation of Samples;
16.4(g)	Sanitary Surveys
16.4(h)	Reporting Requirements

17.2 **Inorganic Chemicals**. Non-transient non-community water systems shall be required to comply with the requirements of §6.0 and §16.1 with the following exceptions. (1) Monitoring and compliance with the requirements for sodium shall not be required. (2) Monitoring and compliance requirements for arsenic do not become effective until January 23, 2006.

(a) **Nitrate and Nitrite.** The maximum contaminant levels for nitrate, nitrite and combined nitrate and nitrite are as follows:

Contaminant	MCL (mg/L)
Nitrate	10 (as Nitrogen)
Nitrite	1 (as Nitrogen)
Total Nitrate and Nitrite	10 (as Nitrogen)

When the nitrate or nitrite sampling results indicate an excess of the maximum contaminant level, a second analyses shall be initiated within twenty-four (24) hours, and if the mean of the two (2) analyses exceeds the maximum contaminant level the supplier shall notify the Director and initiate public notification.

Systems unable to comply with the twenty-four (24) hour sampling requirement must immediately notify the consumers served by the area served by the PWS in accordance with §17.6. Systems exercising this option must take and analyze a confirmation sample within two (2) weeks of notification of the analytical results of the first sample.

(b) **Monitoring Frequency.** The nitrate and nitrite concentration of each active drinking water source maintained by a water purveyor shall be determined as required by §§16.1 (d) and (e).

(c) **Analytical Techniques.** Nitrate analyses shall be made in accordance with the methods specified in Appendix 1.

17.3 **Organic Chemicals.** Non-transient, non-community water systems shall be required to comply with the requirements of §16.2 with the following exceptions. Monitoring and compliance with the requirements for total trihalomethanes shall not be required until January 1, 2004 for §5.0 systems serving fewer than 10,000. Non-transient, non-community §5.0 systems serving at least 10,000 should currently be meeting the monitoring and compliance requirements for total trihalomethanes.

17.4 **Turbidity.** Non-community water systems shall comply with the requirements of §16.3.

17.5 **Unregulated Contaminants and Special Monitoring.** Non-transient, non-community water systems that serve more than 10,000 persons (effective January 8, 1999) shall be required to monitor for unregulated contaminants in conformance with §§16.6 and 16.7.

17.6 **Public Notification.** Non-community water systems shall comply with the requirements of §16.8 herein.

17.7 **Records**

(a) Records of analyses performed by the water purveyor shall be maintained by the water purveyor. The records shall contain the following information:

(1) The time, date and place of sampling and the name of the sample collector;

(2) The sampling point and the reason for collection;

(3) Date analysis started and completion date if more than one (1) day is needed;

(4) Name of laboratory and person responsible for performing the analysis;

(5) The analytical technique or method used; and

(6) The results of the analysis.

(b) Records of microbiological examinations shall be readily available for at least five (5) years and records of nitrate analyses and turbidity determinations shall be readily available for ten (10) years. Any written document relating to a sanitary survey of a PWS shall be kept for at least ten (10) years.

(c) Records of action taken to correct a violation of these Regulations shall be kept for at least three (3) years after the last action taken with respect to the particular violation involved.

(d) Records concerning a variance or exemption granted to a system shall be kept for at least five (5) years following the expiration date of such variance or grant.

(e) Copies of monitoring plans developed pursuant to these Regulations shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under paragraph (a) of this section, except as specified elsewhere in these Regulations.

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SECTION 18.0 - FEES ~~SCHEDULE~~

18.1 Pursuant to the amended §46-13-3 of the General Laws Chapter 46-13, entitled "Public Drinking Water Supply", the Director is authorized to charge fees to support the collection and analysis of samples that are required to meet the minimum monitoring requirements for public drinking water supplies.

18.2 Any Public Drinking Water Supply for which analytical and collection services are provided by the R.I. Department of Health to meet the minimum monitoring requirements for public drinking water is liable for payment of the fee for these services.

18.3 The fee for each chemical, radiological and microbiological test required and conducted by the Division of Laboratories shall be reasonable and shall be determined on the basis of current costs for conducting the analysis. Such cost shall include administrative, personnel, equipment and such other related costs which may be incurred in the analysis. The laboratory fee schedule is ~~listed in table 18-1.~~ set forth in the *Rules and Regulations Pertaining to the Fee Structure for Licensing, Laboratory and Administrative Services Provided by the Department of Health.*

18.4 The fee for sample schedule management/collection by the Office of Drinking Water Quality shall be reasonable and shall be determined on the basis of current costs for such service. The current sampling fee is ~~fifty dollars ($50).~~ set forth in the *Rules and Regulations Pertaining to the Fee Structure for Licensing, Laboratory and Administrative Services Provided by the Department of Health.* Sampling fees will be assessed for each on-site visit to the supply for the purpose of collecting samples. It is the responsibility of the purveyor to make the necessary operational arrangement for sampling. Scheduled on-site visits canceled in the field because of lack of proper operational arrangement will be assessed the sampling fee for the visit and any subsequent visit.

18.5 Payment for scheduled services will be required on the due date. Bills will be provided approximately six (6) weeks in advance of the due date. Payment shall be made payable to the General Treasurer, State of Rhode Island.

18.6 Services will be provided only if payment in full has been received. It remains the responsibility of the purveyor to meet all compliance testing requirements.

18.7 A surcharge on overdue sampling and analysis payments. The surcharge shall be set at the rate of two percent (2%) of the overdue bill per month.

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~~TABLE 18-1 - LABORATORY FEE SCHEDULE~~

~~CHEMICAL GROUP~~	~~ANALYSIS CODE~~	~~TEST~~	~~FEE~~
~~Inorganic Chemistry~~	~~WL 1~~	~~Turbidity~~	~~$15.00~~
	~~WL 2~~	~~Sediment~~	~~$ 5.00~~
	~~WL 3~~	~~Odor~~	~~$ 5.00~~
	~~WL 4~~	~~Color~~	~~$ 5.00~~
	~~WL 5~~	~~Total Dissolved Solids~~	~~$15.00~~
	~~WL 6~~	~~Ignition Solids~~	~~$15.00~~
	~~WL 7~~	~~Suspended Solids~~	~~$15.00~~
	~~WL 8~~	~~Settleable Solids~~	~~$10.00~~
	~~WL 10~~	~~BOD (5 day)~~	~~$35.00~~
	~~WL 11~~	~~Cyanide~~	~~$38.00~~
	~~WL 12~~	~~Phosphorous (total)~~	~~$23.00~~
	~~WL 13~~	~~pH~~	~~$10.00~~
	~~WL 15~~	~~Ammonia Nitrogen~~	~~$25.00~~
	~~WL 16~~	~~Nitrate~~	~~$15.00~~
	~~WL 17~~	~~Phosphate (ortho)~~	~~$20.00~~
	~~WL 18~~	~~Alkalinity~~	~~$10.00~~
	~~WL 20~~	~~Chloride~~	~~$18.00~~
	~~WL 21~~	~~Fluoride~~	~~$18.00~~
	~~WL 22~~	~~Hardness~~	~~$20.00~~
	~~WL 29~~	~~Sulfate~~	~~$20.00~~
	~~WL 36~~	~~Mercury~~	~~$35.00~~
	~~WL 41~~	~~Specific Conductance~~	~~$15.00~~
	~~WL 50~~	~~Foam Screen~~	~~$ 5.00~~
~~Inorganic Chemistry~~	~~WL 56~~	~~Nitrite~~	~~$15.00~~
	~~WL 63~~	~~Lead~~	~~$20.00~~
	~~WL 64~~	~~Copper~~	~~$20.00~~
	~~WL 65~~	~~Lead & Copper~~	~~$38.00~~
	~~WL 66~~	~~Metals - New Systems~~	~~$250.00~~
	~~WL 67~~	~~Minerals - Full Set~~	~~$70.00~~
	~~WL 68~~	~~Metals Routine Set by ICP/MS~~	~~$150.00~~
	~~WL 69~~	~~Magnesium~~	~~$20.00~~
	~~WL 70~~	~~Potassium~~	~~$20.00~~
	~~WL 71~~	~~Sodium~~	~~$20.00~~
	~~WL 72~~	~~Calcium~~	~~$20.00~~
	~~WL 73~~	~~Sodium Composite~~	~~$25.00~~
	~~WL 75~~	~~Antimony~~	~~$20.00~~
	~~WL 76~~	~~Arsenic~~	~~$20.00~~
	~~WL 77~~	~~Barium~~	~~$20.00~~
	~~WL 78~~	~~Beryllium~~	~~$20.00~~
	~~WL 79~~	~~Cadmium~~	~~$20.00~~
	~~WL 81~~	~~Chromium (total)~~	~~$20.00~~
	~~WL 82~~	~~Iron~~	~~$20.00~~
	~~WL 83~~	~~Manganese~~	~~$20.00~~
	~~WL 84~~	~~Nickel~~	~~$20.00~~
	~~WL 85~~	~~Selenium~~	~~$20.00~~
	~~WL 86~~	~~Silver~~	~~$20.00~~
	~~WL 87~~	~~Thallium~~	~~$20.00~~
	~~WL 88~~	~~Zinc~~	~~$20.00~~
	~~WL M~~	~~Community or Non-Transient-Non Community Systems~~	~~$580.00~~
	~~WL N~~	~~Routine Metals Plus Mercury, Cyanide~~	~~$220.00~~
	~~WL O~~	~~N Systems (New Well)~~	~~$250.00~~

~~TABLE 18-1 - LABORATORY FEE SCHEDULE~~

~~CHEMICAL GROUP~~	~~ANALYSIS CODE~~	~~TEST~~	~~FEE~~
~~**Volatile Organic Chemistry**~~	~~TO 2~~	~~4 Trihalomethane (THM) and Total Trihalomethane~~	~~$100.00~~
	~~TO 12~~	~~Water Quality Volatile Organics~~	~~$200.00~~
	~~TO 17~~	~~Petroleum Hydrocarbons and TO 12~~	~~$200.00~~
	~~TO-30~~	~~Method 525.2 Trace Organics~~	~~$250.00~~
~~**Organic Chemistry**~~	~~PE 4~~	~~Carbamates~~	~~$75.00~~
	~~PE 14~~	~~EDB and DBCP, Method 504~~	~~$100.00~~
	~~PE 21~~	~~Chlorinated Herbicides & Pesticides~~	~~$200.00~~
	~~PE 27~~	~~Halo Acetic Acid~~	~~$100.00~~
	~~PE 30~~	~~Pesticides/PCB's, Method 508/505~~	~~$175.00~~
~~**Microbiology**~~	~~SM 1~~	~~Total and Fecal Coliform (Non Potable)~~	~~$25.00~~
	~~SM 2~~	~~Total Coliform MF~~	~~$25.00~~
	~~SM 3~~	~~Heterotrophic Plate Count~~	~~$15.00~~
	~~SM 34~~	~~Total & Fecal Coliform (*E.coli* only) (MMO-MUG)~~	~~$25.00~~
	~~SM 35~~	~~Fecal Coliform (confirmation)~~	~~$10.00~~
	~~SM 36~~	~~Total Coliform PA method~~	~~$15.00~~
~~**Sampling**~~	~~CL 1~~	~~Sampling fee (per on site visit)~~	~~$50.00~~

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SECTION 19.0 - RULES GOVERNING PRACTICES AND PROCEDURES

19.1 All hearings and reviews required under the provisions of Chapter 46-13 of the General Laws of Rhode Island, 1956, as amended, shall be held in accordance with the provisions of the rules and regulations promulgated by the Rhode Island Department of Health entitled *Rules and Regulations of the Rhode Island Department of Health Regarding Practices and Procedures Before the Department of Health and Access to Public Records of the Department of Health (R42-35-PP).*

SECTION 20.0 - VIOLATIONS, NONCOMPLIANCE, AND ENFORCEMENT

20.1 In order to obtain and/or maintain any approval, permit, certification, and/or license, compliance with the provisions of the Act and these Regulations is required. Failure to comply with these requirements of the Act and/or these Regulations shall constitute grounds to revoke, suspend, or otherwise limit or restrict any approval, permit, certification, and/or license issued by the Director. In addition, any person who violates the provisions of Chapter 46-13, or these Regulations shall be subject to the penalties and remedies set forth in Section 46-13-16 of the Act.

Furthermore, the Director is authorized pursuant to the provisions of sections 46-13-10 and 46-13-12 to issue orders requiring corrective action(s) necessary to "provide safe and potable water."

20.2 (a) **Purpose and Goals.**

(1) To assure the protection of public health, safety and welfare by promoting compliance and deterring noncompliance with the Act, and the rules, regulations, approvals, permits, certification, license and orders adopted pursuant to the Act and these Regulations;

(2) To assure that the Department assesses administrative penalties, and otherwise implements the Act and these Regulations, lawfully, fairly and consistently;

(3) To clarify the Department's authority to enforce the Act and the rules, regulations, approvals, permits and orders adopted pursuant to the Act.

(b) **Policy.** These Regulations promote a policy of assuring the effective enforcement of the Act as administered by the Director and to deter noncompliance with the rules, regulations, approvals, permits, certification, license and orders adopted pursuant to the Act and these Regulations:

(1) Seeking any appropriate legal and equitable relief, including:

(i) removal of any economic benefit or competitive advantage realized as a direct or indirect result of the violation;

(2) Assessing administrative penalties, where appropriate, which:

(i) reflect the nature and gravity of the violation and the potential for harm to the public health;

(ii) reflect the length of time during which the violation was repeated or continued;

(iii) will deter future noncompliance by the person in violation; and

(iv) will encourage continued compliance by persons similarly regulated;

(3) Seeking from any person found to be in violation, those additional or extraordinary costs which are actually expended by the Director during the course of the investigation and enforcement of noncompliance for which the State of Rhode Island is not otherwise reimbursed other than non-overtime personnel costs; and

(4) Pursuing any other lawful enforcement option necessary to achieve compliance.

(c) **Application**

(1) These Regulations shall be liberally construed to permit the Department to effectuate the purposes of the Act.

(2) These Regulations shall apply to all persons subject to enforcement action by the Department under the Act, and the rules, regulations, approvals, permits, certification, license and orders adopted pursuant to the Director's authority hereunder.

(3) These Regulations shall be applied in a manner that is consistent with or more stringent than any applicable Federal program requirements for delegated programs.

(d) **Enforcement Options.** The Director may pursue any combination of administrative and judicial enforcement actions depending upon the circumstances and gravity of each case. The penalty and remedies prescribed by the Act (Section 46-13-16) shall be deemed to be concurrent and the existence of an exercised remedy shall not prevent the Director from exercising any other remedy.

(e) **Preconditions for Assessment of Administrative Penalty.** An administrative penalty may be assessed only for a violation or a failure to comply that, at the time it occurred, constituted noncompliance with a legal requirement:

(1) which was then in effect; and

(2) to which the person was then subject; and

(3) to which these Regulations apply.

(f) **Assessment of Administrative Penalty - Penalty Ceiling.** No penalty shall exceed the maximum penalty allowed by the Act. The maximum administrative penalty which the Director has the authority to impose under the Act is $5000.00 per violation per day.

(1) A penalty may be assessed "per day," multi-day violations are counted from the initial day of noncompliance until compliance is achieved.

(2) A penalty may be assessed "per violation", multiple violations of the same law, rule, regulation, permit approval, certification, license or order are counted as separate violations if any violation:

(i) involves a prohibited act which is distinguishable from any other by the nature of the act itself; or

(ii) involves a prohibited act which is distinct from any other by the time or place of its commission; or

(iii) involves a prohibited act which is distinct from any other by definition; or

(iv) presents a risk of harm to the public health, safety or welfare which is distinguishable from the risk threatened by any other violation.

(3) Each day following service of a Notice of Violation, or Immediate Compliance Order or Cease and Desist Order, to which the Director is a party, during which a violation is repeated, continued or remains in place, constitutes a continuing violation. The Director may assess an additional administrative penalty, not to exceed five thousand dollars ($5,000) for each day the violation or failure to comply is repeated, continued or remains in place.

(4) The penalty imposed shall continue to accrue from the day the Notice of Violation, Immediate Compliance Order or Cease and Desist Order is issued until compliance is achieved.

(g) **Assessment of Administrative Penalty – Calculation.** The amount of the penalty will be calculated based on the factors enumerated below.

(1) The penalty may be based on the gravity of the violation. That portion will be calculated according to the "DWQ Penalty Matrix" (See Appendix 3). The applicable penalty range is reached by first determining the "Type of Violation" and the "Deviation from the Standard" of the alleged violation.

(i) "Type of Violation" - refers to the nature of the legal requirement allegedly violated.

(A) Type I violations - Type I violations include violations of legal requirements identified by the Director as directly related to the protection of the public health. Such violations include, but are not necessarily limited to, exceeding any MCL, failure to adhere to new source approval requirements or plan requirements, and/or any failure to comply with an order of the Director which is presently enforceable.

(B) Type II violations also have a direct impact on public health, but are mainly non-compliance with technical safeguards. Such violations include but are not limited to failure to monitor as required, failure to comply with reporting requirements, and failure to make public notice.

(C) Type III violations have an indirect impact on public health and are generally related to poor record keeping. Such violations include, but are not limited to failure to submit monitoring reports, late submittal of monitoring reports, and failure to keep records on file as required.

(ii) "Deviation from the Standard" - refers to the degree to which the violation is out of compliance with the legal requirement allegedly violated. The Deviation from the Standard may be determined without consideration of the factors enunciated below in cases of strict liability. In all other cases, the Department's assessment of whether a violation is a minor, moderate or major deviation from the standard is based upon an evaluation of one (1) or more of the following factors except to the extent already considered:

(A) the degree to which the act or failure to act was from compliance;

(B) whether the person took reasonable and appropriate steps to prevent and/or mitigate the non-compliance;

(C) whether the person has previously failed to comply with any regulations, order, permit or approval issued or adopted by the Department;

(D) the degree of willfulness or negligence, including but not limited to, how much control the violator had over the occurrence of the violation and whether the violation was foreseeable; and

(E) any other factor(s) that may be relevant in determining the amount of a penalty, provided that said other factor(s) shall be set forth in the Notice of Violation or other written notice of the assessment of a penalty.

(2) **The Economic Benefit from Non-Compliance.** The penalty shall include an amount intended to offset the economic benefit of non-compliance.

(i) Such an amount may include, but not be limited to:

(A) the cost of complying;

(B) the cost of equipment needed to comply;

(C) any associated operation and maintenance costs;

(D) the costs of studies needed to achieve compliance;

(E) any other delayed or avoided costs including, interest, market or competitive advantage over other regulated entities which are in compliance.

(ii) The economic benefit portion may not be included in the penalty only if:

(A) there is no identifiable benefit from non-compliance; or

(B) the amount of economic benefit cannot be quantified.

(3) The penalty shall include additional or extraordinary costs which are incurred by the Director during the course of the investigation and enforcement of noncompliance for which the State of Rhode Island is not otherwise reimbursed other than non-overtime personnel costs.

(4) Nothing herein shall preclude the Director from resolving the outstanding penalty through a Consent Agreement at any time he or she deems appropriate.

(h) **Assessment of Administrative Penalty – Hearing**

(1) Any person against whom the Director seeks to assess an administrative penalty for a violation of a law, rule, regulation, approval, license, certification, or order which is within the Director's authority and responsibility to enforce, has the right to request a hearing thereon. The request for a hearing must be filed with the Director within thirty (30) days after service of the notice assessing said penalty.

(2) If a timely request for a hearing is made, a hearing shall be conducted in accordance with Section 42-35 of the General Laws of Rhode Island, 1956, as amended.

(3) Judicial review of any final decision of the administrative hearing officer shall be available in accordance with Section 42-35-15 of the General Laws of Rhode Island, 1956, as amended.

(i) **Assessment of Administrative Penalty–Enforcement.** The Department's proposal of an administrative penalty shall become a final order of the Director upon the person's election to waive, or failure to timely request, an administrative hearing on the violation and/or the penalty. Each day during which the person fails to pay said penalty or otherwise fails to comply with a final order of the Director constitutes a separate and distinct violation. An additional administrative penalty, not to exceed five thousand dollars ($5,000) for each such violation of a final order, may be assessed by the Director. The Director may also, by summons and complaint, seek to enforce said final order in the Superior court for Providence County.

(j) These Regulations shall not be construed to govern any enforcement action which is commenced by the Director prior to the formal adoption of these Regulations, or any administrative appeal taken therefrom, except that they shall apply to all unresolved monitoring and public notice violations as of the effective date of these Regulations.

SECTION 21.0 - SEVERABILITY

21.1 If any provision of the rules and regulations herein or the application thereof to any facility or circumstances shall be held invalid, such invalidity shall not affect the provisions or application of the rules and regulations which can be given effect, and to this end the provisions of the rules and regulations are declared to be severable.

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APPENDIX 1

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SECTION I - MICROBIOLOGY

A. **Microbiological Testing – Analytical Methodology**

Reference for §5.0 - Surface Water and Ground Water Under the Influence of Surface Water and §§16.4 and 17.0 - Distribution Samples including Storage Facilities and Ground Water Sources Regulation.

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

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

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

Organism	Methodology[1]	Citation[2]	TCR[3]	SWTR[3]
Total Coliforms:[4] Enzyme Substrate Method	Chromogenic Substrate Coliform Test ONPG-MUG Test[5]	SM 9223	X	X
	Colisure Test.[6]	SM 9223	X	
	Colilert®, Colilert-18®	SM 9223	X	X
	E*Colite® Test.[7]		X	
	Colitag® Test.[8]		X	
	Readycult® Coliforms 100 Presence/Absence Test.[9]		X	
Total Coliforms:[4] Membrane Filter Method	Total Coliforms[10]	EPA 1604; SM 9222 A, B, C	X	X
	m-ColiBlue24® Test.[11]		X	
	Chromocult® Test[12]		X	
	Coliscan® Test[13]		X	X

The procedures shall be done in accordance with the documents listed below[‡]:

[1] The Director strongly recommends that laboratories evaluate the false-positive and negative rates for the method(s) they use for monitoring total coliforms. The Director also encourages laboratories to establish false-positive and false-negative 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. The Director suggests that laboratories perform these studies on a minimum of 5% of all total coliform-positive samples, except for those methods where verification/ confirmation is already required, e.g., the M-Endo and LES Endo Membrane Filter Tests, Standard Total Coliform Fermentation

[‡] Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at (800) 426-4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 [Telephone: (202) 566-2426]; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html

Technique, and Presence-Absence Coliform Test. Methods for establishing false-positive and negative-rates may be based on lactose fermentation, the rapid test for β-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] *Standard Methods for the Examination of Water and Wastewater,* 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005.

[3] TCR = Total Coliform Rule; SWTR = Surface Water Treatment Rule

[4] The time from sample collection to initiation of analysis may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 ºC during transit.

[5] The ONPG-MUG Test is also known as the Autoanalysis Collect System.

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

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

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

[9] The Readycult® Coliforms 100 Presence/Absence Test is described in the document, "*Readycult®Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and* Escherichla coli *in Finished Waters*", November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGgA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone: (800) 222-0342

[10] Method 1604: Total Coliforms and Escherichia coli in Water by Memberane Filtration Using a Simultaneous Detection Technique (MU Medium) (September 1992). MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., *et. al.,* 1993, Appl. Environ. Microbiol. 59:3534–3544. Also available from the Office of Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460, EPA/600/J–99/225. Verification of colonies is not required.

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

[12] Membrane Filter Technique using Chromocult® Coliform Agar is described in the document, "*Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and* Escherichla coli *in Finished Waters*", November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGgA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone:(800) 222-0342

[13] A description of the Coliscan® test, August 10, 2000, can be obtained from **Micrology Laboratories**, LLC P.O.Box 340, Goshen, IN 46527-0340

(4) **[Reserved]**

(5) **[Reserved]**

(6) Public water systems must conduct analysis of *Escherichia coli* in accordance with one of the following analytical methods:

(i) EC medium supplemented with 50 µg/mL of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 mL of EC medium, as described in paragraph IA(5) of this appendix, is supplemented with 50 µg/mL of MUG before autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in paragraph IA(5) of this appendix for transferring a total coliform-positive culture to EC medium supplemented with MUG,

incubate the tube at 44.5 ±0.2 °C for 24 ±2 hours, and then observe fluorescence with an ultraviolet light (366 nm) in the dark. If fluorescence is visible, *E. coli* are present.

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

(iii) Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article "*National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and Escherichia coli from Drinking Water: Comparison with Presence-Absence Techniques*" (Edberg et al.), Applied and Environmental Microbiology, Volume 55, pp. 1003-1008, April 1989. (Note: The Autoanalysis Colilert System is an MMO-MUG test). If the MMO-MUG test is total coliform-positive after a 24-hour incubation, test the medium for fluorescence with a 366-nm ultraviolet light (preferably with a 6-watt lamp) in the dark. If fluorescence is observed, the sample is *E. coli*-positive. If fluorescence is questionable (cannot be definitively read) after 24 hours incubation, incubate the culture for an additional four hours (but not to exceed 28 hours total), and again test the medium for fluorescence. The MMO-MUG Test with hepes buffer in lieu of phosphate buffer is the only approved formulation for the detection of *E. coli*.

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

(v) The membrane filter method with MI agar, a description of which is cited in footnote 6 to the table in paragraph IA(3) of this appendix.

(vi) E*Colite®Test, a description of which is cited in footnote 10 to the table in paragraph IA(3) of this appendix.

(vii) m-ColiBlue24®Test, a description of which is cited in footnote 11 to the table in paragraph IA(3) of this appendix.

(viii) Readycult®Coliforms 100 Presence/Absence Test, a description of which is cited in footnote 13 to the table in paragraph IA(3) of this appendix.

(ix) Membrane Filter Technique using Chromocult®Coliform Agar, a description of which is cited in footnote 14 to the table in paragraph IA(3) of this appendix.

(x) Colitag®, a description of which is cited in footnote 15 to the table in paragraph IA(3) of this appendix.

(7) As an option to paragraph IA(6(iii) of this appendix, a system with a total coliform-positive, MUG-negative, MMO-MUG test may further analyze the culture for the presence of *E. coli* by transferring a 0.1 ml, 28-hour MMO-MUG culture to EC Medium + MUG with a pipet. The formulation and incubation conditions of EC Medium + MUG, and observation of the results are described in paragraph IA(6(i) of this appendix.

(8) The following materials are incorporated by reference in this appendix with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

Copies of the analytical methods cited in *Standard Methods for the Examination of Water and Wastewater* (18th, 19th, and 20th editions) may be obtained from the American Public Health Association et al. ; 1015 Fifteenth Street, NW., Washington, DC 20005–2605.

Copies of the MMO-MUG Test, as set forth in the article "*National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and Escherichia coli from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method*" (Edberg et al.) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235.

A description of the Colisure Test may be obtained from the Millipore Corp., Technical Services Department, 80 Ashby Road, Bedford, MA 01730.

Copies may be inspected at EPA's Drinking Water Docket; 401 M St., SW.; Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

B. [**RESERVED**]

C. **Invalidation of Samples**

(1) A total coliform sample invalidated under this Paragraph does not count towards meeting the minimum monitoring requirements of these Regulations.

(2) The Director will invalidate a total coliform-positive sample and document same in writing only if:

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

(ii) The Director determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem; or

(iii) The Director has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. (In this case, the system must still collect all repeat samples required.)

(3) A total coliform-positive sample will not be invalidated solely on the grounds that all repeat samples are total coliform negative.

(4) A laboratory must invalidate a total coliform sample, unless total coliforms are detected, if

(i) The sample produces a turbid culture in the absence of gas production using the method cited in §16.4(b)(4)(a);

(ii) The sample produces a turbid culture in the absence of an acid reaction; using the method cited in §16.4(b)(4)(c); or

(iii) It exhibits confluent growth, or produces colonies too numerous to count, using the method cited in §16.4(b)(4)(b).

(5) If a laboratory invalidates a sample for the above reasons, the system must collect another sample from the same location as the original sample within twenty-four (24) hours of being notified of the result. The system must continue to re-sample within twenty-four (24) hours and have the samples analyzed until it obtains a valid result. The Director may extend the twenty-

four (24)-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within twenty-four (24) hours that is beyond its control. In the case of a extension, the Director will specify how much time the system has to collect the repeat samples.

D. **Analytical Methods For Source Water Monitoring**

Fecal Indicator[1]	Methodology	**Method Citation**
E. coli	Colilert[3]	9223B[2]
	Colisure	9223B[2]
	Membrane Filter Method with MI Agar	EPA Method 1604[4]
	m-ColiBlue24 Test[5]	
	E*Colite Test[6]	
	EC–MUG[7]	9221F[2]
	NA–MUG[7]	9222G[2]
Enterococci	Multiple-Tube Technique	9230B[2]
	Membrane Filter Technique	9230C[2]
	Membrane Filter Technique	EPA Method 1600[8]
	Enterolert[9]	
Coliphage	Two-Step Enrichment Presence-Absence Procedure	EPA Method 1601[10]
	Single Agar Layer Procedure	EPA Method 1602[11]

[1] The time from sample collection to initiation of analysis may not exceed 30 hours. The ground water system is encouraged but is not required to hold samples below 10 °C during transit.

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

[3] Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092.

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

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

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

[7] EC-MUG (Method 9221F) or NA-MUG (Method 9222G) can be used for *E. coli* testing step as described in Appendix I – Section 1 A.(6) after use of Standard Methods 9221 B, 9221 D, 9222 B, or 9222 C.

[8] EPA Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-β-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 1 above, rather than as specified in Section 8 of EPA Method 1600.

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

[10] 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.

[11] 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.

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SECTION II - CHEMISTRY

A. **Inorganic Chemistry**

References for §§5.0, 6.0, 16.1 and 17.2

(1) **Surface Water Treatment Rule Monitoring:**

(a) PWSs which must conduct analyses to meet the requirements of §5.0 for turbidity, temperature and measure residual disinfectant concentrations must use the methods contained in the following table. Residual disinfectant concentrations for free chlorine and combined chorine also may be measured by using DPD colorimetric test kits. ITS free chlorine test strip may also be used for the determination of free chlorine. Use of the test strips is described in Method D99-003, *Free Chlorine Species (HOCl- and OCl-) by Test Strip*, Revision 3.0, November 21, 2003, available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730. Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy and precision remain same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five (5) days, or with a protocol approved by the Director.

(2) **Residual Disinfectant Concentration:**

Residual	Methodology	SM[1]	SM Online[2]	Other
Free Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D-00	D1253-03[3]
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F-00	
	DPD Colorimetric	4500-Cl G	4500-Cl G-00	
	Syringaldazine (FACTS)	4500-Cl H	4500-Cl H-00	
Total Chlorine	Amperometric Titration	4500-Cl D	4500-Cl D-00	D1253-03[3]
	Amperometric Titration (low level measurement)	4500-Cl E	4500-Cl E-00	
	DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F-00	
	DPD Colorimetric	4500-Cl G	4500-Cl G-00	
	Iodometric Electrode	4500-Cl I	4500-Cl I-00	
Chlorine Dioxide	Amperometric Titration	4500-ClO_2 C	4500-ClO_2 C-00	
	DPD Method	4500-ClO_2 D		
	Amperometric Titration	4500-ClO_2 E	4500-ClO_2 E-00	
	Spectrophotometric			327.0, Revision 1.1[4]
Ozone	Indigo Method	4500-O_3 B	4500-O_3 B-97	

[1] All the listed methods are contained in the 18th, 19th, and 20th editions of Standard Methods for the Examination of Water and Wastewater, 1992, 1995, and 1998; the cited methods published in any of these three editions may be used.

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

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

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

(3) **Turbidity:**

Parameter	Methodology	Citation[1]
Turbidity[2]	Nephelometric Method	2130B
	Nephelometric Method	180.1[3]
	Great Lakes Instruments	Method 2[4]
	Hach FilterTrak	10133[5]

Footnotes:

The procedures shall be done in accordance with the documents listed below:

[1] Except where noted, all methods refer to *Standard Methods for the Examination of Water and Wastewater,* 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used. In addition, the following online versions may also be used: 2130 B-01. Standard Methods Online are available at *http://www.standardmethods.org.* The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that may be used.

[2] Styrene divinyl benzene beads (e.g., AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin.

[3] *Methods for the Determination of Inorganic Substances in Environmental Samples*, EPA/600/R-93/100, August 1993. Available at NTIS, PB94-121811.

[4] GLI Method 2, "Turbidity," November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, WI 53223.

[5] A description of the Hach FilterTrak Method 10133, *Determination of Turbidity by Laser Nephelometry*, January 2000, Revision 2.0, can be obtained from; Hach Co., P.O. Box 389, Loveland, CO 80539-0389, telephone: 800-227-4224.

(4) **Regulated Inorganic Chemical Monitoring**

(a) **Methodology**

(i) PWSs conducting analyses of inorganic chemicals as required in §§6.0, 16.0 and 17.0 shall conduct these analyses in accordance with one of the following analytical methods or their equivalent as determined by EPA. Criteria for analyzing arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, selenium, sodium and thallium with digestion or directly without digestion, and other analytical test procedures are contained in *Technical Notes on Drinking Water Methods, EPA-600\R-94-173, October 1994*. This document also contains approved analytical test methods which remain available for compliance monitoring until July 1, 1996. These methods will not be available for use after July 1, 1996. This document is available from the National Technical Information Service, NTIS PB95-104766, U.S. Department of Commerce,

5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847.

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other
1. Alkalinity	Titrimetric		D1067-92, 02 B	2320 B	2320 B	2320 B-97	
	Electrometric titration					I-1030-85[5]	
2. Antimony	InductivelyCoupled Plasma (ICP)-Mass Spectrometry	200.8[6]					
	Hydride-Atomic Absorption		D3697-92, 02.				
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Furnace			3113 B		3113 B-99	
3. Arsenic[7]	Inductively Coupled Plasma[8]	200.7[6]		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Furnace		D2972-97, 03 C	3113 B		3113 B-99	
	Hydride Atomic Absorption		D2972-97, 03 B	3114 B		3114 B-97	
4. Asbestos	Transmission Electron Microscopy	100.1[9]					
	Transmission Electron Microscopy	100.2[10]					
5. Barium	Inductively Coupled Plasma	200.7[6]		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8[6]					
	Atomic Absorption; Direct			3111 D		3111 D-99	
	Atomic Absorption; Furnace			3113 B		3113 B-99	
6. Beryllium	Inductively Coupled Plasma	200.7[6]		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Furnace		D3645-97, 03 B	3113 B		3113 B-99	
7. Cadmium	Inductively Coupled Plasma	200.7[6]					
	ICP-Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Furnace			3113 B		3113 B-99	

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other
8. Calcium	EDTA titrimetric		D511-93, 03 B	3500-Ca D	3500-Ca B	3500-Ca B-97	
	Atomic Absorption; Direct Aspiration.		D511-93, 03 A	3111 B		3111 B-99.	
	Inductively Coupled Plasma.	200.7[6]		3120 B	3120 B	3120 B-99	
	Ion Chromatography		D6919-03				
9. Chromium	Inductively Coupled Plasma	200.7[6]		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Furnace			3113 B		3113 B-99	
10. Copper	Atomic Absorption; Furnace		D1688-95, 02 C	3113 B		3113 B-99	
	Atomic Absorption; Direct Aspiration		D1688–95, 02 A	3111 B		3111 B-99.	
	Inductively Coupled Plasma	200.7[6]		3120 B	3120 B	3120 B-99	
	ICP-Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
11. Conductivity	Conductance		D1125-95 (Reapproved 1999) A	2510 B	2510 B	2510 B-97	
12. Cyanide	Manual Distillation followed by		D2036-98 A	4500-CN- C	4500-CN- C		
	Spectrophotometric, Amenable		D2036-98 B	4500-CN- G	4500-CN- G	4500-CN- G-99	
	Spectrophotometric Manual			4500-CN- E	4500-CN- E	4500-CN- E-99	I-3300-85[5]
	Spectro-photometric Semi-automated.	335.4[11]					
	Selective Electrode			4500-CN- F	4500-CN- F	4500-CN- F-99	
	UV, Distillation, Spectrophotometric						Kelada-01[12]

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other
	Micro Distillation, Flow Injection, Spectro-photometric.						QuikChem 10-204-00-1-X[13]
	Ligand Exchange and Amperometry[14]		D6888-04				OIA-1677, DW[15]
13. Fluoride	Ion Chromatography	300.0[11], 300.1[16]	D4327-97, 03	4110 B	4110 B	4110 B-00	
	Manual Distill.; Color. SPADNS			4500-F- B, D	4500-F- B, D	4500-F- B, D-97	
	Manual Electrode		D1179-93, 99 B	4500-F- C	4500-F- C	4500-F- C-97	
	Automated Electrode						380–75WE[17]
	Automated Alizarin			4500-F- E	4500-F- E	4500-F- E-97	129–71W[17]
	Capillary Ion Electrophoresis						D6508, Rev. 2[18]
14. Lead	Atomic Absorption; Furnace		D3559-96, 03 D	3113 B		3113 B-99	
	ICP–Mass spectrometry	200.8[6]					
	Atomic Absorption; Platform.	200.9[6]					
	Differential Pulse Anodic Stripping Voltametry						Method 1001[19]
15. Magnesium	Atomic Absorption		D511-93, 03 B	3111 B		3111 B-99.	
	ICP	200.7[6]		3120 B	3120 B	3120 B-99.	
	Complexation Titrimetric Methods		D511-93, 03 A				
	Ion Chromatography		D6919-03	3500-Mg E	3500-Mg B	3500-Mg B-97	
16. Mercury	Manual, Cold Vapor	245.1[6]	D3223-95, 02	3112 B		3112 B-99	
	Automated, Cold Vapor	245.2[20]					
	ICP–Mass Spectrometry	200.8[6]					
17. Nickel	Inductively Coupled Plasma	200.7[6]		3120 B	3120 B	3120 B-99	
	ICP–Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Direct			3111 B		3111 B-99	

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other
	Atomic Absorption; Furnace			3113 B		3113 B-99	
18. Nitrate	Ion Chromatography	300.0[11] 300.1[16]	D4327–97, 03	4110 B	4110 B	4110 B-00	B-1011[21]
	Automated Cadmium Reduction	353.2[11]	D3867-90 A	4500–NO_3 -F	4500–NO_3 -F	4500–NO_3 -F-00	
	Ion Selective Electrode			4500–NO_3 -D	4500–NO_3 -D	4500–NO_3 -D-00	601[22]
	Manual Cadmium Reduction		D3867-90 B	4500–NO_3 -E	4500–NO_3 -E	4500–NO_3 -E-00	
	Capillary Ion Electrophoresis						D6508, Rev. 2[18]
19. Nitrite	Ion Chromatography	300.0[11] 300.1[16]	D4327–97, 03	4110 B	4110 B	4110 B-00	B-1011[21]
	Automated Cadmium Reduction	353.2[11]	D3867-90 A	4500–NO_3 -F	4500–NO_3 -F	4500–NO_3 -F-00	
	Manual Cadmium Reduction		D3867-90 B	4500–NO_3 -E	4500–NO_3 -E	4500–NO_3 -E-00	
	Spectrophotometric			4500–NO_2 -B	4500–NO_2-B	4500–NO_2 -B-00	
	Capillary Ion Electrophoresis						D6508, Rev. 2[18]
20. Ortho-phosphate[23]	Colorimetric, Automated, Ascorbic Acid	365.1[11]		4500-P F	4500-P F		
	Colorimetric, ascorbic acid, single reagent.		D515-88 A	4500-P E	4500-P E		
	Colorimetric Phosphomolybdate						I-1601-85[5]
	Automated-segmented flow						I-2601-90[5]
	Automated Discrete						I-2598-85[5]
	Ion Chromatography	300.0[11] 300.1[16]	D4327-97, 03	4110 B	4110 B	4110 B-00	
	Capillary Ion Electrophoresis						D6508, Rev. 2[18]

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other
21. pH	Electrometric	150.1, 150.2[20]	D1293-95, 99	4500-H^+ B	4500-H^+ B	4500-H^+ B-00	
22. Selenium	Hydride-Atomic Absorption		D3859-98, 03 A	3114 B		3114 B-97	
	ICP–Mass Spectrometry	200.8[6]					
	Atomic Absorption; Platform	200.9[6]					
	Atomic Absorption; Furnace		D3859-98, 03 A	3113 B		3113 B-99	
23. Silica	Colorimetric, Molybdate Blue						I-1700-85[5]
	Automated-segmented Flow						I-2700-85[5]
	Colorimetric		D859-94, 00.				
	Molybdosilicate			4500-SiO_2 D	4500-SiO_2 C	4500-SiO_2 C-97	
	Heteropoly blue			4500-SiO_2 E	4500-SiO_2 D	4500-SiO_2 D-97	
	Automated for Molybdate-reactive Silica			4500-SiO_2 F	4500-SiO_2 E	4500-SiO_2 E-97	
	Inductively Coupled Plasma	200.7[6]		3120 B	3120 B	3120 B-99	
24. Sodium	Inductively Coupled Plasma	200.7[6]					
	Atomic Absorption; Direct Aspiration			3111 B		3111 B-99	
	Ion Chromatography		D6919-03				
25. Temperature	Thermometric			2550	2550	2550-00.	
26. Thallium	ICP–Mass Spectrometry	200.8[6]					

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 2-6, 9-13, and 15-22 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., Room 3334, Washington, DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other

[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, sample preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis of antimony, lead, and thallium by Method 200.9; antimony and lead by Method 3113 B; and lead by Method D3559-90D, unless multiple in-furnace depositions are made.

[2] Annual Book of ASTM Standards, 1994, 1996, 1999, or 2003, Vols. 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. The previous versions of D1688-95A, D1688-95C (copper), D3559-95D (lead), D1293-95 (pH), D1125-91A (conductivity) and D859-94 (silica) are also approved. These previous versions D1688-90A, C; D3559-90D, D1293-84, D1125-91A and D859-88, respectively are located in the Annual Book of ASTM Standards, 1994, Vol. 11.01. Copies may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

[3] Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used, except that the versions of 3111 B, 3111 D, 3113 B and 3114 B in the 20th edition may not be used.

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

[5] Method I-2601-90, Methods for Analysis by the U.S. Geological Survey National Water Quality Laboratory--Determination of Inorganic and Organic Constituents in Water and Fluvial Sediment, Open File Report 93-125, 1993; For Methods I-1030-85; I-1601-85; I-1700-85; I-2598-85; I-2700-85; and I-3300-85 See Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd edition., 1989; Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0425.

[6] ``Methods for the Determination of Metals in Environmental Samples--Supplement I," EPA/600/R-94/111, May 1994. Available at NTIS, PB95-125472.

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

[8] Starting 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 0.010 mg/L. However, prior to January 23, 2006, systems may have compliance samples analyzed with these less sensitive methods.

[9] Method 100.1, ``Analytical Method For Determination of Asbestos Fibers in Water," EPA/600/4-83/043, EPA, September 1983. Available at NTIS, PB83-260471.

[10] Method 100.2, ‘‘Determination of Asbestos Structure Over 10-µm In Length In Drinking Water,’’ EPA/600/R–94/134, June 1994. Available at NTIS, PB94–201902.

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

[12] The description for the Kelada-01 Method, ``Kelada Automated Test Methods for Total Cyanide, Acid Dissociable Cyanide, And Thiocyanate," Revision 1.2, August 2001, EPA 821-B-01-009 for cyanide is available from the National Technical Information Service (NTIS), PB 2001-108275, 5285 Port Royal Road, Springfield, VA 22161. The toll free telephone number is 800-553-6847. **Note:** A 450-W UV lamp may be used in this method instead of the 550-W lamp specified if it provides performance within the quality control (QC) acceptance criteria of the method in a given instrument. Similarly, modified flow cell configurations and flow conditions may be used in the method, provided that the QC acceptance criteria are met.

Contaminent	Methodology[1]	EPA	ASTM[2]	Standard methods[3] (18th, 19th, Ed.)	Standard methods[3] (20th Ed.)	Standard methods online[4]	Other

[13] The description for the QuikChem Method 10-204-00-1-X, ``Digestion and distillation of total cyanide in drinking and wastewaters using MICRO DIST and determination of cyanide by flow injection analysis," Revision 2.1, November 30, 2000, for cyanide is available from Lachat Instruments, 6645 W. Mill Rd., Milwaukee, WI 53218. Telephone: 414-358-4200.

[14] Sulfide levels below those detected using lead acetate paper may produce positive method interferences. Test samples using a more sensitive sulfide method to determine if a sulfide interference is present, and treat samples accordingly.

[15] Method OIA-1677, DW ``Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry," January 2004. EPA-821-R-04-001, Available from ALPKEM, A Division of OI Analytical, P.O. Box 9010, College Station, TX 77842-9010.

[16] ``Methods for the Determination of Organic and Inorganic Compounds in Drinking Water," Vol. 1, EPA 815-R-00-014, August 2000. Available at NTIS, PB2000-106981.

[17] 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.

[18] Method D6508, Rev. 2, ``Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte," available from Waters Corp, 34 Maple St, Milford, MA, 01757, Telephone: 508/482-2131, Fax: 508/482-3625.

[19] The description for Method Number 1001 for lead is available from Palintest, LTD, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018. Or from the Hach Company, P.O. Box 389, Loveland, CO 80539.

[20] ”Methods for Chemical Analysis of Water and Wastes," EPA/600/4-79/020, March 1983. Available at NTIS, PB84-128677.

[21] Method B-1011, ``Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography," August 1987. Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Milford, MA 01757, Telephone: 508/482-2131, Fax: 508/482-3625.

[22] The procedure shall be done in accordance with the Technical Bulletin 601 " Standard Method of Test for Nitrate in Drinking Water," July 1994, PN221890-001, Analytical Technology, Inc. Copies may be obtained from ATI Orion, 529 Main Street, Boston, MA 02129.

[23] Unfiltered, no digestion or hydrolysis.

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(b) **Sampling Protocol**

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

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

[1] For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time off collection. When chilling is indicated the sample must be shipped and stored at 4 °C or less. Acidification of nitrate or metals samples may be with a concentrated acid or a dilute (50% by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EPA Methods 200.7 or 200.8 or 200.9 are followed.

[2] P = plastic, hard or soft; G = glass, hard or soft.

[3] In all cases samples should be analyzed as soon after collection as possible. Follow additional (if any) information on preservation, containers or holding times that is specified in method.

[4] Instructions for containers, preservation procedures and holding times as specified in Method 100.2 must be adhered to for all compliance analyses including those conducted with Method 100.1.

[5] If the sample is chlorinated, the holding time for an unacidified sample kept at 4 °C is extended to 14 days.

[6] Nitrate-Nitrite refers to a measurement of total nitrate.

(c) **Acceptance Criteria**

(i) Analysis under this section shall only be conducted by laboratories that have been certified by EPA or the Director. To receive certification to conduct analyses for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite and selenium and thallium, the laboratory must:

(A) Analyze Performance Evaluation (PE) samples provided by EPA, the Director or by a third party (with the approval of the Director or EPA) at least once a year.

(B) (1) For each contaminant that has been included in the PE sample and for each method for which the laboratory desires certification achieve quantitative results on the analyses that are within the following acceptance limits:

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

[1] The arsenic acceptance limit criteria became effective January 23, 2006

(2) For samples which include lead and copper and for each method for which the laboratory desires certification achieve quantitative results on the analyses that are within the following acceptance limits:

- 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.
- 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.
- Achieve method detection limits as follows for lead and copper:

- Lead: 0.001 mg/L must be achieved (only if source water compositing is done under S6.23(a)(4)).
- Copper: 0.001 mg/L or 0.020 mg/L when atomic absorption direct aspiration is used (only if source water compositing is done under S6.23(a)(4).

(C) The Director 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 subpart for lead and copper monitoring.

(D) 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 (0.0025mg/L). All levels below the lead and copper MDLs must be reported as zero.

(E) All copper levels measured between the PQL and MDL must be either reported as measured or they can be reported as one-half the PQL (0.015 mg/L). All levels below the copper MDL must be reported as zero.

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B. Volatile Organic Chemistry (VOC'S)

References for §§16.2, 16.6, 17.3 and 17.5

(1) **Regulated Volatile Organic Chemicals**

(a) **Methodology**

(i) PWSs conducting analyses of inorganic chemicals as listed below and as required in §§16.0 and 17.0 of these Regulations shall conduct these analyses in accordance with one (1) of the following analytical methods or their equivalent as determined by EPA:

Contaminant	Method[1]
Benzene	502.2; 524.2
Carbon tetrachloride	502.2; 524.2; 551.1
Chlorobenzene	502.2; 524.2
1,2-Dichlorobenzene	502.2; 524.2
1,4-Dichlorobenzene	502.2; 524.2
1,2-Dichloroethane	502.2; 524.2
Cis-Dichloroethylene	502.2; 524.2
Trans-dichloroethylene	502.2; 524.2
Dichloromethane	502.2; 524.2
1,2-Dichloropropane	502.2; 524.2
Ethylbenzene	502.2; 524.2
Styrene	502.2; 524.2
Tetrachloroethylene	502.2; 524.2; 551.1
1,1,1-Trichloroethane	502.2; 524.2; 551.1
Trichloroethylene	502.2; 524.2; 551.1
Toluene	502.2; 524.2
1,2,4-Trichlorobenzene	502.2; 524.2
1,1-Dichloroethylene	502.2; 524.2
1,1,2-Trichloroethane	502.2; 524.2; 551.1
Vinyl chloride	502.2; 524.2
Xylenes (total)	502.2; 524.2

[1] Methods 502.2, 524.2 and 551.1 are in *Methods for the Determination of Organic Compounds in Drinking Water--Supplement III*, EPA/600/R-95-131, August 1995

(b) **Certification Criteria**

(i) To receive certification to conduct analyses for the contaminants listed in Appendix 1 Section II B(1), above the laboratory must:

(ii) Analyze Performance Evaluation (PE) samples provided by EPA, the Director, or by a third party (with the approval of the Director or EPA) at least once a year by each method for which the laboratory desires certification.

(iii) Achieve the quantitative acceptance limits under Paragraphs (iv) and (v) of this Section for at least 80 percent of the regulated organic chemicals included in the PE sample.

(iv) Achieve quantitative results on the analyses performed under Paragraph (ii) of this Section that are within ±20% of the actual amount of the substances in the Performance Evaluation sample when the actual amount is greater than or equal to 0.010 mg/1.

(v) Achieve quantitative results on the analyses performed under Paragraph (ii) of this Section 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/1.

(vi) Achieve a method detection limit of 0.0005 mg/1.

(vii) To receive certification for vinyl chloride, the laboratory must:

aa) Analyze Performance Evaluation (PE) samples w provided by EPA, the Director, or by a third party (with the approval of the Director or EPA) at least once a year by each method for which the laboratory desires certification.

bb) Achieve quantitative results on the analyses performed under Paragraph ref of this Section that are within ±40 percent of the actual amount of vinyl chloride in the Performance Evaluation sample.

cc) Achieve a method detection limit of 0.0005 mg/1.

dd) Obtain certification for the contaminants listed in Appendix 1 Section II B(1), above.

(2) **Total Trihalomethane Chemistry**

(a) **Methodology**

(i) Sampling and analyses made pursuant to Section 16.0 shall be conducted by the total trihalomethane methods [502.2, 524.2 or 551.1] as listed in *Methods for the Determination of Organic Compounds in Drinking Water--Supplement III*, EPA/600/R-95-131, August 1995.

(3) **Unregulated Contaminants and Special Monitoring**

(a) Unregulated Volatile Organic Contaminants Methodology

(i) Analysis for the unregulated contaminants listed in Section 16.6 shall be conducted using EPA Methods 502.2 or 524.2, or their equivalent as determined by EPA, except analysis for bromodichloromethane, bromoform, chlorodibromomethane and chloroform may be conducted by EPA Method 551.1, and analysis for 1,2,3-trichloropropane also may be conducted by EPA Method 504.1. Methods 502.2, 524.2, 504.1 and 551.1 are in *Methods for the Determination of Organic Compounds in Drinking Water--Supplement III*, EPA/600/R-95-131, August 1995.:

(4) **Compositing of Samples:** All samples must be composited in the laboratory and analyzed within fourteen (14) days of sample collection.

(a) The following procedure must be followed for the compositing samples prior to GC analysis.

(i) Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.

(ii) The samples must be cooled at 4 ºC during this step to minimize volatilization losses.

(iii) Mix well and draw out a 5-ml aliquot for analysis.

(iv) Follow sample introduction, purging and desorption steps described in the method.

(v) If less than five (5) samples are used for compositing, a proportionately small syringe may be used.

(b) The following procedure must be followed for the compositing samples prior to GC/MS analysis.

(i) Inject 5-ml or equal larger amounts of each aqueous sample (up to 5 samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.

(ii) The total volume of the sample in the purging device must be 25 ml.

(iii) Purge and desorb as described in the method.

C. Synthetic Organic Chemistry (SOC's)

References for §§16.2, 16.7, 17.3 and 17.5 of the Regulations

(1) Regulated Synthetic Organic Chemicals

(a) Methodology

(i) PWSs conducting analyses of the inorganic chemicals listed below as required in Section 16.0 and 17.0 of these Regulations shall conduct these analyses in accordance with one (1) of the following analytical methods or their equivalent as determined by EPA.

(ii) Methods 508A and 515.1 are in *Methods for the Determination of Organic Compounds in Drinking Water*, EPA-600/4-88-039, December 1988, Revised, July 1991. Methods 502.2, 504.1, 505, 506, 507, 508, 508.1, 515.2, 524.2 525.2, 531.1, 551.1 and 552.2 are in *Methods for the Determination of Organic Compounds in Drinking Water-Supplement III*, EPA/600/R-95-131, August 1995.

(iii) Methods 547, 550 and 550.1 are in *Methods for the Determination of Organic Compounds in Drinking Water-Supplement I, EPA-600-4-90-020, July 1990*.

(iv) Methods 548.1, 549.1, 552.1 and 555 are in *Methods for the Determination of Organic Compounds in Drinking Water – Supplement II*, EPA-600/R-92-129, August 1992.

(v) Method 1613 is titled *Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope-Dilution HRGC/HRMS*, EPA-821-B-94-005, October 1994.

The documents referenced in items ii to v above are available from the National Technical Information Service, NTIS PB91-231480, PB91-146027, PB92-207703, PB95-261616 and PB95-104774, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll free number is: 800-553-6847

(vi) EPA Methods 515.3 and 549.2 are available from U.S. Environmental Protection Agency, National Exposure Research Laboratory (NERL)-Cincinnati, 26 West Martin Luther King Drive, Cincinnati, OH 45268.

(vii) Methods 6651 and 6610 shall be followed in accordance with *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association (APHA); any of these three editions may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street NW., Washington DC 20005.

Other required analytical test procedures germane to the conduct of these analyses are contained in *Technical Notes on Drinking Water Methods*, EPA-600/R-94-173, October 1994, NTIS PB95-104766. This document also contains approved analytical methods which will not be acceptable after July 1, 1996.

(viii) ASTM Method D 5317-93, 98 (Reapproved 2003) is available in the *Annual Book of ASTM Standards*, (1999), Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, any edition containing the cited version of the method may be used.

(ix) EPA Method 515.4, *Determination of Chlorinated Acids in Drinking Water by Liquid-Liquid Microextraction, Derivatization and Fast Gas Chromatography with Electron Capture Detection*, Revision 1.0, April 2000, EPA/815/B-00/001 and EPA Method 552.3, *Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection*, Revision 1.0, July 2003, EPA 815-B-03-002, can be accessed and downloaded directly online at http://www.epa.gov/safewater/methods/sourcalt.html.

(x) Syngenta Method AG-625, *Atrazine in Drinking Water by Immunoassay*, February 2001, is available from Syngenta Crop Protection, Inc., 410 Swing Road, P.O. Box 18300, Greensboro, NC 27419. Telephone: 336-632-6000.

(xi) Method 531.2 *Measurement of N-methylcarbamoyloximes and N-methylcarbamates in Water by Direct Aqueous Injection HPLC with Postcolumn Derivatization*, Revision 1.0, September 2001, EPA 815-B-01-002, can be accessed and downloaded directly online at http://www.epa.gov/safewater/methods/sourcalt.html.

Synthetic Organic Chemicals

Contaminant	EPA Method	Standard Methods	ASTM	Other
2,3,7,8-TCDD (dioxin)	1613			
2,4-D[3](as acids, salts, and esters)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
2,4,5-TP[3] (Silvex)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
Alachlor[1]	505, 507, 525.2, 508.1, 551.1			
Atrazine[1]	505, 507, 525.2, 508.1, 551.1			Syngenta[4]A G-625
Benzo(a)pyrene	525.2, 550, 550.1			
Carbofuran	531.1, 531.2	6610		
Chlordane	505, 508, 525.2, 508.1			
Dalapon	552.1, 515.1, 552.2, 515.3, 515.4, 552.3			
Di(2-ethylhexyl) adipate	506, 525.2			
Di(2-ethylhexyl) phthalate	506, 525.2			
Dibromochloropropane (DBCP)	504.1, 551.1			
Dinoseb[3]	515.2, 555, 515.1			
Diquat	549.2			

Synthetic Organic Chemicals

Contaminant	EPA Method	Standard Methods	ASTM	Other
Endothall	548.1			
Endrin	505, 508, 525.2, 508.1, 551.1			
Ethylene dibromide (EDB)	504.1, 551.1			
Glyphosate	547	6651		
Heptachlor	505, 508, 525.2, 508.1, 551.1			
Heptachlor Epoxide	505, 508, 525.2, 508.1, 551.1			
Hexachlorobenzene	505, 508, 525.2, 508.1, 551.1			
Hexachlorocyclopentadiene	505, 525.2, 508, 508.1, 551.1			
Lindane	505, 508, 525.2, 508.1, 551.1			
Methoxychlor	505, 508, 525.2, 508.1, 551.1			
Oxamyl	531.1, 531.2	6610		
PCBs[2] (as decachlorobiphenyl)	508A			
PCBs[2] (as Aroclors)	505, 508, 508.1, 525.2			
Pentachlorophenol	515.2, 525.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
Picloram[3]	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
Simazine[1]	505, 507, 525.2, 508.1, 551.1			
Toxaphene	505, 508, 508.1, 525.2			
Total Trihalomethanes	502.2, 524.2, 551.1			

[1] 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.

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

[3] Accurate determination of the chlorinated esters requires hydrolysis of the sample as described in EPA Methods 515.1, 515.2, 515.3, 515.4 and 555 and ASTM Method D5317-93.

[4] This method may not be used for the analysis of atrazine in any system where chlorine dioxide is used for drinking water treatment. In samples from all other systems, any result for atrazine generated by Method AG-625 that is greater than one-half the maximum contaminant level (MCL) (in other words, greater than 0.0015mg/L or 1.5 µg/L) must be confirmed using another approved method for this contaminant and should use additional volume of the original sample collected for compliance monitoring. In instances where a result from Method AG-625 triggers such confirmatory testing, the confirmatory result is to be used to determine compliance.

(xii) Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)

(aa) Analysis for PCBs shall be conducted as follows using either Method 505, or Method 508, 508.1or 525.2. Users of Method 505 may have more difficulty in achieving the required Aroclor detection limits than users of Methods 508.1, 525.2 or 508.

(bb) If PCBs (as one (1) of seven (7) Aroclors) are detected (as designated in this Paragraph) in any sample analyzed using Method 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

Aroclor	**Detection limit (mg/L)**
1016	0.00008
1221	0.02
1232	0.0005
1242	0.0003
1248	0.0001
1254	0.0001
1260	0.0002

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

(b) **Laboratory Criteria**

(i) Analysis under this Section shall only be conducted by laboratories that have received certification by EPA or the State and have met the following conditions:

(aa) To receive certification to conduct analyses for the contaminants in B, (SOC's) above the laboratory must:

(i-a) Analyze Performance Evaluation (PE) samples provided by the State provided by EPA, the Director, or by a third party (with the approval of the Director or EPA) at least once a year by each method for which the laboratory desires certification.

(i-b) Achieve quantitative results on the analyses that are within the following acceptance limits:

Contaminant	Acceptance Limits (percent)
Alachlor	±45
Aldicarb	2 standard deviations
Aldicarb sulfoxide	2 standard deviations
Aldicarb sulfone	2 standard deviations
Atrazine	±45
Benzo(a)pyrene	2 standard deviations
Carbofuran	±45
Chlordane	±45

Contaminant	Acceptance Limits (percent)
Dalapon	2 standard deviations
Di(2-ethylhexyl)adipate	2 standard deviations
Dibromochloropropane (DBCP)	±40
2,3,7,8-TCDD (Dioxin)	2 standard deviations
2,4-D	±50
2,4,5-TP (Silvex)	±50
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
Hexachloro-cyclopentadiene	2 standard deviations
Lindane	±45
Methoxychlor	±45
Oxamyl	2 standard deviations
PCBs (as Decachlorobiphenyl)	0-200
Picloram	2 standard deviations
Pentachlorophenol	±50
Simazine	2 standard deviations
Toxaphene	±45

(bb) Detection shall be defined as greater than or equal to the following concentrations for each contaminant:

Contaminant	Detection Limit (mg/L)
Alachlor	0.0002
Aldicarb	0.0005
Aldicarb sulfoxide	0.0005
Aldicarb sulfone	0.0008
Atrazine	0.0001
Benzo(a)pyrene	0.00002
Carbofuran	0.0009
Chlordane	0.0002

Contaminant	Detection Limit (mg/L)
Dalapon	0.001
1,2-Dibromo-3-chloropropane (DBCP)	0.00002
Di(2-ethylhexyl)adipate	0.0006
Di(2-ethylhexyl)phthalate	0.0006
2,4-D	0.0001
Dinoseb	0.0002
Diquat	0.0004
Endothall	0.009
Endrin	0.00001
Ethylene dibromide (EDB)	0.00001
Glyphosate	0.006
Heptachlor	0.00004
Heptachlor epoxide	0.00002
Hexachlorobenzene	0.0001
Hexachloro-cyclopentadiene	0.0001
Lindane	0.00002
Methoxychlor	0.0001
Oxamyl	0.002
PCBs (as Decachlorobiphenyl)	0.0001
Picloram	0.0001
Pentachlorophenol	0.00004
Simazine	0.00007
Toxaphene	0.001
2,3,7,8-TCDD (Dioxin)	0.000000005
2,4,5-TP (Silvex)	0.0002

D. <u>Radiological Chemistry</u>

Reference for §16.5 of the Regulations.

(1) Analysis for the contaminants in Table A shall be conducted to determine compliance with §16.5 in accordance with the methods in Table A, or their equivalent as.approved by the Director, with prior approval by EPA.

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Contaminant	Methodology	TABLE A: Reference (Method of Page Number)								
		EPA[1]	EPA[2]	EPA[3]	EPA[4]	SM[5]	ASTM[6]	USGS[7]	DOE[8]	Other
Naturally Occurring:										
Gross alpha[9] and beta	Evaporation	900.0	p. 1	00-01	p. 1	302, 7110 B, 7110 B-00		R-1120-76		
Gross alpha[9]	Coprecipitation			00-02		7110 C, 7110 C-00				
Radium 226	Radon emanation	903.1	p. 16	Ra-04	p. 19	305, 7500-Ra C, 7500- Ra C-01	D3454-97	R-1141-76	Ra-04	NY[10]
	Radiochemical	903.0	p. 13	Ra-03		304, 7500-Ra B, 7500-Ra B-01	D2460-97	R-1140-76		GA[12]
Radium 228	Radiochemical	904.0	p. 24	Ra-05	p. 19	7500-Ra D, 7500-Ra D-01		R-1142-76		NY[10], NJ[11], GA[12]
Uranium[13]	Radiochemical	908.0				7500-U B, 7500-U B-00				
	Fluorometric	908.1				7500-U C (17th Ed.).	D2907-97	R-1180-76, R-1181-76	U-04	
	ICP-MS	200.8[14]				3125	D5673-03			
	Alpha Spectrometry			00-07	p. 33	7500-U C (18th, 19th, or 20th Ed.), 7500-U C-00	D3972-97, 02.	R-1182-76	U–02	
	Laser Phosphorimetry						D5174-97, 02			
Man-Made:										
Radioactive Cesium	Radiochemical	901.0	p. 4			7500-Cs B, 7500-Cs B-00	D2459-72	R-1111-76		
	Gamma Ray Spectrometry	901.1			p. 92	7120, 7120-97.	D3649-91, 98a	R-1110-76	4.5.2.3.	

Contaminant	Methodology	TABLE A: Reference (Method of Page Number)								
		EPA[1]	EPA[2]	EPA[3]	EPA[4]	SM[5]	ASTM[6]	USGS[7]	DOE[8]	Other
Radioactive Iodine	Radiochemical	902.0	p. 6			7500-I B, 7500-I B-00				
			p. 9			7500-I C, 7500-I C-00				
						7500-I D, 7500-I D-00	D3649-91, 98a			
	Gamma Ray Spectrometry	901.1			p. 92	7120, 7120-97	D4785-93, 00a		4.5.2.3	
Radioactive Strontium 89, 90	Radiochemical	905.0	p. 29	Sr-04	p. 65	303, 7500-Sr B, 7500-SrB-01		R-1160-76	Sr-01,Sr-02	
Tritium	Liquid Scintillation	906.0	p. 34.	H-02	p. 87	306, 7500-3 H B, 7500-3H B-00	D4107-91, 98 (Re-approved 2002)	R-1171-76		
Gamma Emitters	Gamma Ray Spectrometry	901.1			p. 92	7120, 7120-97.	D3649-91, 98a	R-1110-76	Ga-01-R	
		902.0				7500Cs B, 7500Cs B-00	D4785-93, 00a			
		901.0				7500-I B, 7500-I B-00				

The procedures shall be done in accordance with the documents listed below. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800–426–4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., Room 3334 , Washington, DC 20460 (Telephone: 202-566-2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

[1] "Prescribed Procedures for the Measurement of Radioactivity in Drinking Water," EPA 600/4-80-032, August 1980. Available at the 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 NTIS, ibid.

[3] "Radiochemistry Procedures Manual," EPA 520/5-84-006, December 1987. Available NTIS, ibid.

[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 or 20th edition, 1971, 1989, 1992, 1995, 1998. Available at American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Methods 7110B, 7500-Ra B, 7500-Ra C, 7500-Ra D, 7500-U B, 7500-Cs B, 7500-I B, 7500-I C, 7500-I D, 7500-Sr B, and 7500-^{3}H B are in the 17th, 18th, 19th and 20th editions. Method 7110 C is in the 18th, 19th and 20th editions. Method 7500-U C Fluorometric Uranium is only in the 17th Edition, and 7500-U C Alpha spectrometry is only in the 18th, 19th

Contaminant	Methodology	TABLE A: Reference (Method of Page Number)								
		EPA[1]	EPA[2]	EPA[3]	EPA[4]	SM[5]	ASTM[6]	USGS[7]	DOE[8]	Other

and 20th editions. Method 7120 is only in the 19th and 20th editions. Method 3125 is only in the 20th edition. Methods 7110 B-00, 7110 C-00, 7500-Ra B-01, 7500-Ra C-01, 7500-Ra D-01, 7500-U B-00, 7500-U C-00, 7500-I B-00, 7500-I C-00, 7500-I D-00, 7120-97, 7500-Sr B-01, and 7500-^{3}H B-00 are available online at http://www.standardmethods.org. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

[6] Annual Book of ASTM Standards, Vol. 11.01 and 11.02, 2002; ASTM International; any year containing the cited version of the method may be used. Copies of these two volumes and the 2003 version of D 5673-03 may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

[7] "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments," Chapter A5 in Book 5 of Techniques of Water-Resources Investigations of the United States Geological Survey, 1977. Available at U.S. Geological Survey (USGS) Information Services, Box 25286, Federal Center, Denver, CO 80225-0425.

[8] "EML Procedures Manual," 28th (1997) or 27th (1990) Editions, Volumes 1 and 2; either edition may be used. In the 27th Edition Method Ra-04 is listed as Ra-05 and Method Ga-01-R is listed as Sect. 4.5.2.3. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014-3621.

[9] Natural uranium and thorium-230 are approved as gross alpha calibration standards for gross alpha with co-precipitation and evaporation methods; americium-241 is approved with co-precipitation methods.

[10] "Determination of Ra-226 and Ra-228 (Ra-02)," January 1980, Revised June 1982. Available at Radiological Sciences Institute for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

[11] "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.

[12] "The Determination of Radium-226 and Radium-228 in Drinking Water by Gamma-ray Spectrometry Using HPGE or Ge(Li) Detectors," Revision 1.2, December 2004. Available from the Environmental Resources Center, Georgia Institute of Technology, 620 Cherry Street, Atlanta, GA 30332-0335, USA, Telephone: 404-894-3776. This method may be used to analyze for radium-226 and radium-228 in samples collected after January 1, 2005 to satisfy the radium-226 and radium-228 monitoring requirements specified at 40 CFR 141.26.

[13] If uranium (U) is determined by mass, a 0.67 pCi/µg of uranium conversion factor must be used. This conversion factor is based on the 1:1 activity ratio of U-234 and U-238 that is characteristic of naturally occurring uranium.

[14] "Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry," Revision 5.4, which is published in ``Methods for the Determination of Metals in Environmental Samples--Supplement I," EPA 600-R-94-111, May 1994. Available at NTIS, PB 95-125472.

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(2) When the identification and measurement of radionuclides other than those listed in §D.(1) is required, the following references are to be used, except in cases where alternative methods have been approved by the Director.

(a) Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions, H.L. Krieger and S. Gold, EPA-R4-73-014. USEPA, Cincinnati, Ohio, May 1973.

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

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

(a) To determine compliance with §16.5(b) and §16.5(c), the detection limit shall not exceed the concentrations in Table B.

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

Contaminant	Detection Limit
Gross alpha particle activity	3 pCi/l
Radium-226	1 pCi/l
Radium-228	1 pCi/l
Uranium	1 µg/L

(b) To determine compliance with §16.5(d), Man-made Beta Particle and Photon Emitters, the detection limits shall not exceed the concentrations listed in Table C.

TABLE C Detection Limits for Man-made Beta Particle and Photon Emitters

Radionuclide	Detection Limit
Tritium	1,000 pCi/l
Strontium-89	10 pCi/l
Strontium-90	2 pCi/l
Iodine-131	1 pCi/l
Cesium-134	10 pCi/l
Gross beta	4 pCi/l
Other radionuclides	1/10 of the applicable limit

(c) To judge compliance with the maximum contaminant levels listed in §§16.5(b), (c) and (d), 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.

E. **Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors**

References for §§7.4(a)-(d)

(1) **Incorporation By Reference:** The following documents are incorporated by reference: The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html

(a) EPA Method 552.1 is in Methods for the Determination of Organic Compounds in Drinking Water-Supplement II, USEPA, August 1992, EPA/600/R-92/129 (available through National Information Technical Service (NTIS), PB92-207703).

(b) EPA Methods 502.2, 524.2, 551.1, and 552.2 are in Methods for the Determination of Organic Compounds in Drinking Water-Supplement III, USEPA, August 1995, EPA/600/R-95/131. (available through NTIS, PB95-261616).

(c) EPA Method 300.0 is in Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA, August 1993, EPA/600/R-93/100. (available through NTIS, PB94-121811).

(d) EPA Methods 300.1 and 321.8 are in Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1, USEPA, August 2000, EPA 815-R-00-014 (available through NTIS, PB2000–106981).

(e) EPA Method 317.0, Revision 2.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis," USEPA, July 2001, EPA 815-B-01-001,

(f) EPA Method 326.0, Revision 1.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis," USEPA, June 2002, EPA 815-R-03-007,

(g) EPA Method 327.0, Revision 1.1, "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry," USEPA, May 2005, EPA 815-R-05-008 and EPA Method 552.3, Revision 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection," USEPA, July 2003, EPA-815-B-03-002 can be accessed and down-loaded directly on-line at: http://www.epa.gov/safewater/methods/sourcalt.html.

(h) EPA Method 415.3, Revision 1.1, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," USEPA, February 2005, EPA/600/R-05/055 can be accessed and downloaded directly on-line at: www.epa.gov/nerlcwww/ordmeth.htm.

(i) Standard Methods 4500-Cl D, 4500-Cl E, 4500-Cl F, 4500-Cl G, 4500-Cl H, 4500-Cl I, 4500-ClO2 D, 4500-ClO2 E, 6251 B, and 5910 B shall be followed in accordance with Standard Methods for the Examination of Water and Wastewater, 19th or 20th Editions, American Public Health Association, 1995 and 1998, respectively. The cited methods published in either edition may be used.

(j) Standard Methods 5310 B, 5310 C and 5310 D shall be followed in accordance with the Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater, or the Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, 1996 and 1998, respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005.

(k) Standard Methods 4500-Cl D–00, 4500-Cl E-00, 4500-Cl F-00, 4500-Cl G-00, 4500-Cl H-00, 4500-Cl I-00, 4500-ClO_2E-00, 6251 B-94, 5310 B-00, 5310 C-00, 5310 D-00 and 5910 B-00 are available at http://www.standardmethods.org or at EPA's Water Docket. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that are IBR-approved.

(l) ASTM Methods D 1253-86 and D 1253-86 (Reapproved 1996) shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials, 1996 edition or any ASTM edition containing the IBR-approved version of the method may be used.

(m) ASTM Method D1253-03 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2004 or any ASTM edition containing the IBR-approved version of the method may be used.

(n) ASTM Method D 6581-00 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2001 or any ASTM edition containing the IBR-approved version of the method may be used; Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohoken, PA 19428-2959.

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(2) (a) **Approved Methods for Disinfection Byproduct Compliance Monitoring**

Contaminant & Methodology[1]	EPA Method	Standard Method[2]	SM Online[3]	ASTM Method[4]
TTHM				
P&T/GC/ElCD & PID	502.2[5]			
P&T/GC/MS	524.2			
LLE/GC/ECD	551.1			
HAA5				
LLE (diazomethane)/ GC/ECD		6251 B[6]	6251 B-94	
SPE (acidic methanol)/ GC/ECD	552.1[6]			
LLE (acidic methanol)/ GC/ECD	552.2, 552.3			
Bromate				
Ion chromatography	300.1			D 6581-00
Ion chromatography & post column reaction	317.0 Rev 2.0[7], 326.0[7]			
IC/ICP-MS	321.8[7, 8]			
Chlorite				
Amperometric titration		4500-ClO_2 E[9]	4500-ClO_2 E-00[9]	
Spectrophotometry	327.0 Rev 1.1[9]			
Ion chromatography	300.0, 300.1, 317.0 Rev 2.0, 326.0.			D 6581-00

(b) Analysis under §7.4 for disinfection byproducts must be conducted by laboratories that have received certification by EPA or the Director, except as specified under Paragraph (b)(3) of this Section. To receive certification to conduct analyses for the DBP contaminants in §7.1(a), the laboratory must:

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

[2] 19th and 20th editions of Standard Methods for the Examination of Water and Wastewater, 1995 and 1998, respectively, American Public Health Association; either of these editions may be used.

[3] The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at: http://www.standardmethods.org.

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

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

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

[7] Ion chromatography & post column reaction or IC/ICP-MS must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in §141.132(b)(3)(ii).

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

[9] Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in §141.132(b)(2)(i)(A). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in § 141.132(b)(2)(i)(B) and (b)(2)(ii).

(i) Analyze Performance Evaluation (PE) samples that are acceptable to EPA or the Director at least once during each consecutive twelve (12) month period by each method for which the laboratory desires certification.

(ii) Until March 31, 2007, in these analyses of PE samples, the laboratory must achieve results within the acceptance limit on a minimum of 80% of the analytes included in each PE sample. The acceptance limit is defined as the 95% confidence interval calculated around the mean of the PE study data between a maximum and minimum acceptance limit of ±50% and ± 15% of the study mean.

(iii) Beginning April 1, 2007, the laboratory must achieve quantitative results on the PE sample analyses that are within the following acceptance limits:

DBP	Acceptance Limits (percent of true value)	Comments
TTHM		Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a PE sample for TTHM
Chloroform	±20	
Bromodichloromethane	±20	
Dibromochloromethane	±20	
Bromoform	±20	
HAA5		Laboratory must meet the acceptance limits for 4 out of 5 of the HAA5 compounds in order to successfully pass a PE sample for HAA5
Monochloroacetic Acid	±40	
Dichloroacetic Acid	±40	
Trichloroacetic Acid	±40	
Monobromoacetic Acid	±40	
Dibromoacetic Acid	±40	
Chlorite	±30	
Bromate	±30	

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(iv) Beginning April 1, 2007, report quantitative data for concentrations at least as low as the ones listed in the following table for all DBP samples analyzed for compliance with §7.4:

DBP	Minimum Reporting Level (mg/L)[10]	Comments
TTHM[11]		
Chloroform	0.0010	
Bromodichloromethane	0.0010	
Dibromochloromethane	0.0010	
Bromoform	0.0010	
HAA5[11]		
Monochloroacetic Acid	0.0020	
Dichloroacetic Acid	0.0010	
Trichloroacetic Acid	0.0010	
Monobromoacetic Acid	0.0010	
Dibromoacetic Acid	0.0010	
Chlorite	0.020	Applicable to monitoring as prescribed in § 141.132 (b)(2)(1)(B) and (b)(2)(ii).
Bromate	0.0050 or 0.0010	Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 must meet a 0.0010 mg/L MRL for bromate.

[10] The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory. The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

[11] When adding the individual trihalomethane or haloacetic acid concentrations to calculate the TTHM or HAA5 concentrations, respectively, a zero is used for any analytical result that is less than the MRL concentration for that DBP, unless otherwise specified by the Director.

(3) Analysis of Disinfectant Residuals

Methodology	SM (19th or 20th ed)	SM Online[12]	ASTM Method	EPA Method	Residual Measured[13]			
					Free Cl_2	Combined Cl_2	Total Cl_2	ClO_2
Amperometric Titration	4500-Cl D	4500-Cl D-00	D 1253-86 (96), 03		X	X	X	
Low Level Amperometric Titration	4500-Cl E	4500-Cl E-00					X	
DPD Ferrous Titrimetric	4500-Cl F	4500-Cl F-00			X	X	X	
DPD Colorimetric	4500-Cl G	4500-Cl G-00			X	X	X	
Syringaldazine (FACTS)	4500-Cl H	4500-Cl H-00			X			
Iodometric Electrode	4500-Cl I	4500-Cl I-00					X	
DPD	4500-ClO_2 D							X
Amperometric Method II	4500-ClO_2 E	4500-ClO_2 E-00						X
Lissamine Green Spectro-photometric				327.0 Rev 1.1				X

(4) **Additional Analytical Methods**

(a) **Bromide.** EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0, or ASTM D 6581-00.

(b) **Total Organic Carbon (TOC).** Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples must be acidified at the time of sample collection to achieve pH less than or equal to 2.0 by minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within twenty-eight (28) days.

(c) **Specific Ultraviolet Absorbance (SUVA).** In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in Paragraph E(4)(c)(i) to measure DOC and the method stipulated in Paragraph E(4)(c)(ii) to measure UV_{254}. SUVA must be determined on water prior to the

[12] The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at http://www.standardmethods.org.

[13] X indicates method is approved for measuring specified disinfectant residual. Free chlorine or total chlorine may be measured for demonstrating compliance with the chlorine MRDL and combined chlorine, or total chlorine may be measured for demonstrating compliance with the chloramine MRDL.

addition of disinfectants/ oxidants by 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.

(i) **Dissolved Organic Carbon (DOC).** Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. DOC samples must be filtered through a 0.45 m pore-diameter filter as soon as practical after sampling, not to exceed 48 hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within 28 days of sample collection. Inorganic carbon must be removed from the samples prior to analysis. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet the following criteria: DOC < 0.5 mg/L.

(ii) **Ultraviolet Absorption at 254 nm (UV_{254}).** Method 5910 B or 5910 B-00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV_{254} samples must be filtered through a 0.45 m pore-diameter filter. The pH of UV_{254} samples may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed forty-eight (48) hours.

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APPENDIX 2

RESERVED

APPENDIX 3

DWQ PENALTY MATRIX (1)

The Office of Drinking Water Quality has classified its regulations into the following three (3) categories for use when assessing Administrative Penalties:

Categories*

Category I Penalty Range $1,000 - $5,000/day/violation. These types of violation have a direct impact on public health and will be given a high priority.

- Exceeding any MCL including Bacteria
  Inorganic
  Pesticides/Organic
  Turbidity
  Radiological
- Failure to maintain required chlorine residual
- Failure to adhere to new source approval requirements/plan requirements

Category II Penalty Range $100 - $1000/day/violation. These types of violations/noncompliance, also have a direct impact on public health but are mainly noncompliance with technical safeguards.

- Failure to monitor as required
- Failure to comply with reporting requirements
- Failure to make public notice as required
- Failure to notify DWQ within 48 hrs after confirmation check samples reveal MCL violations
- Denial of right of entry provisions
- Failure to comply with operators certification requirements

Category III Penalty Range $100 - $300/day/violation. These types of violations have an indirect impact on public health and are generally related to poor record keeping.

- Failure to submit monitoring reports (monitoring was done but system did not send report to DWQ until it was requested)
- Late submittal of monitoring reports
- Failure to keep required records on file as required

* Violation of a Department Order is a separate and additional violation from the violation or violations which gave rise to the issuance of the order, and is given a Base Number of $1000.00. No distinction should be made between a unilateral order and a consent order for the purpose of assessing administrative penalties.

The above classification is subject to change as the Office gets more experience with the Administrative Penalties regulations.

DWQ PENALTY MATRIX (2)

Sections	R46-13-DWQ	Noncompliance Categories
1.0	Definitions	N/A
2.0	Coverage	I
	a) Approval required	I
	c) Right of entry	II
3.0	New Water Sources	I
4.0	Approval of Treatment Works, Storage and Pumping Facilities	I
5.0	Filtration and Disinfection	
	5.1 General Requirements	
	5.2 Criteria for avoiding filtration	II
	5.3 Disinfection	I
	5.4 Filtration	I
	5.5 Analytical and monitoring requirements	II
	5.6 Monitoring requirements for systems that do not provide filtration	II
	5.7 Monitoring requirements for systems using filtration equipment	II
	5.8 Reporting and record keeping requirements	III
	5.9.1 General Requirements	
	5.9.2 Source Water Monitoring	II
	5.9.3 Sampling Schedules	II
	5.9.4 Sampling Locations	II
	5.9.5 Analytical Methods	II
	5.9.6 Approved Laboratories	II
	5.9.7 Reporting Source Water Monitoring Results	III
	5.9.8 Grandfathering Previously Collected Data	II
	5.9.9 Requirements When Making a Significant Change in Disinfection Practice	I
	5.9.10 Developing The Disinfection Profile And Benchmark	II
	5.9.11 Bin Classification For Filtered Systems	II
	5.9.12 Filtered System Additional Cryptosporidium Treatment Requirements	I
	5.9.13 Unfiltered System Cryptosporidium Treatment Requirements	I
	5.9.14 Schedule For Compliance With Cryptosporidium Treatment Requirements	I
	5.9.15 Requirements For Uncovered Finished Water Storage Facilities	I
	5.9.16 Microbial Toolbox Options For Meeting Cryptosporidium Treatment Requirements	I
	5.9.17 Source Toolbox Components	I
	5.9.18 Pre-Filtration Treatment Toolbox Components	I

Sections	R46-13-DWQ	Noncompliance Categories
	5.9.19 Treatment Performance Toolbox Components	I
	5.9.20 Additional Filtration Toolbox Components	I
	5.9.21 Inactivation Toolbox Components	I
	5.9.22 Reporting Requirements	III
	5.9.23 Recordkeeping Requirements	III
	5.9.24 Requirements To Respond To Significant Deficiencies Identified in Sanitary Surveys Performed By The Director	I
6.0	Control of Lead and Copper	
	6.80 General requirements	
	6.81 Applicability of corrosion control treatment steps to small, medium-size and large water systems	I
	6.82 Description of corrosion control treatment requirements	I
	6.83 Source water treatment requirements	I
	6.84 Lead service line replacement requirements	I
	6.85 Public education and supplemental monitoring requirements	II
	6.86 Monitoring requirements for lead and copper in tap water	II
	6.87 Monitoring requirements for water quality parameters	II
	6.88 Source monitoring requirements for lead and copper in water	II
	6.89 Analytical methods	II
	6.90 Reporting requirements	III
	6.91 Record keeping requirements	III
7.0	Disinfectent Residuals, Disinfection Byproducts and Disinfection Byproduct Precursors	II
	7.1 Maximum Contaminant Levels (MCLs) for Disinfection Byproducts	I
	7.2 Maximum Residual Disinfectent Levels	I
	7.3 General Requirements	I
	7.4 Analytical Requirements	II
	7.5 Monitoring Requirtements	II
	7.6 Compliance Requirements	I
	7.7 Reporting and Recordkeeping Requirements	III
	7.8 Treatment Techniques for Control of Disinfection Byproducts	I
	7.9 Initial Distribution System Evaluations	Ii
	7.9.1 General Requirements.	
	7.9.2 Standard Monitoring.	
	7.9.3 System Specific Studies.	
	7.9.4 40/30 Certification.	
	7.9.5 Very Small System Waivers.	
	7.9.6 Stage 2 (§7.10) Compliance Monitoring Location Recommendations.	

Sections	R46-13-DWQ	Noncompliance Categories
	7.10 Stage 2 Disinfection Byproducts Requirements	
	7.10.1 General requirements	II
	7.10.2 Routine monitoring	II
	7.10.3 §7.10 monitoring plan	II
	7.10.4 Reduced monitoring	II
	7.10.5 Additional requirements for consecutive systems	II
	7.10.6 Conditions requiring increased monitoring	I
	7.10.7 Operational evaluation levels	I
	7.10.8 Requirements for remaining on reduced TTHM and HAA5 monitoring based on subpart L results	II
	7.10.9 Requirements for remaining on increased TTHM and HAA5 monitoring based on subpart L results	II
	7.10.10 Reporting and recordkeeping requirements	III
8.0	[**RESERVED**]	N/A
9.0	Assurance of Safety in Public Supply	I
	9.2 Contamination of Tanks	I
	9.3 Connection Between Distribution Systems	I
10.0	Correction of Unsafe Conditions	I
11.0	Reports as to Public Supplies	II
12.0	Certified Laboratories	II
13.0	Ground Water Microbiology	II
14.0	Consecutive Water System Monitoring	N/A
15.0	Variances and Exemptions	N/A
16.0	Community Water System Requirements	I
	Maximum Contaminant levels for §16.1 Inorganic Chemicals	
	16.2 Organic Chemicals	
	16.3 Turbidity	
	16.4 Microbiological	
	16.5 Radioactivity	
	Monitoring Requirements, Analytical Techniques, and Monitoring Frequency for §§16.1, 16.2, 16.3, 16.4, 16.5, 16.6 and 16.7	II
	16.8 Public Notification	II
	16.9 Records	III
	16.10 Consumer Confidence Reports	III

Sections	R46-13-DWQ	Noncompliance Categories
17.0	Non-Community Water System Requirements	I
	Maximum Contaminant levels for	
	17.1 Microbiological	
	17.2 Inorganic Chemicals	
	17.3 Organic Chemicals	
	17.4 Turbidity	
	Monitoring Requirements, Analytical Techniques and Monitoring Frequency for §§17.1, 17.2, 17.3, 17.4 and 17.5	II
	17.6 Public Notification	II
	17.7 Records	III

DWQ PENALTY MATRIX (3)

18.0	Fees ~~Schedule~~	N/A
19.0	Rules Governing Practices and Procedures	N/A
20.0	Violations, Noncompliance, and Enforcement	
21.0	Severability	N/A
Other Areas of Non-Compliance		
	Violations of approval letter requirements	I
	Contamination incidents	I
	Non-compliance with admisistrative orders	I
	Non-compliance with admisistrative consent agreements	I

DWQ PENALTY MATRIX (4)

PWSS Civil or Complaint for Penalty Calculation Work Sheet

PWS Name or Owner Name DATE / /
PWS ID#
LOCATION

Violation Cited

I. Calculate Statutory Maximum Penalty
   (A) Length of Violation (in days)
   (B) Maximum Penalty _____
   Civil Penalty - $5,000/day

Statutory Maximum Penalty

II. Calculate Economic Benefit Component
   1. Estimate avoided and delayed costs through reasonable methodology. This must be documented.

III. ***Calculate Gravity Component***
   2. **BASE NUMBER** _____
   3. Impact (+ or -) _____
   4. Extent (+ or -) _____
   5. # of Violations (+ or -) _____
   6. **GRAVITY BASE NUMBER**
      (Total lines 2,3,4 and 5) _____
      **(Total must be within class range)
   7. **NUMBER OF DAYS** (If applicable) _____
      (Must be at least one (1))
   8. **TOTAL GRAVITY BASE NUMBER**
      (Multiply 6 by 7) _____
   9. **PRELIMINARY SETTLEMENT AMOUNT**
      (Economic Benefit + Gravity Component _____

IV. ***Adjustment Factors*** **TO TOTAL GRAVITY BASE NUMBER**

10. History of Violations	(+)	0 to 50%	_____%
11. Lack of Good Faith	(+)	0 to 100%	_____%
12. Financial Condition	(+ or -)	0 to 50%	_____%
13. Public Interest	(+ or -)	0 to 50%	_____%
14. Special Circumstances	(+ or -)	0 to 50%	_____%
15. Litigation Considerations	(-)	0 to 90%	_____%

TOTAL PERCENTAGE ADJUSTMENTS
16. (Add lines 10 thru 15) _____%
17. **MULTIPLY LINE 16 BY LINE 8** $_____
18. Enforcement Costs $_____

V. ***Final Settlement Amount***
   19. TOTAL PENALTY (Add lines 1,8,17 and 18) $_____

COMMENTS (Briefly note reason for any adjustments)

APPENDIX 4

List of Potential Sources of Groundwater Contamination

- Agricultural related activities (pesticide and fertilizer storage and application, machinery maintenance and fueling
- Airports-commercial (maintenance and repair, fuel storage)
- Animal care and holding areas (stables, kennels, pet shops)
- Asphalt, coal, tar and concrete companies
- Automotive repair shops
- Automotive body shops
- Auto parts stores
- Beauty salons
- Boat builders and refinishers
- Bus and truck terminals
- Chemical manufacturers
- Construction sites
- Dredge disposal sites
- Dry cleaners
- Food processors (meat packers, dairies, bakeries)
- Fuel oil distributors (product storage, equipment maintenance and storage)
- Funeral homes and cemeteries
- Furniture strippers, refinishers
- Golf courses
- Hotels and motels
- Industrial manufacturers
- Junkyard and salvage yards
- Land application of sewage sludge
- Landfills and dumps
- Laundromats
- Machine shops
- Medical facilities (hospitals, clinics, laboratories)
- Metal and drum cleaning/reconditioning
- Military facilities (past and present)
- Nurseries
- Nursing homes
- Paint shops
- Photographic processors
- Pipelines (oil and sewer)
- Printers and blueprint shops
- Prisons
- Railroad yards
- Repair shops (engines, appliances, etc.)
- Research laboratories
- Residential development (lawn care, septic systems)
- Restaurants and taverns
- Retail shopping centers, malls
- Road salt storage
- Rust proofers
- Sand and gravel mining operations

- Sawmills
- Schools, colleges and trade centers
- Service stations (gas stations)
- Storm water management facilities (leaching systems)

List of Potential Sources of Groundwater Contamination

- Transmission line rights of way
- Transportation corridors (road deicing, materials transport)
- Utility substations/transformers
- Waste storage, treatment and recycling (hazardous and non-hazardous)
- Water transfer stations
- Wastewater treatment plants (past or present sludge disposal)
- Wood preservers

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