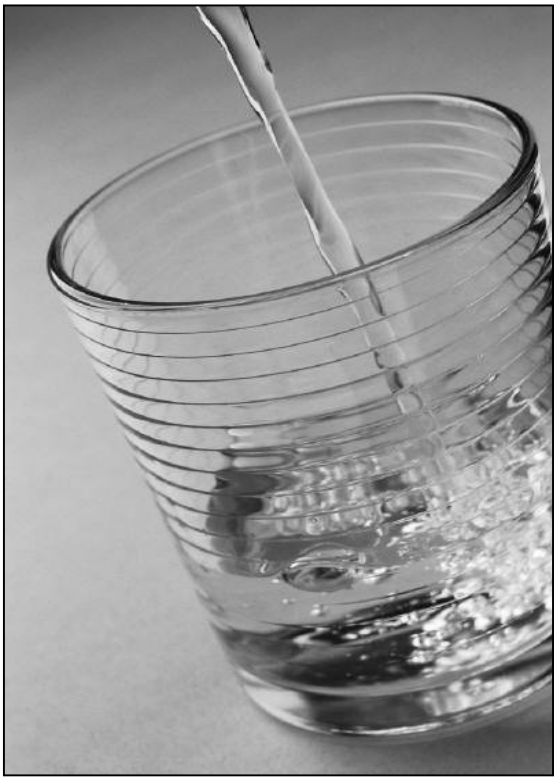
# Bureau of Water

South Carolina Department of Health and Environmental Control

# State Primary Drinking Water Regulation: R.61-58

**Current through April 25, 2008 State Register.**



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South Carolina Department of Health
and Environmental Control

# R.61-58, STATE PRIMARY DRINKING WATER REGULATIONS

## Effective April 25, 2008

**(This regulation replaces and supercedes any former regulations)**

**Environmental Quality Control Administration**
**S.C. Department of Health and Environmental Control**
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Regulation History

Promulgated pursuant to South Carolina Code Section 48-2-10 et seq. (Act 122, 1993) and Section 48-39-10 et seq.

Added by Document No. 1822 in S.C. State Register 19-6, June 23, 1995, effective July 1, 1995

Amended by Document No. 2281 in S.C. State Register 22-6 Part 2, effective June 26, 1998

Amended by Document No. 2374 in S.C. State Register 23-6, effective June 25, 1999

Amended by Document No. 2504 in S.C. State Register 25-2, effective February 23, 2001

Amended by Document Nos. 2673 and 2697 in S.C. State Register 26-6, effective June 28, 2002

Amended by Document Nos. 2815, 2816, and 2824 in S.C. State Register 27-3, effective March 26, 2004

Amended by Document No. 2800 in S.C. State Register 29-3, effective March 25, 2005

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On April 25, 2008, Regulation 61-58 was amended. This copy is a reprint of the State Register version and reflects R.61-58 in its entirety. If there are inconsistencies between this version and the version printed in the State Register, the State Register versions take priority. The State Register's internet web site is: http://www.lpitr.state.sc.us/cgi-bin/state_register.exe

Authority for this regulation comes from Sections 44-55-30 et seq. of the 1976 South Carolina Code of Laws. For questions, contact DHEC at:

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R.61-58 STATE PRIMARY DRINKING WATER REGULATIONS

A. General.

Regulations 61-58 through 61-58.15 are promulgated pursuant to S.C. Code Sections 44-55-10 et seq. and are collectively known as the State Primary Drinking Water Regulations. The Department finds the standards and procedures prescribed are necessary to maintain reasonable standards of purity of the drinking water of the State consistent with the public health, safety, and welfare of its citizens.

B. Definitions.

(1) "Act" means the State Safe Drinking Water Act of 1976, and amendments.

(2) "Action level" is the concentration of lead or copper in water specified in R.61-58.11.B(1), Lead and Copper Action Levels, which determines, in some cases, the treatment requirements contained in R.61-58.11, Control of Lead and Copper that a water system is required to complete.

(3) "Administrator" means the Administrator of the United States Environmental Protection Agency.

(4) "Annular space" means the space between the well casing and the formation or the space between the inner casing and outer casing where two casings are used.

(5) "Aquifer" means a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of groundwater to wells and springs.

(6) "Aquifer Storage and Recovery (ASR) Well" means a water well which allows potable water to be injected into a subsurface aquifer to be recovered by pumping at a later date.

(7) "Artificial filter" means filter material which is placed in the annular space to increase the effective diameter of the well, and to prevent fine-grained sediments from entering the well.

(8) "Backflow prevention device" means any device approved by the Department for use in preventing backflow under prescribed limited conditions of use.

(9) “Bag filters” are pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed 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.

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

(11) “Bedrock” means the parent solid rock formation underlying weathered rock and soil.

(12) "Best available technology" or "BAT" means the best technology, treatment techniques, or other means which either the Department or the Environmental Protection Agency (EPA) finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration).

(13) "Board" means the South Carolina Board of Health and Environmental Control charged with responsibility for implementation of the Safe Drinking Water Act.

(14) "Boil Water Notice/Advisory" means a notice, whether written or verbal, issued by the Department, or the owner or operator of a public water system, notifying the users of the water system that the water is/may be contaminated and to boil the water (vigorous rolling boil for at least one minute) prior to using it for drinking or cooking. The notice shall give the reason for its issuance and corrective actions being taken.

(15) "Booster Pump" means any pump installed within a water distribution system for the purpose of increasing the water pressure in the water distribution system, including distribution storage facilities downstream from the pump. The term booster pump does not apply to the so called low service and high service pumps at water treatment plants.

(16) "Business Plan" for the purpose of these regulations means a document consisting of three sub-plans, a "Facilities Plan", a "Management Plan", and a "Financing Plan" which is intended to show how a water system will be self-sustaining and have the commitment and the financial, managerial and technical capability to consistently comply with the State Safe Drinking Water Act and these Regulations.

(17) “Cartridge filters” are pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed 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.

(18) "Centralizer" means device to keep the casing and screen aligned in the center of the borehole to ensure proper emplacement of grout around the casing and artificial filter around the screens.

(19) "Certified Laboratory" means a laboratory approved by the Department under Regulation 61-81.

(20) "Certified Tester" means any person holding an up-to-date backflow prevention assembly tester certification card issued by the Department. Certified testers fall into one of the following classifications:

(a) General Tester -any person who has successfully completed an approved backflow prevention training and certification course which is sponsored by or approved by the Department, and who has personal possession of or whose employer owns a backflow prevention assembly test kit. This person provides the service of testing backflow prevention assemblies to the general public.

(b) Inspector Tester -any person with the same qualifications as the General Tester, except the Inspector Tester must be employed by a municipality, water district, subdivision, or other public water system. The Inspector Tester is normally involved in the management of a backflow prevention program, and does not sell his services to the general public.

(c) Limited Tester -any person with the same qualifications as the General Tester except the prescribed test(s) is (are) conducted only on backflow prevention assemblies which are owned by his employer. The Limited Tester does not provide testing services to the general public.

(d) Manufacturer's Agent -any person with the same qualifications as the General Tester except the prescribed test(s) is (are) conducted as an extension of his duties as a representative of a particular backflow prevention company.

(21) "Certified Well Driller" means any person currently certified by the State Environmental Certification Board to practice as a well driller in South Carolina.

(22) "Clay" means fine-grained inorganic material (grains less than 0.0005 mm in diameter) which has very low permeability and is plastic.

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

(24) "Coliform Bacteria" means all aerobic and facultative anaerobic, gram-negative, non-spore forming, rod-shaped bacteria which ferment lactose with gas formation within forty eight hours at thirty-five degrees Celsius.

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

(26) "Commissioner" means the duly constituted Commissioner of the Department or his authorized agent.

(27) "Community Water Systems" means a public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents. This may include, but not be limited to, subdivisions, municipalities, mobile home parks, apartments, etc.

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

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

(30) "Comprehensive Performance Evaluation" (CPE) is a thorough review and analysis of a treatment plant’s performance-based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant’s capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. For purposes of compliance with R.61-58.10.H and (I) 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.

(31) "Cone of Depression" means the depression in the water table or potentiometric surface in an aquifer caused by pumping water from a well and usually having the shape of an inverted cone.

(32) "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.

(33) “Consecutive system” is a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through

the distribution system of one or more consecutive systems.

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

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

(36) "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.

(37) "Cross-connection" means any actual or potential connection or structural arrangement between a public water supply and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas or substance other than the intended potable water which the system is supplied. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices and other temporary or permanent devices through which or because of which backflow can or may occur are considered to be cross-connections.

(38) "CT" or "CTcalc" is the product of "residual disinfectant concentration" (C) in mg/L determined before or at the first customer, and the corresponding "disinfectant contact time" (T) in minutes, i.e., "C" × "T". If a public water system applies disinfectants at more than one point prior to the first customer, it shall determine the CT of each disinfectant sequence before or at the first customer to determine the total percent inactivation or "total inactivation ratio." In determining the total inactivation ratio, the public water system shall determine the residual disinfectant concentration of each disinfection sequence and corresponding contact time before any subsequent disinfection application point(s). "$CT_{99.}$" is the CT value required for 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts. $CT_{99.}$ for a variety of disinfectants and conditions appear in Tables 1.1 -1.6, 2.1, and 3.1 of R.61-58.10.F(2)(c).

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

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

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

is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3-log inactivation of *Giardia lamblia* cysts.

(39) "Dedicated Fire Line" means a water line connected to a public water system which is designed and used solely for a fire protection system. Such lines must be provided with an acceptable and approved backflow prevention device and must not connect at any point downstream of that device with water lines or fixtures that are used for potable water.

(40) "Department" means the South Carolina Department of Health and Environmental Control, including personnel thereof authorized and empowered by the Board to act on behalf of the Department or Board.

(41) "Development" means repairing damage to the aquifer caused by drilling procedures and increasing the porosity and permeability of the geologic materials surrounding the intake portion of the well.

(42) "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.

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

(44) "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.

(45) "Disinfectant contact time" ("T" in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration ("C") is measured. Where only one "C" is measured, "T" is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or where residual disinfectant concentration ("C") is measured. Where more than one "C" is measured, "T" is (a) for the first measurement of "C", the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first "C" is measured and (b) for subsequent measurements of "C", the time in minutes that it takes for water to move from the previous "C" measurement point to the "C" measurement point for which the particular "T" is being calculated. Disinfectant contact time in pipelines shall 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 shall be determined by tracer studies or an equivalent demonstration.

(46) "Disinfected" means that the water is free of harmful or pathogenic organisms.

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

(48) "Disinfection profile" is a summary of daily *Giardia lamblia* inactivation through the treatment plant. The procedure for developing a disinfection profile is contained in R.61-58.10.H(3) (Disinfection profiling and bench marking) and in R.61-58.10.I(4) (Disinfection profile).

(49) "Dispensing Station" means a facility where additional treatment is provided to water from an approved public water system, and that treated water is available to the general public. This does not apply to point of use devices in public buildings (e.g., restaurants and cafeterias, etc.).

(50) "Distribution Treatment Plant" means any facility located within the distribution system capable of altering the physical, chemical, radiological or bacteriological quality of the water in a public water system (i.e. chlorine booster station).

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

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

(53) "Drawdown" means the difference in levels between the static water level in a well and the surface of the depressed water level that occurs when the well is pumped.

(54) "Drilling Fluid" means a water or air based fluid used in drilling to remove cuttings from the hole, to clean and cool the drill bit, to reduce friction between the drill pipe and the sides of the hole and to seal the bore hole.

(55) “Dual sample set” is a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purposes of conducting an IDSE under subpart U of this part and determining compliance with the TTHM and HAA5 MCLs under subpart V of this part.

(56) "Dug well" means large diameter (24 to 60-inch) well generally of low yield which is usually excavated by hand and which penetrates only a few feet below the water table.

(57) "Effective corrosion inhibitor residual" for the purpose of R.61-58.11, Control of Lead and Copper, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

(58) "Effective (grain) size" means the sieve size that retains 90 percent of the materials.

(59) "Emergency" means any event which adversely impacts the ability of the system to produce or deliver safe drinking water to the consumer.

(60) "Emergency Well" means a well that is operable and connected to the distribution system, but is not routinely operated or sampled. Such wells are only available to be used during emergency situations and only in conjunction with a boil water advisory.

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

(62) "Enhanced softening" means the improved removal of disinfection byproduct precursors by precipitative softening.

(63) "Expansion" means installation of additions, extensions, changes, or alterations to a public water system's existing source, transmission, storage or distribution facilities which will enable the system to increase in size its existing service area and/or number of authorized service connections.

(64) "Facilities Plan" means a document which consists of an assessment of the current and foreseeable water supply needs of a water system's service area; a detailed description of alternatives considered for meeting those needs; detailed cost estimates for the construction, operation and maintenance of the different alternatives, and the rationale for the alternative selected. For existing systems, the description of alternatives would include but not be limited to: a detailed description of existing facilities (source, treatment and distribution); description of any upgrade necessary to bring the existing facilities into compliance with the Act and these regulations; an assessment of the ability of the existing facilities, along with any necessary upgrade, to supply the current and foreseeable water supply needs of the area (including the ability to comply with any foreseeable regulatory changes); and a description of any other alternatives considered for meeting the water supply needs.

(65) "Federal Act" means the Federal Safe Drinking Water Act, as amended.

(66) "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.

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

(68) "Financial Plan" means a document which consists of projections that a water system's revenues and cash flow will be sufficient for meeting the cost of construction, operation and maintenance for at least five full years from the initiation of operations. The financial plan must also include assurances deemed necessary for the system to remain viable. Such assurances may include but not be limited to: 1) a projection of rates showing a significant coverage ratio, 2) escrow funds, 3) bonding and 4) letter of credit.

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

(70) "Fire Flow" means five hundred (500) gallons per minute or the flow required for fire protection by the local government or public water system, whichever is greater.

(71) "First draw sample" means a one-liter sample of tap water, collected in accordance with R.61-58.11(H)(2), Sample Collection Methods, that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.

(72) "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.

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

(74) "Formation" means any substantial interval penetrated during the drilling of a well in which the geologic materials have distinct compositional characteristics with respect to adjacent overlying and underlying intervals.

(75) "Fracture Zone" means any level or interval penetrated during drilling which has void spaces caused by breakage of the formation.

(76) "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 R.61-58.5.P(2)(b) MCLs shall be 120 days.

(77) “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.

(78) "Geologic Material" means naturally occurring matter derived from or consisting of rock and sediment.

(79) "Geophysical logging" means any number of techniques that measure some electrical, chemical or radioactive property of the subsurface, either characteristic of the ground water or of the rocks in which the ground water occurs.

(80) "Gross alpha particle activity" means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

(81) "Gross beta particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

(82) "Groundwater" means subsurface water found in void spaces in geologic materials within the zone of saturation.

(83) "Groundwater Treatment Plant" means any facility capable of altering the physical, chemical, radiological or bacteriological quality of groundwater for public consumption in a public water system.

(84) "Ground water under the direct influence of surface water (GWUDI)" means any water beneath the surface of the ground with (1) significant occurrence of insects or other microorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or (2) *Cryptosporidium*, or (3) 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 shall be determined for individual sources in accordance with criteria established by the Department. The Department'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.

(85) "Grout" means a fluid mixture of cement and water (neat cement) of a consistency that can be forced through a pipe and placed as required. Various additives, such as sand, bentonite, and hydrated lime, may be included in the mixture to meet certain requirements. For example, sand is added when a considerable volume of grout is needed.

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

(87) "Halogen" means one of the chemical elements chlorine, bromine or iodine.

(88) "Hardpan" means hard impervious layer cemented by relatively insoluble secondary material.

(89) "High Rate Gravity Filter" means any gravity filter which filters water at a rate in excess of four (4) gallons per minute per square foot.

(90) "Initial compliance period" means the first full three-year compliance period which begins at least 18 months after promulgation, except for contaminants listed at R.61-58.5.B(2)(l)-(p) and those listed at R.61-58.5.D(2)(b)(xix)-(xxxiii) and R.61-58.5.N(2)(s)-(u), initial compliance period means the first full three-year compliance period after promulgation for systems with 150 or more service connections (January 1993-December 1995), and first full three-year compliance period after the effective date of the regulation (January 1996-December 1998) for systems having fewer than 150 service connections.

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

(92) "Large water system" for the purpose of R.61-58.11, Control of Lead and Copper, only, means a water system that serves more than 50,000 persons.

(93) "Lead free" means: (i) when used with respect to solders and flux, those containing not more than 0.2 percent lead; and (ii) when used with respect to pipes and pipe fittings, those containing not more than 8.0 percent lead.

(94) "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.

(95) "*Legionella*" means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

(96) "Limestone" means a sedimentary formation composed chiefly of calcium carbonate, consolidated or unconsolidated, which may be in the form of shell pieces or calcareous muds or sands.

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

(98) "Man-made beta particle and photon emitters" means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235, and uranium-238.

(99) "Management Plan" means a document which consists of the identification of a water system's owner; description of the management structure; an organizational chart; staffing requirements and duties; identification of any outside services and a copy of any service agreements; a copy of the system's operation and maintenance procedures required by R.61-58.7.B; and a detailed estimate of costs for the operation and maintenance of the system as it relates to the management plan, unless included in the cost estimate for the facilities plan.

(100) "Marl" means calcareous clay. In South Carolina, the term is mostly applied to the Cooper Marl or Eocene Age, characterized by its dark greenish drab to grayish green color.

(101) "Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

(102) "Maximum residual disinfectant level" (MRDL) means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a PWS is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels under Section 1412 of the Safe Drinking Water Act. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in R.61-58.5.Q, 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.

(103) "Maximum residual disinfectant level goal" (MRDLG) means the maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLGs are

nonenforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

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

(105) "Mechanical logging" means any number of techniques that measure some physical property of the subsurface.

(106) "Medium-size water system" for the purpose of R.61-58.11, Control of Lead and Copper, only, means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

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

(108) "National Primary Drinking Water Regulations" means primary drinking water regulations promulgated by the Administrator pursuant to the Federal Act and contained in 40 CFR Part 141, as amended.

(109) "Natural filter" means the material adjacent to the screens in Type II wells which is part of the screened formation and which is relatively free of fine-grained material as a result of well development.

(110) "National Secondary Drinking Water Regulations" means secondary drinking water regulations promulgated by the Administrator pursuant to the Federal Act, and contained in 40 CFR Part 143, as amended.

(111) "Near the first service connection" means at one 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.

(112) "Non-caving formation" means formation which will not collapse into an open borehole drilled through it such as igneous and metamorphic crystalline rocks, limestone, tight clay, etc.

(113) "Non-coliform growth (NCG)" means any bacterial growth other than coliform type which appears in a membrane filter test for coliform bacteria.

(114) "Non-community water system" means a public water system which serves at least fifteen (15) service connections or regularly serves an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year, and does not meet the definition of a community water system.

(115) "Non-transient non-community water system" means a public water system that is not a community water system and that regularly serves at least twenty-five (25) of the same persons over six months per year.

(116) "Operator" means a person certified by the South Carolina Environmental Certification Board as being qualified to operate and maintain a public water system. Operation and maintenance responsibilities shall include, but not be limited to, conducting tests of the raw and treated water,

adjusting chemical feed rates, and/or operating equipment so as to change the physical, chemical, radiological or bacteriological quality of surface or ground water to meet established standards.

(117) "Optimal corrosion control treatment" for the purpose of R.61-58.11, Control of Lead and Copper, only, 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 national primary drinking water regulations.

(118) "Penetration rate log" means tabulation of the time required to drill unit depth intervals such as minutes per foot, minutes per 5-feet, minutes per drill rod section, etc.

(119) "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 Department. The true value of the concentration of the reference material is unknown to the laboratory at the time of the analysis.

(120) "Person" means an individual, partnership, co-partnership, cooperative, firm, company, public or private corporation, political subdivision, agency of the State, trust, estate, joint structure company or any other legal entity or their legal representative, agent or assigns.

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

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

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

(124) "Point-of-entry treatment device (POE)" is 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.

(125) "Point-of-use treatment device (POU)" is a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap

(126) "Pollution Source" means a facility or activity which may introduce any dangerous material to the groundwater system below the water table in concentrations sufficient to cause drinking water quality standards to be exceeded or to decrease the quality of the drinking water. pollution sources shall include, but not be limited to, the following:

(a) Septic tank

(b) Tile Field

(c) Sewer line

(d) Abandoned unprotected well

(e) Waste treatment lagoon

(f) Storage lagoon

(g) Animal feedlot

(h) Chemical handling area

(i) Chemical storage area

(j) Petroleum storage area

(k) Waste disposal area

(l) Mine

(127) "Presedimentation" is a preliminary treatment process used to remove gravel, sand and other particulate material from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant. May be with or without chemical addition.

(128) "Primary Drinking Water Regulation" means the maximum contaminant limits, the requirements for monitoring, the requirements for reporting, record retention requirements and public notification specified in R.61-58.5, Maximum Contaminants in Drinking Water, and R.61-58.6, Reports, Record Retention and Public Notification of Drinking Water Violations.

(129) "Professional Engineer" means a person properly qualified to perform engineering work as provided in Title 40 of the 1976 Code of Laws of South Carolina, as amended, Chapter 22, Engineers and Land Surveyors.

(130) "Professional Geologist" means a person registered as a professional geologist by the South Carolina State Board of Registration for Geologists.

(131) "Public Water System" means (1) any public or privately owned waterworks system which provides drinking water, whether bottled or piped, for human consumption, including the source of supply whether the source of supply is of surface or subsurface origin; (2) all structures and appurtenances used for the collection, treatment, storage or distribution of drinking water delivered to consumers; (3) any part or portion of the system and including any water treatment facility which in any way alters the physical, chemical, radiological, or bacteriological characteristics of drinking water; provided, that public water system shall not include a drinking water system serving a single private residence or dwelling. A separately owned system with its source of supply from another waterworks system shall be a separate public water system.

(132) "Rapid Mix" means the rapid dispersion of chemicals throughout the water to be treated, usually by violent agitation.

(133) "Rapid Rate Gravity Filter" means a gravity filter not to exceed 4 gallons per minute per square foot of surface area.

(134) "Raw water" means untreated water as obtained from the source.

(135) "Rem" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is one one-thousandth of a rem.

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

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

(138) "Sand" means a detrital geologic material in the form of un-cemented particles having a size range from two (2) millimeters to one-sixteenth ( 1/16 ) of a millimeter and composed of mineral crystals or rock fragments.

(139) "Sanitary Seal" means a cap on the top of the well casing usually fitted with a rubber expansion gasket, which seals off surface drainage, thereby protecting the well from contamination directly down the casing.

(140) "Secondary Containment" means a basin constructed to receive the liquids spilled from any chemical storage tank or solution tank, and shall be designed to prevent migration of any accumulated liquid out of the basin to the soil, ground-water, or surface water at any time. The volume of the secondary containment shall equal or exceed the volume of the tank. Where more than one (1) tank is located in the secondary containment area, the volume of the secondary containment shall be equal to or greater than the volume of the largest tank.

(141) "Secondary maximum contaminant level" means the maximum contaminant levels which, in the judgment of the Department, are requisite to protect the public welfare. Such levels may apply to any contaminant in drinking water (1) which may adversely affect the odor or appearance of such water and consequently may cause a substantial number of the persons served by the public water system providing such water to discontinue its use, or (2) which may otherwise adversely affect the public welfare. Such levels may vary according to geographic and other circumstances.

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

(143) "Service line sample" means a one-liter sample of water, collected in accordance with R.61-58.11.H(2)(c), Sample Collection Methods, that has been standing for at least 6 hours in a service line.

(144) "7Q10" means the minimum average annual stream flow that can statistically be expected to occur for a seven day period once every ten years.

(145) "Sieve analysis" means a method of determining grain-size distribution by mechanically separating the various size portions using a set of graduated sieves and weighing the portion of the sample retained on each sieve. These weights are converted to percent retained and graphically plotted against grain size to show the grain size distribution in a well.

(146) "Single family structure" for the purpose of R.61-58.11, Control of Lead and Copper, only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

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

(148) "Small water system" for the purpose of R.61-58.11, Control of Lead and Copper, only, means a water system that serves 3,300 persons or fewer.

(149) "Specific Capacity" means the rate of well yield per unit of drawdown. It is usually expressed as gallons-per-minute per foot of drawdown and is a required measurement in selecting pump setting and size.

(150) "Stabilized Water" means water which has been physically or chemically altered to reduce its aggressiveness or corrosiveness.

(151) "Stand-by Well" means a well that is not routinely used , but which can be immediately placed into operation if needed. Such wells are routinely exercised and sampled by the water system to ensure operability and water quality.

(152) "Standard sample" means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

(153) "State Water System" or SWS means any water system that serves less than fifteen (15) service connections or regularly serves an average of less than twenty-five (25) individuals daily.

(154) "Static water level" means the stable water level which has not been affected by pumping the well in which it is measured.

(155) "Subpart H systems" means public water systems using surface water or ground water under the direct influence of surface water as a source that are subject to the requirements of 40 CFR 141, subpart H.

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

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

(158) "Surface Water Treatment Plant" means any facility capable of altering the physical, chemical, radiological or bacteriological quality of surface water to produce water for public consumption in a public water system.

(159) "SUVA" means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of a 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).

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

(161) "Tap" means a service connection, the point at which water is delivered to the consumer (building, dwelling, commercial establishment, camping space, industry, etc.) from a distribution system, whether metered or not and regardless of whether there is a user charge for consumption of the water.

(162) "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.

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

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

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

(166) "Tremie pipe" means a device, usually a small diameter pipe, that carries grouting materials to the bottom of the zone to be grouted and which allows pressure grouting from the bottom up without introduction of appreciable air pockets.

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

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

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

(170) "Uniformity coefficient" means the ratio of the sieve size that will retain 40 percent of the aquifer materials to the effective size.

(171) "Viable Water System" means a water system which is self-sustaining and has the commitment and the financial, managerial and technical capability to consistently comply with the State Safe Drinking Water Act (44-55-10 et seq.) and these regulations.

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

(173) "Vending Machine" means any self-service device which upon insertion of a coin, coins, or token, or upon receipt of payment by other means, dispenses unit servings of water in bulk, without the necessity of refilling the machine between each operation.

(174) "Waterborne disease outbreak" means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the Department.

(175) "Well" means a bored, drilled or driven shaft, or a dug hole whose depth is greater than the largest surface dimension, from which water is extracted or injected. This shall include, but not be limited to, wells used for water supply for irrigation, industrial or manufacturing processes or drinking water; wells used for underground injection of waste for disposal, storage, or drainage disposal; wells used in mineral or geothermal recovery, and any other special process well. In South Carolina, wells used for public water supplies fall into one of the following types of construction:

(a) Type I -open hole wells into bedrock aquifers.

(b) Type II -screened, natural filter wells into unconsolidated aquifers.

(c) Type III -screened, artificial filter (gravel pack) wells into unconsolidated aquifers.

(d) Type IV -open hole wells into limestone aquifers.

(176) "Well Casing" means tubular retaining structure, generally metal, which is installed in the excavated hole to maintain the well opening.

(177) "Well interference" means the additive drawdown effects to two or more wells pumping from the same aquifer in the same vicinity.

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

C. Appeals.

Any determination made by the Department pursuant to these regulations shall be subject to the provisions of R.61-72 and the Administrative Procedures Act.

D. Severability.

Should any section, paragraph or other part of these regulations be declared invalid for any reason, the remainder shall not be affected.

E. Violations and Penalties.

Any person or persons violating these regulations shall be subject to the penalties provided in Section 44-55-90, of the 1976 Code of Laws, as amended.

**R.61-58.1 CONSTRUCTION AND OPERATION PERMITS**.

A. Applicability.

This Regulation establishes procedures for obtaining construction and operational permits from the Department.

B. Requirements for Construction Permits.

(1) Before the construction, expansion or modification of any public water system, application for a permit to construct shall be made to, and a permit to construct obtained from, the Department.

(2) The application for a permit to construct shall include the following documentation:

(a) a completed application form for a permit to construct submitted in triplicate (one original and two copies);

(b) four (4) sets of detailed plans (including location map);

(c) three (3) sets of material and construction specifications, except when Department-approved standard specifications are to be used for the construction project;

(d) design data and calculations;

(e) if the owner of the project is different from the utility supplying the water, a letter from the utility supplying the water stating their willingness and ability to serve the project;

(f) if the owner of the project is different from the person that will be responsible for operating and maintaining the project, a letter from that person acknowledging such responsibility; and,

(g) if the owner of the project is different from the entity which has legal authority to serve or grant franchises for the area in which the project is located, the application shall include a letter from that legal entity stating that the proposed project is consistent with the water supply service plan for the area. This letter is not required if the project will not supply water to any person within the service or franchise area, other than to the legal authority.

(3) The application procedure outlined in R.61-58.1(B)(2) is based on a design-bid-build concept for the construction of a project. The Department may consider on a case by case basis alternate design and construction concepts and issue construction permits accordingly.

(4) Before a permit to construct can be issued for a new public water system, the applicant shall demonstrate to the satisfaction of the Department that the new system will be a "viable water system" as defined in R.61-58(B). In addition to the documentation required in R.61-58.1(B)(2), the application for a permit to construct a new public water system shall include a management plan and a multi-year financial plan. These plans will not be required for those new systems whose only source of water is from an existing viable water system and the new system does not provide additional treatment to the water or sell the water. If the application proposes that the new system has its own source of water (i.e., its own well(s) or surface water treatment plant), the applicant shall evaluate the feasibility of connecting to an existing viable public water system as part of the demonstration of viability. This evaluation shall include, but not be limited to, a determination of the willingness and ability of an existing system to serve the project, water quality, capital cost of constructing the line extension versus constructing a new source and

the operation and maintenance costs of both alternatives. Any cost comparisons between creating a new water system with its own source of water and connecting to an existing viable water system shall not be based on any subsidized monitoring. Also any financing of the new system shall not utilize a loan amortization schedule which exceeds the useful life of the facility or its components. This demonstration of viability may be presented to the Department in the form of a Preliminary Engineering Report or as an engineering report submitted when applying for a permit to construct.

(5) For projects in the eight coastal counties, no permit may be issued until the project is found by the Department to be consistent with the Coastal Zone Management Program.

(6) Projects involving construction in state navigable waters will be evaluated by the Department for compliance with the Department's regulations concerning such construction before a permit may be issued.

(7) For projects involving a surface water discharge of water treatment residuals or wastewater, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained from the Department. For projects involving land application of water treatment residuals or wastewater, a No Discharge (ND) permit must be obtained from the Department. No construction permit can be issued for such projects until a valid NPDES or ND permit is obtained.

(8) For projects involving a new groundwater source(s), the permitting will be a two step process. In the first step the owner must submit an application for a permit to construct the source. This construction will involve the drilling of the well, the development of the well, conducting a pumping test in accordance with R.61-58.2(B)(12) and testing the water quality in accordance with R.61-58.2(B)(14). The second step will involve the permitting of the pumping equipment, concrete pad, well head piping, and any treatment, storage and/or distribution facilities associated with the source. The owner must make a second application for a permit to construct these facilities. This second application must include the well record form, the necessary plans and specifications and calculations for these facilities along with the results of the pumping test and water quality analyses. The Department may waive this two-step permitting process and issue a single construction permit for the entire project if the quality and quantity of water from the proposed well can be reasonably predicted through information available from existing wells in the immediate area or a test well. In the event the quantity and/or quality of water from the well is different than anticipated in the original design, revised plans and specifications must be submitted to the Department for approval prior to proceeding with the construction of the project.

(9) Construction permits are valid for three (3) years, from the date of issue, at which time the project must be completed or an extension must be applied for in writing. The extension request must be made by the professional engineer of record for the project and, if applicable, shall include current flow test data. Projects for which the permit to construct has been expired for more than one (1) year are considered new projects and must include a new application as required in paragraph 2 of this section.

(10) A permit to construct may be denied when:

(a) the project does not comply with the design requirements specified in R.61-58.2, R.61-58.3, and R.61-58.4;

(b) the water quality fails to comply with the drinking water standards specified in R.61-58.5;

(c) the owner of a proposed new system fails to prove to the Department’s satisfaction that the system will be a “viable water system” as defined in R.61-58(B); or,

(d) the project does not comply with the Department's regulations for permits for

construction in navigable waters.

(e) the project does not comply with the Interbasin Transfer Act and R.121-12.1 et seq., Code of Laws of South Carolina, 1976, as amended.

(11) Piping associated with a service connection will not require a construction permit if the following conditions are met:

(a) all piping associated with the connection is dedicated strictly for use by a single customer being served water;

(b) the customer consists of only a single house, single mobile home, single building or multiple-building complex under single ownership with no rental units (e.g., schools or industry);

(c) the customer is not a shopping mall, multiple-building complex where there will be several owners or renters (e.g., apartment complex, condominium complex, mobile home park, campground, industrial park, or business park) or marina; and,

(d) the line serving the customer does not pass a lot or potential customer between the connection and the customer to be served (this includes the piping downstream or the service meter as well as piping upstream of the service meter).

(12) Failure to obtain a permit to construct is a violation of the Act (Code Section 44-55-40) and is subject to an enforcement action by the Department. Where a person has failed to obtain a permit to construct, an application for permit must be submitted and must include record drawings carrying the seal and signature of a professional engineer.

(13) A 15-day local government notification period shall lapse prior to the issuance of any construction permit. This notification period shall be waived for any projects permitted under the provisions of a general construction permit and delegated review program. This notification period may be waived by the cognizant local government or by the Department if the construction is necessary in order to maintain a safe and adequate supply of water during an emergency. A letter from the local government having potable water planning authority for the area approving the project constitutes a waiver by the cognizant local government.

(14) A dedicated fire line protected by an approved backflow prevention device located at the point of connection to the public water system's distribution line will not require a permit to construct.

C. Engineer's Report.

A preliminary engineering report shall be prepared in triplicate for each new surface water intake, surface water treatment plant, expansion or modification to an existing surface water intake or surface water treatment plant, or other projects deemed necessary by the Department. This report shall carry the seal and signature of a professional engineer. The engineer's report shall, where pertinent, present the following information:

(1) General Information (Required for Each Report):

(a) name, address, phone number of owner, corporation, town or utility as well as name of responsible officer;

(b) name, address, phone number of engineering firm and name of engineer

responsible for design;

(c) general description of service area and surroundings (type of economy, estimated percent residential, estimated percent industrial, terrain, location, possible rate of development);

(d) number and type of customers to be served, (i.e., domestic, industrial, commercial, agricultural, etc.); and,

(e) approval of any land use and development by area planning council which has jurisdiction.

(2) Surface Water Sources

(a) location map including latitude and longitude of intake;

(b) name of source(s), type (river, lake, etc.) and classification (Water Classifications and Standards, R.61-68);

(c) watershed area;

(d) expected 7Q10 flow and lowest flow of record of source(s);

(e) name and type of discharges within ten (10) miles upstream (industrial, agricultural, municipal and other);

(f) chemical and bacteriological analyses of raw water. This analysis must include all parameters addressed in R.61-58.5;

(g) distance from raw water supply to reservoir or plant;

(h) proposed pumping rate from source;

(i) general description of intake and pump house; and,

(j) a detailed engineering and economic assessment on the feasibility of utilizing alternative water sources, or combinations of water sources, other than the proposed water source.

(3) Water Treatment Plants

(a) Projected maximum volume of water to be treated;

(b) Year when plant is expected to operate at its maximum capacity;

(c) If existing, present operating capacity;

(d) Location map of plant;

(e) Height above the one hundred (100) year flood plain based on the best information available;

(f) Land available for future plant expansion;

(g) Proposed treatment scheme shown in block diagram;

(h) Proposed design criteria (retention times, velocities, weir overflow rates, filtration rates, etc.);

(i) Description of proposed method of handling, treating, and disposing of wastewater from plant (includes clarification sludge, filter backwash water, brines, etc.);

(j) Name(s) and grade(s) of operator(s);

(k) For modifications to existing treatment plant, report must include: Present capacity of raw water pumps, and a brief description of what effect proposed modification will have on existing facilities including velocities and retention times through plant; and,

(l) Detailed description of any pilot testing to be performed.

D. Application for Public Water System Construction Permit.

Three (3) copies (the original and two (2) copies) of the application form completed and signed by the professional engineer and the owner shall accompany all submittals for formal approval. Copies of this application form may be obtained from the Department and shall include:

(1) Name and location of project;

(2) Brief description of project including, if applicable, type of source, diameter of well, treatment, expected yield and storage, number and type of services length and size(s) of distribution lines and number of fire hydrants;

(3) Owner's name and address (person on whose behalf application is made);

(4) Name and address of utility or organization responsible for operating and maintaining the system;

(5) Name of the water system providing water;

(6) Department system number of the water system providing water, and;

(7) Signatures of the professional engineer(s) responsible for the design and construction inspections and the owner of the project.

E. Construction Plans.

Construction plans shall carry the seal and signature of a professional engineer and, where applicable, shall provide the following:

(1) General layout drawn to scale on plan sheets no larger than thirty (30) inches by forty-two (42) inches, including:

(a) suitable title;

(b) name of utility or owner;

(c) area or institution to be served;

(d) scale, in feet;

(e) north reference point;

(f) any physical or political boundaries within the area to be served including utility easements;

(g) sufficient number of elevations (Mean Sea Level) to characterize terrain in the area;

(h) date (including month, day, and year), address, and name of the professional engineer responsible for the design;

(i) legible prints;

(j) location and size of existing water mains;

(k) location and nature of existing water works structures and appurtenances affecting the proposed improvements, noted on one sheet;

(l) for small water systems supplied by wells, the location of all existing wells within the system; and,

(m) site location map.

(2) Detailed plans, including:

(a) Construction drawings of distribution system addition drawn to a scale of no smaller than one inch equals two hundred (200) feet showing location of all appurtenances referenced to fixed above ground objects including size, length, identity, and location of sewers, drains, water mains, plant structures, petroleum storage facilities, and for new well projects any other pollution source as defined under "Pollution Sources" in R.61-58.(B). The Department may grant a variance to the 200 feet/inch scale on a case by case basis if the drawings adequately show all necessary physical features mentioned in this item;

(b) Where requested by the Department, profiles including hydraulic gradients for lines ten (10) inches and larger having a horizontal scale of not more than one hundred (100) feet to the inch and a vertical scale of not more than ten (10) feet to the inch, with both scales clearly indicated;

(c) Stream crossings, providing profiles with elevations (MSL) of the stream bed and the normal and extreme high and low water levels;

(d) Schematic drawing of proposed well construction, showing diameter and depth of drill hole(s), casing diameters and depths, grouting depths, elevations and designations of geological formations, water levels and other details to describe the proposed well completely;

(e) Drawing(s) of wellhead construction showing the concrete pad, sanitary seal, screened vent, check valve, pressure gauge, flow meter, blowoff, sample tap, gate valve(s), air line and gauge for measuring water level in the well, protective cover for wellhead, well identification plate;

(f) Topography and arrangement of present or planned wells or structures, with contour interval not greater than two (2) feet for a minimum one hundred (100) foot radius;

(g) Elevation drawings of structures showing the one hundred (100) year flood plain (MSL) and elevations of floor, bottom, overflows, etc. within the structure;

(h) Location and size of property to be used for groundwater development with respect to known references;

(i) Location of all real or potential sources of pollution within two hundred fifty (250) feet of a groundwater source or wellhead protection area, whichever is greater, within one hundred (100) feet of a treated water ground storage facility and ten (10) miles upstream of a surface water intake;

(j) Schematic flow diagrams and hydraulic profiles showing flow through various plant units drawn on plan sheets the same size as the construction drawings;

(k) Location, dimensions, and elevations of all proposed plant facilities;

(l) Location of all plant piping in sufficient detail to show flow through plant including waste lines;

(m) Location of all chemical feeding equipment, points of application, and sample taps following chemical injection points;

(n) Location of sanitary or other facilities, such as lavatories, showers, toilets, lockers, etc.;

(o) All appurtenances, specific structures, and equipment pertinent to the project such as water plant structures (air relief valves, altitude valves, blowoffs, hydrants, service connections, etc.);

(p) Erosion control structures for wellhead blowoff and elevated and ground storage tank drains;

(q) Adequately detailed drawing of any feature or piece of equipment not otherwise covered or adequately described by the specifications; and,

(r) Protection of the water source, structures, and appurtenances, to include, but not be limited to, fencing, protective housing, or comparable form of security.

F. Specifications.

The title page or cover of the specifications must carry the seal and signature of a professional engineer. Complete, detailed, technical specifications shall be supplied for each proposed project, and shall include, but not be limited to, the following:

(1) Construction specifications including:

(a) A detailed written program for maintaining normal operation of existing facilities during construction with minimal interruption of service;

(b) Laying methods and conditions including depth of cover, type of bedding and reaction blocking, and special structural details for water lines installed under storm drains;

(c) Pressure and leakage test procedures for new water mains including method of determining maximum allowable leakage;

(d) Disinfection procedure for all new or affected water system components to include disinfectant, dosage, contact time, and method for testing the results of the procedure;

(e) Well construction method and procedure;

(f) Chlorination room construction; and,

(g) Other chemical feeding facilities construction;

(2) Material specifications including:

(a) Laboratory facilities and equipment, including sampling taps and their location;

(b) Number and design of chemical feeding equipment including make and model, if available;

(c) Equipment for sanitary or other facilities including any necessary backflow or back-siphonage protection;

(d) Water main and appurtenances schedule and class, including approval status by testing and certification organizations;

(e) Make, model, horsepower and performance curves of all pumping equipment; and,

(f) Paint coatings.

(3) Testing and development procedure for new sources.

(4) Standard specifications.

If a water system or professional engineering firm uses a set of its own standard specifications, such specifications may be submitted to the Department, in duplicate, for approval. Following this approval, no specifications will be required on future project submittals as long as no changes are made. If there are any additions, deletions, or revisions to the approved standard specifications for a particular project submitted, the professional engineer shall either submit three (3) copies of an addendum to the standard specifications covering the changes only, or shall submit three (3) complete copies of specifications for the project in question. Each professional engineer that will be using a standard specification must place his seal and signature on the title page and must place his seal and signature on any revisions.

G. Design Data.

A summary of complete design criteria and design calculations shall be submitted for each proposed project, and shall contain, but not be limited to, the following where applicable:

(1) Pumping capacity of source;

(2) Average daily water consumption;

(3) Number and type(s) of proposed service connections;

(4) fire flow requirements (refer to Section R.61-58.B for the definition of fire flow);

(5) The results of a flow test conducted at a location near the proposed connection to the existing system. The results of this flow test shall include static pressure and residual pressure when a known flow, in excess of the demand for the proposed extension, is flowing. The time and date the flow test was conducted, the pipe size, type of pipe, elevation and distance between the test point and connection site shall also be included;

(6) Basin capacities;

(7) Retention times;

(8) Unit loadings;

(9) Filter area and proposed filtration rate;

(10) Backwash rate;

(11) Feeder capacities and ranges;

(12) Ground storage and transfer pump capacity;

(13) System storage capacities; and,

(14) System pressures at maximum instantaneous demand (not less than twenty-five (25) pounds per square inch); or fire flow in addition to peak hourly flow or flushing flow in addition to peak hourly flow (not less than twenty (20) pounds per square inch), whichever is the worst case.

H. Requirements for a General Construction Permit.

(1) A public water system which meets the following criteria may apply for a general permit for the construction of water line extensions.

(a) The system must have a full-time professional engineer on staff or a professional engineer on retainer.

(b) The system must have a full-time management and full-time inspection and maintenance staff.

(c) The system must have a set of design criteria which has been approved by the Department. This criteria shall be at least as stringent as that used by the Department.

(d) The system must have a set of approved construction specifications for water distribution lines on file with the Department. These specifications must bear the seal and signature of the professional engineer on staff or the professional engineer on retainer.

(e) The system must have historically demonstrated satisfactory bacteriological and chemical water quality as required by R.61-58.5, R.61-58.10, and R.61-58.11.

(f) The system must have a satisfactory pressure record as required by R.61-58.4.D(4).

(g) The system must have implemented and maintained a viable cross connection control program in accordance with R.61-58.7(F);

(h) The system must have an active inspection program for new water distribution line construction.

(i) The system must maintain an updated map of the distribution system. This map must include the following, where applicable:

(i) Existing water distribution lines;

(ii) Location and size of all storage tanks, booster pump stations, pressure reducing valves, master metered connections, and fire hydrants; and,

(iii) Location of all water treatment plant(s), surface water intake(s), well(s) and connections to other public water systems; and,

(j) The system must have a computerized hydraulic model of its distribution system. This model shall include a sufficient number of lines to adequately represent the distribution system. This hydraulic model must be made available for review by the Department upon request.

(2) The application for a general construction permit shall include a completed application form for a permit to construct, submitted in triplicate (one original and two copies), and necessary documentation to show compliance with the criteria specified in R.61-58.1(H)(1). If the system does not have approved construction specifications or design criteria on file with the Department at the time of making application for a general construction permit, the application must include two (2) copies of its standard specifications and two (2) copies of its design criteria.

(3) A general construction permit shall be valid for a period of five (5) years. In order to renew the general construction permit, a new application must be submitted to the Department in accordance with R.61-58.1(H)(2).

(4) The Department may revoke the general construction permit at any time during the five year period for failure to maintain the qualifications as specified in R.61-58.1(H)(1) or failure to comply with the conditions of the permit. Such revocation is subject to appeal in accordance with the Administrative Procedures Act and applicable procedures for contested cases.

(5) The general permit shall apply to the construction of water line extensions only.

(6) For those systems which have a professional engineer on staff the following procedure shall be followed under the general construction permit:

(a) An annual report shall be submitted, in duplicate, to the Department listing all water line extensions constructed during the calendar year. This report shall be submitted no later than January 30th following the year for which the report was prepared. This report shall include the following information for each line extension:

(i) street name;

(ii) size(s) and length(s) of line; and,

(iii) type of customer(s) being served.

(b) If a line extension is for the connection of the distribution system to an additional source of water, the general construction permit will not apply and the system shall make application for a permit to construct in accordance with R.61-58.1(B).

(c) For those projects which are in the eight (8) coastal counties, the system shall obtain approval, prior to construction, from the Office of Ocean and Coastal Resources Management certifying that the project is consistent with the Coastal Zone Management Program.

(d) The system shall maintain, for a minimum of three years, records of all pressure testing and bacteriological analyses conducted in conjunction with each water line extension and make them available to the Department upon request.

(e) No approval from the Department will be required prior to placing any of the water line extensions into service.

(7) For those systems which have a professional engineer on retainer the following procedure shall be followed under the general construction permit:

(a) For all water line extensions greater than twenty-five hundred (2,500) linear feet, two (2) copies of line drawings, to scale, shall be submitted to the Department for permitting. This submittal shall also include a description of what is to be served and a flow test conducted near the point of connection to the existing system. The flow test information shall include the static pressure, flow, residual pressure and date, time, and duration of the test. These drawings shall carry the seal and signature of the professional engineer on retainer. A construction permit shall be issued by the Department prior to construction of the proposed line extension(s). Written approval shall be obtained from the Department prior to placing the water line extension(s) into service; and,

(b) For all water line extensions less than or equal to twenty-five hundred (2,500) linear feet, two (2) copies of line drawings, to scale, shall be submitted to the Department at least ten (10) days prior to construction. This submittal shall also include a description of what is to be served and a flow test conducted near the point of connection to the existing system. The flow test information shall include the static pressure, flow, residual pressure and date, time, and duration of the test. These drawings shall carry the seal and signature of the professional engineer on retainer. No additional construction permit will be required. However, if the Department suspects that there may be a problem with a proposed water line extension, the Department may require additional information to be submitted in order to justify the design. The Department shall be notified in writing within ten (10) days following the date the water line extension is placed into service. This notification shall include two copies of record drawings if the construction differed from the plans submitted under R.61-58.1.H(6)(a) and a copy of the results of all pressure testing and bacteriological analyses conducted in conjunction with the project. No written approval from the Department will be required prior to placing the extension into service.

For those projects which are in the eight (8) coastal counties, the system shall obtain approval,

prior to construction, from the Office of Ocean and Coastal Resource Management certifying that the project is consistent with the Coastal Zone Management Program.

(8) The general permit shall include conditions to ensure compliance with the state program for permits to construct in navigable waters.

(9) The general construction permit applies only to the construction of those water lines designed, and owned or operated, by the public water system to which the general permit is issued. Permits for privately owned water lines must be obtained through the Delegated Permit program specified in R.61-58.1(I) or through the permitting process specified in R.61-58.1(B) through (G).

I. Delegated Review Program.

(1) A public water system which meets the following criteria may apply for delegated review authority.

(a) The system must have a professional engineer on staff.

(b) The system must have a full-time management and full-time inspection and maintenance staff.

(c) The system must have a set of design criteria which has been approved by the Department.

(d) The system must have a set of approved construction specifications for water distribution lines on file with the Department. These specifications must bear the seal and signature of the professional engineer on staff.

(e) The system must have historically demonstrated satisfactory bacteriological and chemical water quality as required by R.61-58.5, R.61-58.10, and R.61-58.11.

(f) The system must have a satisfactory pressure record as required by R.61-58.4.D(4).

(g) The system must have implemented and maintained a viable cross connection control program in accordance with R.61-58.7(F);

(h) The system must have an active inspection program for new water distribution line construction;

(i) The system must maintain an updated map of the distribution system. This map must include the following, where applicable:

(i) Existing water distribution lines;

(ii) Location and size of all storage tanks, booster pump stations, pressure reducing valves, master metered connections, and fire hydrants; and,

(iii) Location of all water treatment plant(s), surface water intake(s), well(s) and connections with other public water systems; and,

(j) The system must have a computerized hydraulic model of its distribution system. This model shall include a sufficient number of lines to adequately represent the

distribution system. This hydraulic model must be made available for review by the Department upon request.

(2) The application for delegated review authority shall include a completed application form for a permit to construct, submitted in triplicate (one original and two copies), and necessary documentation to show compliance with the criteria specified in R.61-58.1(I)(1). If the system does not have approved construction specifications or design criteria on file with the Department at the time of making application for delegated review authority, the application must include two (2) copies of its standard specifications and two (2) copies of its design criteria.

(3) The Department may revoke a system's delegated review authority at any time for failure to maintain the qualifications as specified in R.61-58.1(I)(1) or failure to comply with the permitting procedures under the delegated review program. Such revocation is subject to appeal in accordance with the Administrative Procedures Act for contested cases.

(4) The delegated review program applies only to the permitting of line extensions which are not subject to the requirements for demonstrating viability as specified in R.61-58.1.B(4) and connecting to the system which has the delegated review authority.

(5) The procedure for obtaining a permit to construct under the delegated review program is as follows:

(a) The professional engineer for a water line extension project may submit plans and specifications and design data to the public water system with delegated review authority for review in lieu of submitting to the Department an application for a permit to construct as specified in R.61-58.I(B)(2). The delegated review authority shall review the project for compliance with its design criteria and construction specifications.

(b) Following a satisfactory review of the project by the delegated review authority, the system shall submit the following information to the Department for permitting:

(i) A transmittal letter, signed by the professional engineer on staff, which clearly states the project is being submitted under the delegated review program. This letter shall also state that the project has been reviewed and complies with the system's design criteria and construction specifications;

(ii) A completed application form for a permit to construct in duplicate (the original and one (1) copy);

(iii) Two (2) sets of plans bearing the seal and signature of the design engineer;

(iv) One (1) copy of the flow test results from a location near the tie-on site. This must include the static pressure and residual pressure while flowing in excess of the demand for the proposed extension. The time, date and duration of the flow test, the size of pipe, type pipe and distance to the tie-on site must be included;

(v) One (1) copy of design calculations indicating a minimum pressure of twenty-five (25) pounds per square inch must be maintained everywhere in the distribution system during instantaneous demand or twenty (20) pounds per square inch during fire flow plus peak hourly flow; and,

(vi) Two (2) copies of a site location map.

(c) Where applicable, the Department will review the project for consistency with the Coastal Zone Management Plan and for construction in navigable waters prior to issuing a permit to construct.

(d) Written approval must be obtained from the Department prior to placing the water line extension into service.

J. Revisions to Approved Plans.

Any deviations from approved plans or specifications which could potentially effect capacity, hydraulic conditions, operating units, the functioning of water treatment processes, or the quality of the water to be delivered, shall be approved by the Department, in writing, before such changes are made. A revised application in accordance with R.61-58.1(B) will be required.

K. Requirements for Obtaining Approval to Place Permitted Construction into Operation.

(1) Newly-constructed facilities shall not be placed into operation until written approval is issued by the Department, except where it is allowed by a general construction permit. Upon completion of permitted construction, the professional engineer shall make arrangements with the Department for final inspection. Prior to this inspection, the professional engineer shall submit to the Department a letter certifying that construction is complete and in accordance with the approved plans and specifications. This letter must specifically identify the project by permit number. If the project was not completed in accordance with the approved plans and specifications, the professional engineer shall so state and shall outline any deviations to the permitted project. No written approval shall be issued to place a drinking water construction project into operation until written approval is obtained to place any associated wastewater construction into operation. The following information, where applicable, shall be submitted with the professional engineer's letter of certification:

(a) Results of chemical, physical, radiological, and bacteriological analyses of new sources and/or treated water. These analyses shall be performed by a certified laboratory.

(b) Results of bacteriological analyses following disinfection, including chlorine residuals at the time of collection, which have been conducted within thirty (30) days of the request for final approval. These analyses shall be performed by a certified laboratory.

(c) Results of pressure/leakage test conducted on water lines;

(d) Record drawings of construction if the construction deviated from that approved;

(e) Completed Water Well Record form;

(f) Geophysical/mechanical well logs;

(g) Results of pumping test as required by R.61-58.2(B)(12).

(h) Letter of acceptance from organization responsible for operation and maintenance (must be the same as shown on the application for permit to construct form);

(i) Paint coating(s) used for water storage tank(s);

(j) Copy of recorded legal easement(s) and/or deed restriction(s) for protection of

well pollution free radius;

(k) Proof of registration with the S. C. Public Service Commission for new privately owned utilities and homeowner associations;

(l) Proof of testing of all backflow prevention assemblies installed; and,

(m) Copies of any information specified in a special condition of a Department construction permit.

(2) Failure to obtain written approval from the Department prior to placing any newly constructed drinking water facilities into operation is a violation of the Act (Code Section 44-55-40) and is subject to an enforcement action by the Department. Where a person has failed to obtain a permit to construct, an application for permit must be submitted to include record drawings carrying the seal and signature of a professional engineer.

L. Drinking Water Dispensing Stations and Vending Machines.

(1) Any person or public water system desiring to make vended or dispensed water available to the public shall obtain approval from the Department prior to installation and shall obtain approval to operate before placing it into use. All water dispensing stations or vending machines must utilize water from an approved public water system. Each dispensing station or vending machine which provides further treatment is considered a separate public water system and must comply with all applicable requirements for public water systems. Before any approval can be issued technical information on machines and treatment equipment including make and model, rates of filtration, maximum daily output, and method of disinfection; and, complete plans and specifications for each machine or treatment unit shall be submitted to the Department.

(2) Approval is issued for an individual machine at a particular location, connecting to a known public water system. Machine replacement or relocation must be approved by the Department.

(3) A final inspection, total coliform clearance sample and a written approval from the Department is required before placing a machine or dispensing station into operation.

M. Bottled Water.

1. All sources within the state which are used in the manufacturing of bottled water shall be either permitted in accordance with R.61-58.1 or from an existing approved public water system.

2. If an out-of-state source of water is used by a bottled water manufacturing plant located within South Carolina, that source must be approved by the Department prior to use.

3. All treatment used in the manufacturing of bottled water shall be permitted in accordance with R.61-58.1

N. Request for Review of Permit Decisions.

1. An applicant may request that the director of the Department's water supply permitting division review any construction or operating permit decision within 15 (fifteen) days of receipt of the decision. The request shall be in writing and include a detailed justification of the reasons for the review.

2. The director shall respond in writing to the request within 15 (fifteen) days of receipt of the written request. This response may include, but not be limited to, a request for additional information,

scheduling of a meeting to discuss the permit decision, or the issuance of a final permit decision.

3. The applicant may appeal the director's final decision on the permit in accordance with R.61-58(C).

O. Operating Permits.

(1) Public water systems which meet any of the following conditions shall obtain and maintain an operating permit from the Department:

(a) A system which has its own source of water (i.e., well or surface water treatment plant);

(b) A system which provides treatment;

(c) A system which sells water to any person; or,

(d) A system which is a carrier which conveys passengers in interstate commerce.

(2) Any person making application for a permit to construct a new public water system which meets any of the conditions specified in R61-58.1.O(1) will not be required to submit a separate operating permit application. The Department will issue an operating permit for the system at the same time the permit to construct is issued. The operating permit will be contingent upon the permittee obtaining approval from the Department to place the newly constructed facilities into operation in accordance with R.61-58.1.K.

(3) For existing systems, the Department shall provide a draft of the operating permit to the applicant for comment, for at least a thirty (30) day period. If the applicant gives written notice of concurrence with the draft permit, the thirty (30) day comment period may be waived. After consideration of any comments received from the applicant, the Department will issue the operating permit. The operating permit will become effective on that date unless a review of the decision is requested in accordance with R.61-58.1(N), or appealed in accordance with R.61-58.C.

(4) The Department may revoke an operating permit for any existing water system which is unable to demonstrate its ability to remain a “viable water system” as defined in R.61-58.B.

(5) The Department may modify an operating permit at any time to include any new promulgated requirements of the Act or these Regulations, to address requirements necessary to ensure compliance with the State Safe Drinking Water Act and these regulations, to include any approved or permitted construction modifications to the system, or to modify a compliance schedule. Permit modifications will be issued in accordance with R.61-58.1.O(3).

(6) The permittee may request a modification of the operating permit at anytime with adequate justification. The permittee shall complete and submit to the Department an operating permit application form along with a detail justification for the modification(s) requested. Permit modifications will be issued in accordance with R.61-58.1.O(3).

(7) An operating permit is non-transferable, except with prior approval of the Department. The permittee shall submit written notification to the Department at least 30 days in advance of the proposed transfer. This notification shall include an operating permit application form which has been completed by the proposed new owner of the system. The Department may request on a case by case basis that the proposed new owner of the system submit a business plan which shows how the system will be managed to ensure its long term viability. If the Department approves of the transfer, a new operating

permit will be issued to the new owner of the system in accordance with R.61-58.1.O(3).

(8) If an existing water system is out of compliance with any of the requirements of the Act or these Regulations, the Department may include in the operating permit a schedule for achieving compliance with such requirements.

(9) The operating permit for an existing system shall specify the "overall rating" of the last sanitary survey conducted by the Department. If the overall rating of the last sanitary survey was "unsatisfactory", the operating permit shall require the submission of a business plan which will demonstrate how the system will be managed in the future to ensure its long term viability. The business plan must be submitted to the Department for approval within six months of the effective date of the operating permit. The Department may on a case by case basis require that the business plan include a schedule for achieving compliance with the Act and these Regulations. Once the compliance schedule is approved by the Department, it becomes a part of the operating permit.

(10) Once the permittee has satisfactorily complied with the requirements of R.61-58.1.O(9) and necessary corrections have been made to the water system, the permittee may request that the Department revise the sanitary survey rating on the operating permit.

(11) The operating permit shall include a condition that requires the submission of a business plan to the Department within six months following the issuance of an "unsatisfactory" rating on any future sanitary survey.

(12) The Department may issue general operating permits for groups of systems with similar operating requirements. The Department may deny coverage under the general operating permit to any system which is not in compliance with the requirements of the Act or these Regulations. The Department may also deny coverage under the general operating permit where specific requirements are necessary to obtain and/or maintain compliance with the Act or these Regulations.

(13) If an existing public water system is divided into two or more smaller water systems, each of the smaller water systems shall comply with the water quality monitoring requirements of the water system prior to it being divided.

## 61-58.2 GROUNDWATER SOURCES AND TREATMENT

A. Applicability.

This regulation applies to all new construction and all expansions or modifications of existing public water systems. If the Department can reasonably demonstrate that safe delivery of potable water to the public is jeopardized, a system may have to upgrade its existing facilities in order for an expansion or modification to meet the requirements of this regulation. This regulation prescribes minimum design standards for the construction of groundwater sources and treatment facilities.

B. Groundwater Development.

All wells must be constructed by a certified well driller.

(1) Quantity -

(a) A minimum of two (2) independent sources of groundwater shall be provided for all community water systems serving fifty (50) or more taps or one hundred fifty (150) or more people. Systems with an additional source (Surface Water Plant or Master Meter) will not be required to have two groundwater sources.

(b) The total developed groundwater source capacity shall equal or exceed the design maximum day demand without pumping more than sixteen (16) hours a day. With the largest producing well out of service, the capacity of the remaining well(s) pumping twenty-four (24) hours a day shall equal or exceed the design maximum daily demand, except those systems requiring only one well. The capacity from an additional source (Surface Water Plant or Master Meter) will be included in the quantity analysis. However, emergency and stand-by wells will not be included in the quantity analysis.

(2) Quality - Where the water quality does not meet the drinking water standards established in R.61-58.5, appropriate treatment designed in accordance with R.61-58.2 shall be provided.

(3) Site Considerations -

(a) Location -

(i) The location of the public well shall be at least one hundred (100) feet from all potential pollution sources except where the professional engineer or professional geologist can justify a lesser distance based in part on hydrogeological conditions or special well construction techniques or where the pollution source is designed in such a manner as to prevent the release of contaminants to the environment. A greater pollution free radius shall be required where water from water table aquifers will be used. A Wellhead Protection Area Inventory must be performed based on the location and expected yield of the proposed well.

(ii) The well location shall be at least fifty (50) feet from all surface water bodies including drainage ditches. The site must be such that the wellhead can be protected above the one hundred (100) year flood plain. Special construction techniques may be required by the Department in any area which is generally subject to flooding and the professional engineer must demonstrate to the satisfaction of the Department that the site selected is the best available. No well(s) shall be constructed in such proximity to existing wells as to cause unwarranted well interference.

(b) Easement - Once the pollution free radius is established according to R.61-58.2(B)(3)(a), an appropriate easement, ownership or deed restriction to ensure the required pollution-free radius shall be filed at the county courthouse. A copy of the deed must be submitted to the Department prior to placing the well into operation. If a right-of-way easement is needed to maintain access to the well, such an easement shall be filed at the county courthouse and a copy submitted to the Department prior to placing the well into operation.

(c) Special Considerations - Wells located within two hundred (200) feet of a body of water, or constructed such that water is being drawn from less than fifty (50) feet in depth, or constructed such that the filter material extends to less than fifty (50) feet below grade, must conduct special monitoring required in R.61-58.2(B)(14)(c). This monitoring must be conducted within one year of receiving the permit to operate. If the well is found to be under the direct influence of surface water, treatment must be added and monitoring conducted in accordance with the requirements of R.61-58.10, Filtration and Disinfection.

(4) All materials and products installed in a public water system after December 31, 1995, which comes into direct contact with drinking water during the treatment, storage, transmission or distribution of the water, shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

(5) Drilling and Sampling -

(a) Driller's log - A driller's log shall be completed for each well and shall include a depth reference point, the depth of each formation change, a description of each formation including color, mineralogy, rock type, grain size, and any other observations which may have a bearing on the final construction of the well. Special attention is required in the case of Type I wells in that the log shall denote the depth, thickness, and approximate flow of each fracture or fracture zone as measured by discharge during air circulation hammer/rotary drilling. The Department must be provided two (2) copies of the driller's log prior to the construction of the pumping, treatment or distribution facilities associated with the well or with the engineer's certification letter if the project is permitted in one step.

(b) Geophysical/Mechanical logs - Where required by the Department, two (2) copies shall be provided to the Department prior to the construction of the pumping, treatment or distribution facilities associated with the well or with the engineer's certification letter if the project is permitted in one step.

(c) Penetration rate log - Where required by the Department, two (2) copies shall be provided to the Department prior to the construction of the pumping, treatment or distribution facilities associated with the well or with the engineer's certification letter if the project is permitted in one step.

(d) Sieve Analysis For Type II and III Wells - Where required by the Department, two (2) copies of sieve analysis results shall be provided to the Department prior to the construction of the pumping, treatment or distribution facilities associated with the well or with the engineer's certification letter if the project is permitted in one step.

(e) Drilling fluid control program - Where drilling water is used, it shall contain no dangerous materials, shall be disinfected and shall meet the drinking water standards

established in R.61-58.5. All other drilling fluids and additives used shall comply with recognized industry standards and practices for the construction of drinking water wells, and shall be applied and used as prescribed by the manufacturer. Toxic and/or dangerous substances shall not be added to drilling fluid. Non-potable surface or ground water shall not be used as a drilling fluid.

(6) Well Casing Selection and Installation -

(a) Casing selection - New casing which bears mill markings and which conform to standard specifications (ASTM A-53) for water well pipe shall be used. Thermoplastic casing and couplings which meet standard specifications (ASTM F-480) and which are approved by the National Sanitation Foundation may be used for Type II, III and IV wells which will not exceed three hundred (300) feet in depth. Unless specifically approved by the Department, thermoplastic casing shall not be used for Type I wells. No material containing more than eight (8) percent lead by weight shall be used in the completed well.

(b) Method of installation - The following methods shall be used:

| **Well** | **Casing installed by** |
|---|---|
| Type I | Driving to refusal in firm bedrock. Where firm bedrock is encountered shallower than twenty (20) feet a minimum casing length of twenty (20) feet will be required. |
| Type II and III | Lowering the casing string in the pre-drilled hole so as not to damage any parts of the screen or casing. |
| Type IV | Driving into firm limestone where metal casing is used or by placing into firm limestone where thermoplastic casing is used. |

(c) Method of joining - Casing lengths shall be joined in alignment and made water tight by an appropriate method for the material used such that the resulting joint shall have the same structural integrity as the casing. Threaded and coupled joints shall be API or equivalent and shall be firmly and securely seated. PVC solvent cement and bell end or coupled joints shall meet ASTM standard specifications.

(d) Sanitary protection of well - The well shall be protected at all times during construction. The casing shall be sealed with a suitable flanged, threaded, or welded cap or compression seal upon completion. The outside casing shall be sealed to, and centered in, a reinforced concrete pad having a minimum strength of two thousand (2000) pounds per square inch, a minimum radius of three (3) feet and a minimum thickness of four (4) inches. The concrete pad shall be constructed with a slope so that water will drain away from the casing. The top of the outside casing shall extend at least twelve (12) inches above the concrete pad. There shall be no openings in the casing wall below its top except for water level measurement access ports or vents. Such openings shall be sealed water tight prior to use of the well. Any well which is to be temporarily removed from service, or which is completed for a period of time prior to being placed in service, shall be capped with a watertight cap and protected from vandalism.

(e) Well identification plate - Every well shall be equipped immediately after completion of the drilling, and prior to issuance of a permit to operate with an

identification plate.

(i) The identification plate shall be constructed of a durable, weatherproof, rustproof metal or equivalent material.

(ii) The identification plate shall be securely attached to the well casing or concrete pad around the casing where it is readily visible.

(iii) The identification plate shall be stamped with a permanent marking to show the following information:

(A) Drilling contractor and registration number;

(B) Date well completed;

(C) Total depth of well (in feet);

(D) Casing: Depth (in feet), Inside Diameter (in inches);

(E) Screened intervals (of screened wells);

(F) Filter-pack interval (of wells with artificial filter-pack);

(G) Yield expressed in gallons per minute (gpm), or specific capacity expressed in gallons per minute per foot of drawdown (gpm/ft.-dd);

(H) Static water level and date measured; and,

(I) Latitude and longitude (to the nearest second).

(7) Well Grouting - The Department shall be notified a minimum of three (3) days prior to the time of grouting.

(a) Grouting materials -All wells shall be grouted with a minimum of sand-cement, bentonite-cement mixture or neat cement. The sand-cement or neat cement mixture shall be composed of not more than two (2) parts by weight of sand to one (1) part of cement with not more than seven (7) gallons of clean water per bag (one cubic foot or 94 pounds) of cement. The bentonite-cement mixture shall be composed of three (3) to five (5) pounds of bentonite mixed with seven (7) gallons of clean water per bag (one cubic foot or 94 pounds) of cement.

(b) Method of installation of grout - Grout material shall be placed by tremie pipe, either by pouring or forced injection, after water or other drilling fluid has been circulated in the annular space sufficiently to clear all obstructions. There shall be a minimum annular space of three (3) inches for gravity feed and one and one-half (1.5) inches for forced injection between the outside surface of the casing and the formation. The minimum size tremie pipe shall be two (2) inches inside diameter for gravity feed and one (1) inch inside diameter for forced injection. When placing the grouting material, the tremie pipe shall be lowered to the bottom of the zone to be grouted and raised slowly as the grout material is introduced. The tremie pipe shall be kept full continuously from start to finish of the grouting procedure, with the discharge end of the tremie pipe being continuously submerged in the grout until the zone to be grouted is completely filled. The grout shall be allowed to properly cure before construction may be resumed.

More sophisticated methods of installation of grout may be used but care must be taken to ensure these are in accordance with standard procedures.

(c) Length of grout - The minimum length of grout for sanitary protection shall be:

| **Well** | **Grouted from surface** |
|---|---|
| Type I | To at least fifty (50) feet or firm bedrock, whichever is less. However, where bedrock is encountered at less than twenty (20) feet, at least twenty (20) feet of casing shall be used and the entire length of the casing shall be grouted. |
| Type II and III | To fifty (50) feet or the first low permeability stratum (clay, marl, etc.), or to within ten (10) feet of the upper most screen when no low permeability stratum is encountered, whichever is greater. |
| Type IV | To fifty (50) feet or firm limestone or firm marl, whichever is less. However, where limestone or firm marl is encountered at less than twenty (20) feet, at least 20 feet of casing shall be used and the entire length of the casing shall be grouted. |

The Department may require an additional length of grout where warranted by site, geological and/or water quality conditions.

(d) Centralizers - For Well Types II and III centralizers shall be attached to the outer casing at the bottom of the upper zone to be grouted and at the top and bottom of other critical grouting points such as zones of unsuitable water quality as indicated by test hole information.

(8) Well Screens - This part is applicable to Well Types II and III only.

(a) Filter type selection - Where a non-homogeneous aquifer, having a uniformity coefficient less than three (3.0) and an effective grain size less than one tenth (0.1) inches is to be screened, an artificial filter shall be used as described in R.61-58.2(B)(9).

(b) Screen-type selection - The screen specified shall have controlled uniform slot size, have structural integrity, and be of a type which will allow a well entrance velocity which does not exceed six (6) feet per minute. The use of non-metallic screens will be reviewed on a case-by-case basis. The use of non-metallic screen settings below two hundred (200) feet will be allowed only when recommended by the manufacturer.

(c) Screen slot size - The screen slot size shall be based on sieve analysis, industry standards, and good engineering practice; and/or shall meet the sand content limits outlined in R.61-58.2(B)(11)(b).

(d) Screen length - Screen of sufficient length shall be installed to obtain an entrance velocity not to exceed six (6) feet per minute.

(e) Screen location - Screen settings located in unconfined water-table aquifers shall be approved only on a case-by-case basis where justification concerning pollution-free radius, treatment, etc. is provided.

(f) Method of screen installation - The screen shall be provided with such fittings as are necessary to seal the top tightly to the casing and to close the bottom, as defined in R.61-58.2(B)(8)(g) and (h). If the screen is telescoped inside the casing, a packer seal made for this purpose, or an approvable substitute, shall be lapped at least twelve (12) inches into the casing. If this screen is attached to the casing prior to lowering, centralizers shall be used and a suitable coupling shall be provided or the screen shall be welded to the casing.

(g) Method of joining screen to screen - Screen sections for a single interval shall be joined by threaded and coupled joints, socket-type fittings and solvent welding, or electric arc or acetylene welding. Welding rods and methods recommended by the screen manufacturer shall be employed. Resulting joint(s) must be straight, sand tight, and retain one hundred (100) percent of the screen strength.

Blank spacers for multiple interval screens shall be of compatible material with the screens or casing. They shall be joined to the screen by threaded and coupled joint, socket-type fittings, solvent welding, or electric arc or acetylene welding using materials and procedures specified in R.61-58.2(B)(6)(c). The resulting joints shall be straight, sand tight, and retain one hundred (100) percent of the screen strength.

(h) Method of connecting screen to casing - The connection between the screen and casing shall be by a neoprene or rubber seal especially made for this purpose, or by threaded and coupled joints, socket fittings and solvent welding, or electric arc or acetylene welding using materials and procedures listed in R.61-58.2(B)(6)(c). The resulting joints must be straight, water tight, and retain one hundred (100) percent of the screen strength.

(i) Methods of sealing bottom - The bottom of the screen shall be sealed with bagged cement or a threaded or welded plug made of compatible material with the screen body.

(9) Well Filter Construction (Artificial) - This part is applicable only to Type III wells.

(a) Filter material - Clean, well-rounded quartz particles free of limestone, clay, organic matter or other unsuitable materials shall be used.

(b) Selection of artificial filter grain size and screen aperture size - When an artificial filter is necessary, the filter grain size shall be determined from sieve analysis of the formation to be screened. The screen aperture shall be of such size as to retain between eighty-five (85) and one hundred (100) percent of the filter material. The drill hole diameter shall be carefully controlled so that the thickness of the filter medium ranges from a minimum of three (3) inches to a maximum of eight (8) inches.

(c) Length of artificial filter - The filter material shall, at a minimum, extend below the lowest screen for a distance two and a half (2.5) times the largest diameter of the well casing to the same distance above the highest screen. Where zones of inferior water quality are to be avoided, the annular space opposite the inferior zones shall be grouted in accordance with R.61-58.2(B)(7)(a) and (b).

(d) Delivery and storage of filter material - The filter material shall be protected from the weather and any contamination by bagging, or covering with plastic or canvas until used. If no protective cover is placed on the ground under the filter material, the layer in contact with the ground shall not be used.

(e) Method of installation of filter material - The filter material shall be placed with a disinfected fluid. For wells less than fifty (50) feet in depth with a short screen (5 to 10 feet), the filter material may be gravity fed from the surface if the annular space is at least six inches. For wells deeper than fifty (50) feet, a tremie pipe shall be required.

(10) Well Plumbness and Alignment - The completed well shall be sufficiently plumb and straight so that there will be no interference with installation, alignment, operation, or removal of the test or permanent pumps.

(11) Well Development - Proper well development is demonstrated by the turbidity of the water produced by the well and its sand content.

(a) Turbidity - The water produced by a completed well must have a turbidity of less than five (5.0) nephelometric turbidity units (NTU) unless it can be demonstrated that the turbidity is due to the natural water quality of the aquifer.

(b) Sand content - The maximum sand content shall be five (5) milligrams per liter or twenty (20) milligrams per gallon in the completed well.

(12) Well Testing for Performance - The Department shall be notified at least three (3) days prior to the time of the pumping test. The pumping test shall not be conducted until the well has been adequately developed.

(a) Type of pumping test performed - Pump tests to fully evaluate the yield and specific capacity shall be performed on all newly constructed wells and shall be performed for a minimum of twenty-four (24) hours at the design or maximum capacity of the well. The test procedure shall be based on good hydro-geologic practice.

(b) Aborted tests - Whenever there is an interruption in pump operation for a period greater than one percent of the elapsed pumping time, there shall be a suspension of the test until the water level in the pumped well has recovered to the static level. The test must be restarted and run for the full twenty-four (24) hour period.

(c) Location of discharge - Water shall be discharged so that it will not affect test results and so that no damage by flooding or erosion is caused to the chosen drainage structure or disposal site. The location of the discharge point shall be shown on the site plan and precautions must be taken to ensure the protection of flora and fauna.

(d) Record of tests - Accurate records shall be kept of the test along with weather conditions and other pertinent information. Two (2) copies shall be furnished to the Department prior to construction of the pumping, treatment or distribution facilities associated with the well or with the engineer's certification letter if the project is permitted in one step. The records shall also be available for inspection at any time during the test. At a minimum the record shall include the following information:

(i) time the test was started;

(ii) method of measuring the pumping rate and water level;

(iii) pumping rate and water level measurements every 15 minutes for the first three (3) hours and at least hourly for the remainder of the test;

(iv) water level measurements every fifteen (15) minutes for the first three (3)

hours following the end of pumping and hourly thereafter; and,

(v) name of the person(s) conducting the test.

(e) Measurement of water levels - The method of taking water level measurements shall have an accuracy to within plus or minus one tenth (0.1) of a foot. The air line method, steel tape method, or electric sounder method may be used according to proper procedures.

(13) Well Disinfection -

(a) Scheduling disinfection - The well shall be disinfected at the following times during construction:

(i) The well shall be disinfected as soon as construction of the well and cleaning procedures have been completed. All oil, grease, soil, and other materials which could harbor and protect bacteria from disinfectants shall be removed from the well. Unless prior approval is obtained for employing chemicals or unusual cleaning methods, the cleaning operation shall be carried out by pumping and swabbing only.

(ii) The well shall be disinfected after completion of the performance testing and sampling. The well shall be capped in accordance with R.61-58.2(B)(6)(d) and shall be protected from vandalism until the permanent pump is installed.

(iii) The well shall be disinfected after installation of the thoroughly scrubbed and cleaned permanent pump.

(b) Disinfectants - Chlorine disinfectant shall be delivered to the site of the work in original closed containers bearing the original label indicating the percentage of available chlorine. The disinfectant shall be recently purchased (chlorine compounds in dry form shall not be stored for more than one year and storage of liquid compounds shall not exceed 60 days). During storage, disinfectants shall not be exposed to the atmosphere or to direct sunlight. The quantity of chlorine compounds used for disinfection shall be sufficient to produce a minimum of fifty (50) milligrams per liter available chlorine in solution when mixed with the total volume of water in the well.

(c) Disinfection procedure - For each disinfection, a reliable means shall be provided for ensuring that the disinfecting agent is uniformly applied throughout the entire depth of the well including the casing, pipes and wiring above the water level. The disinfection shall be in accordance with current AWWA Standards for disinfection of wells.

After the contact period, the well shall be pumped to clear it of the disinfecting agent. The disposal point for the purged water shall be selected so as to avoid damage to aquatic life or vegetation.

(14) Water Samples and Analyses - All samples shall be appropriately identified by the well identification number assigned by the Department, date, and time and shall include the name of the sample collector, contractor and owner. The samples shall be analyzed by a certified laboratory. Test results shall be provided to the Department prior to the construction of the pumping and treatment facilities (if applicable) or with the engineer's certification letter if the project is permitted in one step.

(a) Bacteriological analysis - Prior to sampling, the well shall be pumped until the

chlorine residual in non-detectable. Two consecutive samples of water shall be collected at least twenty-four (24) hours apart and be analyzed for total coliform bacteria. The results of both samples must show the absence of total coliform bacteria using membrane filter methodology. The measured chlorine residual and non-coliform growth must also be reported. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) milliliters, the sample result will be deemed invalid and must be repeated. All samples must be analyzed by a laboratory certified by the Department. The Department may request that heterotrophic plate count analyses be conducted on a case-by-case basis where construction, development, or disinfection problems are suspected.

(b) Chemical and radiological analysis - Representative clear samples shall be properly collected and preserved and shall be analyzed by a certified laboratory. The sample shall be analyzed for all contaminants listed in R.61-58.5 and all other parameters needed to determine the aggressiveness of the water to include, pH, total alkalinity, calcium, hardness, total dissolved solids, temperature, and shall be delivered to the laboratory no more than thirty (30) hours after its collection. The pH and temperature measurements shall be made in the field using certified methodology.

(c) Special monitoring for direct surface water influence - For those wells meeting the requirements of R.61-58.2(B)(3)(c), and for any other well deemed necessary by the Department because of location, depth, testing analysis, or other pertinent information, the following special monitoring must be conducted:

(i) quarterly analyses, for a period of one (1) year, of the untreated well water for total and fecal coliform bacteria;

(ii) analyses for pH, turbidity, temperature, and conductivity before and after two or more heavy rainfall events (at least 2 inch over a 24 hour period); and,

(iii) where the above analysis indicates a possible problem, microscopic particulate analysis must be conducted.

If these analyses indicate that the well is under direct surface water influence, treatment must be added and monitoring conducted in accordance with R.61-58.10 or the well must be abandoned in accordance with R.61-58.2(B)(15).

(15) Permanent Well and Test Hole Abandonment - All wells and test holes that are not completed as a production, monitoring or observation well shall be properly abandoned. Abandonment of these wells shall be performed by a certified well driller.

(a) Aquifer sealing materials - The well to be abandoned shall be filled with neat cement, sand-cement, bentonite-cement or concrete. The neat cement, sand-cement or bentonite-cement mixtures shall be as specified in R.61-58.2B(7)(a).

(b) Placement of sealing material - Sealing materials used in abandonment operations shall be placed in such a way as to avoid segregation or dilution of the sealing materials. Dumping sealing material from the top shall not be permitted. Special consideration shall be given to the following:

(i) the abandonment of flowing artesian wells;

(ii) a borehole or well which is to be abandoned due to contamination shall be considered a special case, and the method of filling and sealing such wells shall be

subject to individual review and prior written approval by the Department.

(iii) In the sealing of a double or multiple cased well, the certified well driller shall submit, for prior approval, a drawing thereof with a description of the proposed procedure and materials to be used to completely and permanently seal both the well and any column of filter pack that extends to the ground surface.

(iv) Bridging for deep wells - Very deep wells that do not require complete filling for sanitary protection may be backfilled with clean sand or gravel to the depth appropriate for the bottom of the plug of sealing materials. Where open casing (types II or III wells) or open borehole (types I or IV wells) is to remain below the sealed depth, a temporary bridge or plug made of inorganic materials (e.g., metal, cement) or manufactured devices specifically designed for this purpose in well construction and made of plastic or other elastic materials (e.g., neoprene, rubber) may be used to support the column of sealing materials until they cure and bond to the casing or borehole. The column of sealing materials is installed above the temporary bridge.

In Type I or IV wells, the column of permanent sealing materials may be set with the bottom at least ten (10) feet below the top of firm bedrock or limestone and extending up to within five (5) feet of the ground surface. The casing may be removed if desired and the borehole abandoned by grouting instead. The upper most five (5) feet may be filled with soil suitable for the intended land use.

In Type II or III wells, the sealing materials shall extend down to at least fifty (50) feet below ground surface, except that the uppermost five (5) feet of the borehole may be filled with soil suitable for the intended land use. Casing may be removed, if desired, and the borehole abandoned by grouting.

(v) In abandoning all new wells (test wells, wells of insufficient yield, unacceptable water quality, etc.) the casing must be properly installed with the appropriate grouted material or else removed and the borehole abandoned by grouting.

(vi) Contaminated wells - wells tapping multiple aquifers of different hydrostatic heads or wells tapping multiple zones of significantly different water quality must be abandoned in a manner such that contaminated or lower quality water does not migrate through the abandoned well or borehole and such that ongoing large vertical transfers of water between aquifers, of any quality, do not occur. The methods proposed for sealing such wells shall be reviewed and will require prior written approval by the Department, completely filling an uncased borehole with sealing materials shall be acceptable without prior approval.

(vii) In sealing a double wall or multiple cased well, the certified well driller shall submit a drawing with a description of the proposed procedure.

(c) Well abandonment records - Before the equipment is removed from the site, the exact location of the abandoned well or hole shall be accurately surveyed and a record made to the location with respect to several fixed reference points. All information relative to the abandonment procedures, the location, depth, and diameter of the well or hole shall be supplied in writing to the owner and the Department.

(16) Well Head Piping and Pumping Facilities.

(a) General Requirements:

(i) A sanitary seal must be provided on the top of the well casing. A pressure gauge and air line or other method for readily measuring the water level in the well shall also be provided.

(ii) A casing vent elbowed downward must be provided for the well casing a minimum of eighteen (18) inches above the well house floor (except on packer jet wells). The vent can be gooseneck type with twenty-four (24) mesh screen over the opening or manufactured slotted pipe with effective opening of .024 inches or smaller.

(iii) A check valve shall be provided on the pump discharge above the top of the casing. For jet pumps, no check valve is required in the main line but a back-flow/back-siphonage device must be provided on blow offs and sample cocks.

(iv) A sampling tap must be provided for raw water sampling downstream of the check valve and prior to any chemical injection point. If chemical feed is provided at the well head, a second sample tap shall be provided downstream of the last injection point. This second sampling tap shall be located following adequate mixing of the chemical(s), but prior to any storage tank. A static in-line mixer may be required to ensure that adequate mixing of the chemical(s) has taken place prior to the sampling tap.

(v) Adequate control switches, etc., for the pumping equipment must be provided. A pressure relief valve must be provided and shall not be separated by a valve from the controlling device.

(vi) A flow meter shall be provided on:

(A) each well serving a community water system;

(B) each well serving a non-transient non-community water system;

(C) each well which is equipped with treatment; and,

(D) any other public water supply well where the yield of the well, while pumping against the normal working pressure of the system, cannot be easily measured from the blow-off using a bucket and stopwatch or by some other readily accessible means of measuring flow.

The flow meter shall be capable of measuring instantaneous and totalized flow.

(vii) Adequate support for the well pump and drop pipe must be provided.

(viii) An hour meter shall be provided to record the elapsed run time of each well pump which is required to have a flow meter.

(ix) A valved blow-off shall be provided and located prior to any chemical feed but downstream of the flow meter.

(x) A manual control switch shall be provided for each well pump.

(xi) All electrical wiring shall be in conduit and meet the requirements of the

National Electric Code.

(xii) Each well pump station must have a sign on the door with a twenty-four (24) hour telephone number for emergencies.

(xiii) Wells or well pump stations in pits are prohibited.

(xiv) All wells shall be readily accessible at all times for inspection, maintenance and sampling. Also, well houses shall be constructed in a manner and of material that will allow one person easy access to the sampling tap(s) and the well head piping for inspection, maintenance and sampling.

(b) Turbine pumps - Drilled wells with the prime mover mounted on the casing (Turbine pumps) shall:

(i) Have the casing equipped with a flange or suitable sanitary seal;

(ii) Have the casing firmly connected to the pump structure or have the casing inserted into a recess extending at least one inch into the base of the pump if a watertight connection is not provided;

(iii) Have the base of the pump not less than twelve (12) inches above the pump room floor or apron;

(iv) Have the pump foundation and base designed to prevent water from coming into contact with the joint between the casing and the prime mover; and,

(v) Have an air release valve installed on the discharge pipe upstream of the check valve.

(c) Submersible Pumps - Where a submersible pump is used, the top of the casing shall be effectively sealed against entrance of water under all conditions of vibration or movement of conductors or cables. For hydropneumatic systems not equipped with an air compressor, the discharge pipe shall be equipped with a snifter (a device which will allow air to enter the drop-pipe) upstream of the check valve and a bleeder valve on the drop-pipe located above the static water level in the well.

(d) Well head piping - The well head piping shall be provided with a valved means to pump waste to a point away from the groundwater source, but shall not be directly connected to a sewer. Neither the well head nor the well head piping shall be buried below grade or in a pit. The discharge line shall:

(i) Have control valves located above the pump floor;

(ii) Be protected against freezing;

(iii) Be valved to permit testing and control of each well;

(iv) Have watertight joints;

(v) Have all exposed valves protected; and,

(vi) Have erosion protection at the point of discharge from the blow-off.

(e) Water Seals - Water seals shall not be supplied with water of a lesser sanitary quality than that of the water being pumped. Where pumps are sealed with potable water and are pumping water of lesser sanitary quality the seal shall be provided with a back-flow preventer appropriate for the degree of hazard in question.

(f) Water Pre-lubrication - When automatic pre-lubrication of pump bearings is necessary and an auxiliary power supply is provided, the pre-lubrication line shall be provided with a valved bypass around the automatic control so that the bearings can, if necessary, be lubricated manually before the pump is started.

C. General Design Requirements.

(1) Plant Layout - Design shall provide for an adequate access road, site drainage, protection of well(s) from spillage, and adequate protection from vandalism. Consideration shall also be given to functional aspects of the plant layout and future expansion.

(2) Building Layout - Design shall provide, if necessary, for adequate ventilation, lighting, telephone service, heating and air conditioning, floor drainage, and dehumidification equipment. Consideration shall also be given to accessibility of equipment for operation, servicing, and removal, telephone communication capability, flexibility of operation, operator safety, and convenience of operation.

(3) Electrical Controls - Main switch gear electrical controls shall be located above grade and protected from standing water.

(4) Auxiliary Power - Where elevated storage equals less than one half maximum daily demand, portable or in-place auxiliary power shall be provided for all systems serving three hundred (300) or more service connections. An air quality permit may be required for the emissions from the auxiliary generators. Auxiliary power requirements may be waived if one or more of the following are applicable:

(a) a verifiable history of worst case power outages and verification that the available elevated storage can provide for a similar time period of outage;

(b) two (2) or more independent sources from the serving electrical utility are available; or,

(c) an alternate water source is available via connections with other systems.

Auxiliary power shall be sized to provide for sufficient pumping and treatment capacity to meet one half (1/2) of the maximum daily demand or to supplement the existing storage to meet one half (1/2) of the maximum daily demand.

(5) Sample Taps - Sample taps shall be provided so that water samples can be obtained from:

(a) each raw water source;

(b) appropriate locations throughout the treatment process so that the operator can maintain proper control of the treatment process;

(c) effluent from each filter prior to any post chemical addition; and,

(d) the entry point(s) to the distribution system.

Taps shall be consistent with sampling needs and shall not be of the petcock type. Taps used for obtaining samples for bacteriological analysis shall be of the smooth-nosed type without interior or exterior threads. Taps shall not be of the mixing type, and shall not have a screen, aerator, or other such appurtenances. All sampling taps shall be easily accessible and located at least 12 inches above the floor or ground level.

(6) Chemical injection points - All chemical injection points shall be downstream of the check valve on the wellhead piping.

(7) All chemical treatment equipment shall be enclosed and protected from the weather.

(8) Process Water - The process water service line shall be supplied from a source at a point where all chemicals have been thoroughly mixed.

(9) Piping Identification - To facilitate identification of piping where treatment occurs, all pipes shall be color coded and/or marked with the name of the liquid or gas being carried and its direction of flow.

(10) Proprietary Treatment Units/Innovative Treatment Techniques - Proprietary treatment units and alternative treatment technology may be considered if pilot tests demonstrate the ability of the technology to provide water which meets all drinking water standards utilizing the proposed groundwater source. The unit/technology will be approved only at rates consistent with R.61-58.2(D) until satisfactory operating data for at least eighteen (18) months is obtained.

(11) Manuals and Parts Lists - An operation and maintenance manual shall be provided for each installation. This manual shall include repair information, parts lists for each piece of equipment, and procedures for the start up and shut down of the facility.

(12) Safety - All design must meet applicable safety codes and minimum Occupational Safety and Health Administration (OSHA) standards.

D. Groundwater Treatment.

(1) Filtration - All filters treating groundwater under the direct influence of surface water must meet the performance standards set forth in R.61-58.10(E).

The application of any one type of filtration must be supported by water quality data. Experimental treatment studies may be required to demonstrate the applicability of the method of filtration proposed.

(a) Pressure Filters - The use of these filters may be considered for iron and manganese removal and other clarification processes.

(i) Rate of Filtration - The nominal rate shall be three (3) gallons per minute per square foot of filter area and shall not exceed five (5) gallons per minute per square foot without adequate justification.

(ii) Details of Design - The filter design shall address the following:

(A) Pressure gauges on the inlet and outlet pipes of each filter shall be provided.

(B) Provisions shall be made for filtration and backwashing of each filter individually with an arrangement of piping as simple as possible to accomplish these purposes.

(C) The backwash water collection system shall be designed to allow for adequate bed expansion without loss of media.

(D) The underdrain system shall efficiently collect the filtered water and shall distribute the backwash water uniformly at a rate not less than fifteen (15) gallons per minute per square foot of filter area.

(E) Backwash flow indicators and controls shall be located such that they are easily readable while operating the control valves.

(F) An air release valve on the highest point of each filter shall be provided.

(G) An accessible manhole to facilitate inspections and repairs (above level of media) shall be provided.

(H) A means to observe the wastewater during backwashing shall be provided.

(I) No unprotected cross connections shall exist.

(J) Filter material must be in accordance with R.61-58.3(D)(5)(a)(vi).

(K) A sufficient number of filter units so as to ensure continuity of service with one unit temporarily removed from operation. The facility shall be designed so that the design filtration rate is not exceeded during backwash operation.

(L) Filter material shall have a total depth of not less than twenty-four (24) inches and generally not more than thirty (30) inches.

(M) Only finished water from the treatment process shall be used to backwash the filter(s).

(b) Gravity Filters - Gravity filters shall be designed in accordance with applicable portions of R.61-58.3(D)(5).

(c) Diatomaceous earth filtration

(i) Conditions of use - Diatomaceous earth filters are expressly excluded from consideration for bacteria removal, color removal, or turbidity removal where either the gross quantity of turbidity is high or the turbidity exhibits poor filterability characteristics.

(ii) Pilot plant study - Installation of a diatomaceous earth filtration system shall be preceded by a pilot plant study on the water to be treated.

(A) Conditions of the study such as duration, filter rates, head loss

accumulation, slurry feed rates, turbidity removal, bacteria removal, etc., shall be approved by the Department prior to the study.

(B) Satisfactory pilot plant results shall be obtained prior to preparation of final construction plans and specifications.

(C) The pilot plant study shall demonstrate the ability of the system to meet applicable drinking water standards at all times.

(iii) Types of filters - Pressure or vacuum diatomaceous earth filtration units will be considered for approval.

(iv) Treated water storage - Treated water storage capacity in excess of normal requirements shall be provided to allow operation of the filters at a uniform rate during all conditions of system demand at or below the approved filtration rate, and guarantee continuity of service during adverse raw water conditions without by-passing the system.

(v) Precoat Application - A uniform precoat of at least 1/16 inch shall be applied hydraulically to each septum by introducing a slurry to the tank influent line and employing either a filter-to-waste or recirculation system.

(vi) Body feed - A body feed system to apply additional amounts of diatomaceous earth slurry during the filter run is required. Continuous mixing of the body feed slurry shall be provided.

(vii) Filtration

(A) Rate of filtration - The filtration rate shall be controlled by a positive means and shall not exceed one and a half (1.5) gallons per minute per square foot of filter.

(B) Head loss - The head loss shall not exceed thirty (30) pounds per square inch for pressure diatomaceous earth filters, or a vacuum of fifteen (15) inches of mercury for a vacuum system.

(C) Recirculation - A recirculation or holding pump shall be employed to maintain differential pressure across the filter when the unit is not in operation in order to prevent the filter cake from dropping off the filter elements. A minimum recirculation rate of one tenth (0.1) gallon per minute per square foot of filter area shall be provided.

(D) Septum or filter element - The filter elements shall be structurally capable of withstanding maximum pressure and velocity variations during filtration and backwash cycles, and shall be spaced such that no less than one (1) inch is provided between elements or between any element and a wall.

(E) Inlet design - The filter influent shall be designed to prevent scour of the diatomaceous earth from the filter element.

(viii) Backwash - A satisfactory method to thoroughly remove and dispose of spent filter cake shall be provided.

(ix) Appurtenances - The following shall be provided for every filter:

(A) sampling taps for raw and filtered water;

(B) loss of head or differential pressure gauge;

(C) rate-of-flow indicator, with totalizer;

(D) a throttling valve used to reduce rates below normal during adverse raw water conditions; and,

(E) an evaluation of the need for body feed, recirculation, and any other pumps, in accordance with R.61-58.4(B)(1)(d).

(2) Disinfection - Disinfection may be accomplished with liquid chlorine, calcium or sodium hypochlorite, chlorine dioxide, ozone or chloramines. Other agents will be considered by the Department provided that reliable feed equipment is available and test procedures for a residual are recognized, and the agent meets the requirements of an acceptable drinking water additive. Continuous disinfection will be required at groundwater supplies which are of questionable sanitary quality or where any other treatment is provided. Due consideration shall be given to the contact time of the disinfectant in water with relation to pH, ammonia, taste-producing substances, temperature, bacterial quality, and other pertinent factors. Consideration also must be given to the formation of disinfection by-products.

(a) Chlorination - Where chlorine is used the following shall apply:

(i) Type - Only vacuum type gas chlorinators or hypochlorite feeders of the positive displacement type are acceptable.

(ii) Capacity - The chlorinator capacity shall be such that a free chlorine residual of at least five (5) milligram per liter can be attained in the water after a contact time of at least thirty (30) minutes at maximum flow rates. The equipment shall be of such design that it will operate accurately over the desired feeding range.

(iii) Automatic Proportioning - Automatic proportioning chlorinators will be required where the rate of flow or chlorine demand is not reasonably constant or where the rate of flow of the water is not manually controlled.

(iv) Residual chlorine - Where alternate disinfectants are used in the treatment process, the capability for the addition of either free or combined chlorine in the finished water shall be provided.

(b) Cross connection protection - The chlorinator water supply piping shall be designed to prevent contamination of the treated water supply by sources of questionable quality.

(c) Chlorine gas - Consideration shall be given to the location of gas chlorine facilities and the safety of the public in the surrounding area. The Department reserves the right to deny approval of chlorine gas on the basis of hazards to the public health. Consideration may be given for facilities that propose the use of chlorine gas in inhabited areas when the use of safety devices which will not allow the release of chlorine gas (e.g. chlorine scrubbers) are provided. Only vacuum gas chlorinator systems will be approved.

(i) Chlorine gas feed equipment shall be enclosed and separated from other operating areas. Concrete, wood, and other construction materials shall be sealed to prevent the escape of chlorine gas from the chlorine building. The chlorine room shall be provided with a shatter resistant inspection window installed in an interior wall or an inspection window in the door. It shall be constructed in such a manner that all openings between the chlorine room and the remainder of the plant are sealed, and shall be provided with doors ensuring ready means of exit and opening only to the building exterior.

(ii) Full and empty cylinders of chlorine gas shall be isolated from operating areas, restrained in position to prevent upset, stored in rooms separate from ammonia storage, and stored in areas not in direct sunlight or exposed to excessive heat.

(iii) If the chlorine room is large enough for a person to enter, the room shall be constructed such that:

(A) It has a ventilating fan with a capacity which provides one complete air change per minute;

(B) The ventilating fan shall be located near the ceiling and pull suction through a duct extending to within twelve (12) inches of the floor and discharge as far as practical from the door and air inlet. The point of discharge shall be located so as not to contaminate air inlets to any rooms or structures. A sealed motor or other means shall be used to ensure the reliability of the fan;

(C) Air inlets shall be located near the ceiling;

(D) Air inlets and outlets shall have mechanical louvers;

(E) Switches for fans and lights are outside of the room, at the entrance;

(F) Vents from feeders and storage areas discharge to the outside atmosphere, above grade and away from inlet vent; and,

(G) Ventilation shall not be automatically controlled.

(iv) If the room is too small for a person to enter, the room must meet the requirements of R.61-58.2(D)(2)(c)(iii)(E) and (F).

(v) Chlorine feed lines shall meet the following requirements:

(A) Chlorine gas under pressure shall be piped with schedule eighty (80) stainless steel or schedule eighty (80) seamless carbon steel. No chlorine gas under pressure will be piped beyond the chlorinator room.

(B) Chlorine gas under vacuum shall be piped with schedule eighty (80) PVC or reinforced fiberglass.

(C) Chlorine solution shall be piped with schedule eighty (80) PVC.

(vi) Heaters shall be provided to maintain proper temperature for operation.

(vii) There shall be no equipment housed in the chlorine room except chlorinators, chlorine cylinders, weighing scales, heater, ventilation fan, and light(s).

(viii) Weighing scales shall be provided for weighing cylinders, at all installations utilizing chlorine gas unless provisions for automatic switchover of cylinders and an acceptable alternate means to determine daily dosage are provided.

(ix) Chlorine feed systems shall be designed to ensure continuous feed of chlorine.

(x) If a floor drain is provided, it shall be equipped with a water seal or trap to prevent escaped gases from exiting through the building sewer.

(xi) A chlorine leak detection and alarm system shall be provided.

(xii) An air pack approved by the National Institute for Occupational Safety and Health shall be available for each gas chlorination installation.

(xiii) A chlorine cylinder repair kit for plugging the type of chlorine cylinders used shall be available for each gas chlorination installation.

(d) Ozone - Ozone is a suitable disinfectant for groundwater. On-site generation facilities shall be constructed in accordance with manufacturer's standards.

(i) Pilot plant tests - Pilot plant tests shall be performed with the water to be treated to establish the optimum dosage, contact time, depth of conductor and the need for multiple application points.

(ii) Building Design - Ozone generators shall be housed in a separate room with separate heating and ventilation. The building layout must provide for easy access to the equipment. Ventilation equipment shall be two (2) speed with the normal speed providing the normal distribution of heat or air movement. The second speed must be capable of providing a complete turnover of the air in the room every two (2) minutes to exhaust any ozone leakage in an emergency.

(iii) Piping Materials

(A) All dry ozone gas piping shall be mechanical jointed number 304 or 316 stainless steel or welded 304L or 316L stainless steel. All wet ozone gas piping shall be number 316 or 316L stainless steel. All flexible couplings shall be stainless steel.

(B) Valves shall be stainless steel face and body.

(C) Gasket materials shall be resistant to deterioration by the ozone.

(iv) Reinforced concrete or stainless steel are acceptable materials. All concrete joints shall be sealed using a synthetic rubber material resistant to

deterioration by the ozone.

(e) Other disinfection agents - Any proposal for the use of other disinfecting agents shall be approved by the Department prior to preparation of final plans and specifications.

(f) Ammonia Gas - Consideration shall be given to the location of ammonia gas facilities and the safety of the public in the surrounding area. The Department reserves the right to deny approval of ammonia gas on the basis of hazards to the public health. Only vacuum ammonia systems will be approved.

(i) Ammonia gas feed equipment shall be enclosed and separated from other operating areas. Concrete, wood, and other construction materials shall be sealed to prevent the escape of ammonia gas from the ammonia room. The ammonia room shall be provided with a shatter resistant inspection window installed in an interior wall or an inspection window in the door. It shall be constructed in such a manner that all openings between the ammonia room and the remainder of the plant are sealed, and shall be provided with doors ensuring ready means of exit and opening only to the building exterior.

(ii) Full and empty cylinders of ammonia gas shall be isolated from operating areas, restrained in position to prevent upset, stored in rooms separate from chlorine storage, and stored in areas not in direct sunlight or exposed to excessive heat.

(iii) If the ammonia room is large enough for a person to enter, the room shall be constructed such that:

(A) It has a ventilating fan with a capacity which provides one complete air change per minute;

(B) The ventilating fan shall be located and pull suction near the ceiling and discharge as far as practical from the door and air inlet. The point of discharge shall be located so as not to contaminate air inlets to any rooms or structures. A sealed motor or other means shall be used to ensure the reliability of the fan;

(C) Air inlets shall be located near the floor;

(D) Air inlets and outlets shall have mechanical louvers;

(E) Switches for fans and lights are outside of the room, at the entrance;

(F) Vents from feeders and storage areas discharge to the outside atmosphere, above grade and away from inlet vent; and,

(G) Ventilation shall not be automatically controlled.

(iv) If the room is too small for a person to enter, the room must meet the requirements of R.61-58.2(D)(2)(f)(iii)(E) and (F).

(v) Ammonia feed lines shall not carry ammonia gas beyond the ammonia room.

(vi) There shall be no equipment housed in the ammonia room except ammoniators, ammonia cylinders, weighing scales, heater, ventilation fan, and light(s).

(vii) Weighing scales shall be provided for weighing cylinders, at all installations utilizing ammonia gas from cylinders. Where bulk storage tanks are installed, they shall be equipped with a pressure gauge.

(viii) An ammonia leak detection and alarm system shall be provided.

(g) Chlorine Dioxide - Chlorine dioxide is a suitable disinfectant for groundwater. Chlorine dioxide shall be generated on site. The unit shall be flow paced and not have a holding tank for the chlorine dioxide solution generated. All applicable EPA disinfectant by-product rules shall be observed.

(i) Sizing of the chlorine dioxide generator - Chlorine dioxide demand studies shall be conducted to determine estimated feed rates and points of feed.

(ii) Building Design -

(A) Chlorine dioxide generators shall be located in a room separate from chlorine cylinders.

(B) Number of Units: Where chlorine dioxide is used as the primary disinfectant, at least two (2) flow pacing chlorine dioxide generators shall be provided. The facility shall be adequately sized to supply the maximum treatment capacity with any one generator out of service. If chlorine dioxide is not used as a primary disinfectant (i.e. an oxidant only), a second generator is not required.

(iii) Piping Materials -

(A) All piping from the chlorine dioxide generator shall be schedule 80 PVC

(B) Gasket materials shall be kynar or other compatible material.

(C) All tubing connector fittings shall be kynar or other compatible material.

(3) Softening - The softening process selected shall be based upon the mineral qualities of the raw water and the desired finished water quality in conjunction with requirements for the disposal of brine waste, the plant location. Applicability of the process chosen shall be demonstrated. Ion exchange units used for softening shall be designed in accordance with R.61-58.2.D(4).

(4) Ion Exchange Process - The total iron and manganese concentration shall not exceed three tenth (0.30) milligrams per liter in the water as applied to the ion exchange material. Pretreatment is required when the total iron and manganese concentration exceeds is three tenth (0.3) milligram per liter or more.

(a) Design - The units may be of pressure or gravity type, of either an upflow or downflow design. A manual override shall be provided on all automatic controls.

(b) Exchange Capacity - The design capacity for hardness removal shall not exceed twenty thousand (20,000) grains per cubic foot when resin is regenerated with three tenth (0.3) pounds of salt per kilograin of hardness removed.

(c) Depth of Media - Exchange resin shall have a total depth of not less than twenty-four (24) inches and generally not more than thirty (30) inches unless otherwise approved by the Department.

(d) Flow Rates - The rate of softening shall be based on an actual bench scale test of the water to be treated. The backwash rate shall be sufficient to clean the bed. The flow rate will be dependent on the grain size and specific gravity of the exchange resin.

(e) Bypass - A bypass may be provided around softening units to produce a blended water of desirable hardness. Meters shall be installed on the bypass line and on each softener unit.

(f) Additional limitations - Waters having five (5) units or more turbidity shall not be applied directly to the cation exchange softener. Silica gel resins shall not be used for waters having a pH above 8.4 and shall not be used when iron is present. When the applied water contains a chlorine residual, the cation exchange resin shall be a type that is not damaged by residual chlorine. Phenolic resin shall not be used.

(g) Sampling Taps - Smooth-nose sampling taps shall be provided for the collection of representative samples for both bacteriological and chemical analyses. The taps shall be located to allow sampling of the softener influent, the softener effluent, and the blended water. The sampling taps for the blended water shall be at least twenty (20) feet downstream from the point of blending. Petcocks are not acceptable as sampling taps.

(h) Brine and Salt Storage Tanks - Brine measuring or salt dissolving tanks and wet salt storage facilities shall be covered and shall be constructed of corrosion-resistant material. The make-up water inlet shall have a free fall discharge of two (2) pipe diameters above the maximum liquid level of the unit, or shall be protected from back-siphonage by use of a vacuum breaker. The salt shall be supported on graduated layers of gravel under which is a suitable means of collecting the brine. Wet salt storage basins shall be equipped with manhole or hatchway openings having raised curbs and watertight covers having overhanging edges. Overflows, where provided, must be angled downward, have a proper free fall discharge and be protected with noncorrodible screens or self-closing flap valves.

(i) Storage Capacity - Wet salt storage basins shall have sufficient capacity to provide for at least three (3) days of operation.

(j) Corrosion Control - Corrosion control shall be provided.

(k) Waste Disposal - A suitable means of handling and disposal shall be provided for brine waste designed in accordance with 61-58.2(F).

(l) Construction Material - Pipes and contact materials shall be corrosion resistant.

(m) Housing - Salt storage tanks and feed equipment shall be enclosed.

(5) Aeration - Aeration treatment devices, as described herein, may be used for oxidation,

separation of gases or for taste and odor control. A separate air quality permit for the separation of gases from water by aeration may be necessary.

(a) General Requirements

(i) Sample taps must be provided following aeration equipment.

(ii) Where aeration equipment discharges directly to the distribution system, air release valves must be provided.

(b) Natural Draft Aeration - Design shall provide that:

(i) Water is distributed uniformly over the top tray;

(ii) Water is discharged through a series of three (3) or more trays with the separation of trays not less than twelve (12) inches;

(iii) Trays are loaded at a rate of one (1) gallon per minute to five (5) gallons per minutes for each square foot of total tray area;

(iv) Trays have slotted, woven wire cloth or perforated bottoms;

(v) Perforation are three sixteenth (3/16) to one-half (1/2) inches in diameter, spaced one (1) to three (3) inches on centers, when perforations are used in the distribution pan;

(vi) Construction of durable material resistant to the aggressiveness of the water and dissolved gases;

(vii) Protection of aerators from loss of spray water by wind carriage by enclosure with louvers sloped to the inside at an angle of approximately forty-five (45) degrees;

(viii) Protection from insects by number twenty-four (24) mesh screen; and,

(ix) Aerated water receives disinfection treatment.

(c) Forced or Induced Draft Aeration - Devices shall be designed to:

(i) Provide an adequate countercurrent of air through the enclosed aeration column;

(ii) Include a blower in a screened enclosure and with a watertight motor;

(iii) Exhaust air directly to the outside atmosphere;

(iv) Include a down-turned, number twenty-four (24) mesh screened air outlet and inlet;

(v) Be such that air introduced in the column shall be as free from noxious fumes, dust, and dirt as possible;

(vi) Be such that sections of the aerator can be easily reached or removed for

maintenance of the interior;

(vii) Provide loading at a rate of one (1) to five (5) gallons per minute for each square foot of total tray area;

(viii) Ensure that the water outlet is adequately sealed to prevent the unwarranted loss of air;

(ix) Discharge through a series of five (5) or more trays, with separation of trays not less than six (6) inches;

(x) Provide distribution of water uniformly over the top tray; and,

(xi) Be of a durable corrosion resistant material.

(d) Pressure Aeration - This method may be used for oxidation purposes if pilot plant study indicates method is applicable. It is not acceptable for removal of dissolved gases. Filters following pressure aeration shall have adequate exhaust devices for release of air. Pressure aeration devices shall be designed to give thorough mixing of compressed air with water being treated. Screened and filtered air, free of noxious fumes, dust, dirt and other contaminants shall be provided.

(e) Other Methods of Aeration - Other methods of aeration may be used if applicable to the treatment needs. Such methods may include, but are not restricted to, spraying, diffused air, cascades, and mechanical aeration. The treatment processes shall be designed to meet the particular needs of the water to be treated and shall be subject to Department approval.

(f) Protection from Contamination - Aerators that are used for oxidation or removal of dissolved gases from waters that will be given no further treatment other than chlorination shall be protected from contamination from insects and birds by a roof or similar structure.

(g) Disinfection - Groundwater supplies exposed to the atmosphere by aeration must receive chlorination as a minimum additional treatment.

(6) Iron and Manganese Control - Iron and manganese control, as used herein, refers solely to treatment processes designed specifically for this purpose.

(a) Removal by Oxidation, Detention and Filtration.

(i) Oxidation - Oxidation shall be by aeration or by chemical oxidation with chlorine, potassium permanganate, chlorine dioxide, ozone or other oxidant approved by the Department.

(ii) A minimum detention of twenty (20) minutes shall be provided following oxidation by aeration to ensure that the oxidation reactions are as complete as possible. This minimum detention shall be omitted only where a pilot plant study or an analogous system indicates no need for detention.

(iii) Sedimentation basins shall be provided when treating water with high iron and/or manganese content or where chemical coagulation is used to reduce the load on the filters.

(A) Detention time - Sedimentation basin design considerations and calculations shall include basin overflow rate, weir loading rate, flow through velocity and theoretical detention time.

(B) Inlet Devices - Inlets shall be designed to distribute water equally and at uniform velocities. The structures shall be designed so as to dissipate inlet velocities and provide uniform flows across the basin.

(C) Outlet Devices - Outlet devices shall be designed to maintain velocities suitable for settling in the basin and to minimize short circuiting.

(D) Velocity - The velocity through settling basins shall not exceed five tenths (0.5) of a foot per minute. The basins shall be designed to minimize short circuiting. Baffles shall be provided, as necessary.

(E) Overflow - An overflow weir (or pipe) shall be installed to establish water level in the basin.

(F) Sludge handling - Facilities are required by the Department for the disposal of sludge and shall be designed in accordance with R.61-58.2F. Provisions shall be made for the operator to observe and sample sludge being withdrawn from the unit.

(G) Washdown Hydrants - Washdown hydrants shall be provided and shall be equipped with backflow prevention devices acceptable to the Department.

(iv) Filtration - Filters shall conform to R.61-58.2(D)(1).

(b) Removal by Manganese Green Sand Filtration

(i) An anthracite media cap of at least six (6) inches shall be provided over manganese green sand.

(ii) The filtration rate will be dependent on the raw water quality and the type of filter used. It shall not exceed three (3) gallons per minute per square foot.

(iii) The backwash rate shall be sufficient to clean the bed.

(iv) Sample taps shall be provided prior to the application of permanganate; immediately ahead of filtration; at a point between the anthracite coal media and the manganese treated greensand; halfway down the manganese treated greensand; and at the effluent for each filter.

(v) A differential pressure gauge or separate inlet and outlet pressure gauges shall be provided to measure the loss of head through the unit.

(c) Removal by Ion Exchange - Iron removal with sodium zeolite ion exchange units shall not be approved without a pilot study addressing the efficiency of removal, an evaluation of the potential for bed fouling, and consideration of the corrosiveness of the treated water. The Ion Exchange process treatment shall be designed in accordance with

R.61-58.2(D)(4).

(d) Sequestration by phosphates - Where phosphate treatment is used, sufficient disinfectant residuals shall be maintained in the distribution system.

(i) Phosphates shall not be applied ahead of the filters in iron and manganese removal treatment. Where there is no removal treatment, the phosphate shall be added prior to any disinfection.

(ii) Phosphate chemicals shall meet the requirements of chemical additives in R.61-58.2(E)(3), including maximum feed rates.

(e) Sampling Taps - Smooth-nosed sampling taps shall be located on each source, each treatment unit influent and each treatment unit effluent.

(7) Fluoridation - Commercial sodium fluoride, sodium silicofluoride and hydrofluorosilic acid shall be NSF approved and shall conform to American Waterworks Association Standards B701, B702 and B703 respectively. Fluoride chemicals shall meet the requirements of chemical additives in R.61-58.2(E)(3). The proposed method of fluoride feed shall be approved by the Department prior to preparation of final plans and specifications.

(a) Fluoride Compound Storage - Dry chemical storage shall be designed in accordance with R.61-58.2(E)(2)(e). Storage units for hydrofluorosilic acid shall be isolated from operating areas and shall be vented to the atmosphere at a point outside any building.

(b) Injection Point - The fluoride compound shall not be added before ion exchange softening or before lime addition, to avoid precipitation of fluoride.

(c) Chemical Feed Installations - Fluoride feed systems shall meet the following criteria:

(i) Scales or loss-of-weight recorders for weighing the quantity of chemicals added shall be provided;

(ii) Feed equipment shall have an accuracy to within five (5) percent of any desired feed rate;

(iii) The point of application of hydrofluorosilic acid, if into a pipe, shall be in the lower half of the pipe and project upward at an angle approximately forty (40) degrees and extend into the pipe one-third of diameter; and,

(iv) All fluoride feed lines shall be provided with adequate antisiphon devices.

(v) All fluoride feed systems shall be equipped with a fail-safe system to prevent the continued feed of fluoride at times when there is no flow of water through the fluoride feed point.

(d) Protective equipment - At least one (1) pair of rubber gloves, a respirator of a type certified by the National Institute for Occupational Safety and Health for toxic dusts or acid gas (as necessary), an apron or other protective clothing, and goggles or face masks shall be provided for use by the operator. Other protective equipment may be required, as deemed necessary by the Department.

(e) Dust Control

(i) Provisions shall be made for the transfer of dry fluoride compounds from shipping containers to storage bins or hoppers in such a way as to minimize the quantity of fluoride dust which may enter the room in which the equipment is installed. The enclosure shall be provided with an exhaust fan and dust filter to the outside atmosphere of the building.

(ii) Provisions shall be made for disposing of empty bags, drums and barrels in a manner which will minimize exposure to fluoride dusts. A floor drain shall be provided to facilitate the washing of floors.

(8) Corrosion Control - Water that is corrosive due either to natural causes or to treatment given the water shall be rendered non-corrosive, and nonaggressive before being pumped to the distribution system.

(a) Alkali Feed - Corrosive water due to natural occurrence, or chemical exchange process shall be treated by an alkali feed. Alkali feed can consist of lime, soda ash, bicarbonate, caustic soda, or a combination of any of the above. Lime feed systems shall include a mechanism for flushing the feed lines, including suction and pumping equipment, if used.

(b) Phosphates - The feeding of phosphates may be applicable for corrosion control. Phosphate chemicals shall meet the requirements of chemical additives in R.61-58.2(E)(3).

(c) Carbon dioxide addition

(i) Recarbonation basin design shall provide:

(A) A total detention time of at least twenty (20) minutes.

(B) A minimum of two (2) compartments, consisting of a mixing compartment having a detention time of at least three (3) minutes, and a reaction compartment.

(ii) Carbon dioxide feed systems shall be isolated from the operating area and adequate precautions shall be taken to prevent the possibility of carbon monoxide entering the plant from recarbonation compartments.

(iii) Provisions shall be made for draining the recarbonation basin and removing sludge.

(d) Other Treatment - Other treatment for controlling corrosive waters will be considered on a case by case basis. All chemicals must meet the requirements in R.61-58.2(E)(3). Any proprietary compound must receive the specific approval of the Department before use.

(e) Control - Laboratory equipment, acceptable to the Department, shall be provided to test the compounds being fed.

(9) Taste and Odor Control - When necessary, provision shall be made for the addition of

taste and odor control chemicals. These chemicals shall be added sufficiently ahead of other treatment processes to ensure adequate contact time for an effective and economical use of the chemicals.

(a) Flexibility - Plants treating water that is known to have taste and odor problems shall be provided with equipment that makes several of the control processes available to allow the operator flexibility in operation.

(b) Chlorination - Chlorination can be used for the removal of some objectionable odors. Adequate contact time must be provided to complete the chemical reactions involved. Consideration shall be given to the formation of disinfection by-products if this method is used.

(c) Chlorine Dioxide - Chlorine dioxide may be used in the treatment of taste or odor. Provision shall be made for the proper storing and handling of sodium chlorite, so as to eliminate any danger of explosion. Consideration shall be given to the formation of disinfection by-products if this method is used.

(d) Granular Activated Carbon Absorption Units - Rates of flow shall be consistent with the type and intensity of the problem. The rate used shall be supported by the results of pilot plant studies and shall be in accordance with the requirements of R.61-58.2(D)(1).

(e) Aeration - Aeration units used for taste and odor removal shall be designed in accordance with R.61-58.2(D)(5).

(f) Potassium Permanganate - The application of potassium permanganate may be considered, provided that dosages are determined by permanganate demand testing.

(10) Membrane Technology - All applications for projects involving membrane technology must be preceded by an engineering report and may require a pilot study.

(a) Reverse Osmosis

(i) Pilot Study - The pilot study, where required, must determine or address the following items:

(A) Membrane loading rates including the most efficient percentage of recovery;

(B) What pre-treatment is needed including feed rates of any chemicals;

(C) Whether by-pass blending can be used and what the blending rate will be;

(D) The post treatment needs including what chemical additions will be necessary to make the finished water non-corrosive; and,

(E) The best type of membrane for the source water application.

(ii) General Design Requirements -

(A) A flow meter with totalizer must be provided for the permeate and the blend lines in each treatment train.

(B) Valves must be provided on the influent, permeate, reject, and cleaning lines for each unit.

(C) Pressure gauges must be provided on the influent and permeate lines for each unit for measurement of head loss.

(D) Sample taps must be provided for the permeate, blended product, and finished water.

(E) Monitoring equipment must be provided to measure pH, conductivity, temperature, turbidity, and any specific contaminants for which treatment is being provided.

(F) Disposal of concentrate and cleaning solutions must be approved by the Department.

(iii) Reverse Osmosis Membrane Material -

(A) Membrane material used in public water systems shall be certified as meeting the specification of the American National Standards Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

(B) Loading rates must be determined by pilot testing and manufacturers recommendations.

(iv) Scale Inhibitors and Cleaning Solutions - Scale inhibitors and cleaning solutions must meet the requirements of chemical additives in R.61-58.2(E)(3).

(v) Post-Treatment -

(A) Continuous disinfection must be employed on the permeate or on the blended effluent from the treatment units.

(B) Treatment shall be employed to render the finished water non-corrosive.

(b) Electrodialysis Reversal - Electrodialysis reversal treatment shall not be used on surface water or groundwater under the direct influence of surface water unless the requirements of R.61-58.10 are otherwise met.

(i) Pretreatment - Pretreatment must be used to protect the membrane from fouling. Media filtration used in pretreatment must be designed in accordance with R.61-58.2(D)(1). Degassification must be designed in accordance with R.61-58.2(D)(5).

(ii) Pilot Study - The pilot study must determine or address the following items:

(A) Membrane loading rates including the most efficient percentage of recovery;

(B) What pre-treatment is needed including feed rates of any chemicals;

(C) Whether by-pass blending can be used and what the blending rate will be;

(D) The post treatment needs, including what chemical additions will be necessary to make the finished water non-corrosive; and,

(E) The best type of membrane for the source water application.

(iii) General Design Requirements -

(A) A gallon meter with totalizer must be provided for the product water and the blend lines in each treatment train.

(B) Valves must be provided on the influent, product water, reject, and cleaning lines for each unit.

(C) Electric volt and current meters must be provided to measure the electric potential across each unit.

(D) Pressure gauges must be provided on the influent and product lines for each unit for measurement of head loss.

(E) Sample taps must be provided for the product, blended water, and finished water.

(F) Monitoring equipment must be provided to measure pH, conductivity, temperature, turbidity, and any specific contaminants for which treatment is being provided.

(G) Disposal of concentrate and cleaning solutions must be approved by the Department.

(iv) Electrodialysis Reversal Membrane Material -

(A) Membrane material used in public water systems shall be certified as meeting the specification of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

(B) Loading rates must be determined by pilot testing and manufacturers recommendations.

(v) Scale Inhibitors and Cleaning Solutions - Scale inhibitors and cleaning solutions must meet the requirements of chemical additives in R.61-58.2(E)(3).

(vi) Post-Treatment -

(A) Continuous disinfection must be employed on the product water

or on the blended effluent from the treatment units.

(B) Treatment shall be employed to render the finished water non-corrosive.

E. Chemical Application.

(1) General - No chemical shall be applied to treat drinking waters unless specifically permitted by the Department. A certified operator is required whenever the chemical or physical characteristics of the water is changed.

(a) Plans and specifications - Plans and specifications shall be submitted for review and approval, as required by in R.61-58.1, and shall include:

(i) Descriptions of feed equipment, including maximum and minimum feed ranges and pump curves for solution feeders,

(ii) Location of feeders, piping layout and points of chemical application,

(iii) Storage and handling facilities;

(iv) Specification for chemicals to be used;

(v) Operating and control procedures including proposed application rates;

(vi) Descriptions of testing equipment and procedures; and,

(vii) Locations of sampling taps for testing.

(b) Chemical application - Chemicals shall be applied to the water at such points and by such means as to:

(i) Provide maximum efficiency of treatment;

(ii) Ensure maximum safety to consumer;

(iii) Provide maximum safety to operators;

(iv) Ensure satisfactory mixing of the chemicals with the water;

(v) Provide maximum flexibility of operation through various points of application, when appropriate;

(vi) Prevent backflow or back-siphonage between multiple points of feed through the use of separate feed equipment for each point and backflow preventers where a manifold system is used for standby, multiple feed use;

(vii) Not be located upstream of the metering device when the chemical in consideration will interfere with the flow measurement;

(viii) Provide a separate injection point and a separate feed line for each chemical application that is added and, spacing to prevent inter-reaction of chemicals; and,

(ix) Provide chemical injection points which are readily accessible. All below-grade injection points shall be housed in a vault or similar structure.

(c) General equipment design - General equipment design shall be such that:

(i) Chemical-contact materials and surfaces are corrosion resistant;

(ii) Corrosive chemicals are introduced in such a manner as to minimize potential for corrosion; and,

(iii) Chemicals that are incompatible are not fed, stored or handled together.

(2) Facility Design

(a) Chemical feeders -

(i) A separate feeder shall be used for each separate chemical applied, and for each injection point.

(ii) Spare parts shall be available for all feeders to replace parts which are subject to wear and damage.

(iii) Dry chemical feeders shall:

(A) Measure chemicals volumetrically or gravimetrically;

(B) Provide adequate solution water and agitation of the chemical in the solution pot;

(C) Provide gravity feed from solution pots; and,

(D) Completely enclose chemicals to prevent emission of dust to the operating room.

(iv) Chemical feed equipment, where necessary, shall be located in a separate room to reduce hazards and dust problems; shall be conveniently located near points of application to minimize length of feed lines; and, shall be readily accessible for servicing, repair, and observation of operation.

(v) Feeders shall be able to supply, at all times, the necessary amounts of chemicals at an accurate rate;

(b) Control -

(i) Feeders with automatic controls shall be designed so as to allow override by manual controls.

(ii) Chemical feed rates shall be proportional to flow.

(iii) Meters, scales, calibration columns, or other acceptable means to measure chemicals being fed must be provided in order to determine chemical feed rates.

(iv) Provisions shall be made for measuring the quantities of chemicals used.

(c) Cross-connection control -

(i) Cross-connection control shall be provided to ensure that liquid chemical solutions cannot be siphoned through solution feeders into the water supply.

(ii) The service water lines discharging to the solution tanks shall be properly protected from backflow as required by the Department.

(iii) No direct connection shall exist between any sewer and a drain or overflow from the feeder, solution chamber or tank. All drains shall terminate at least six (6) inches or two (2) pipe diameters, whichever is greater, above the overflow rim of a receiving sump, conduit or waste receptacle.

(d) Service water supply shall be ample in supply and adequate in pressure; shall be provided with means for measurement when preparing specific solution concentrations by dilution; shall be properly treated potable water; and shall be properly protected against backflow.

(e) Storage of chemicals -

(i) Space shall be provided for at least three (3) days of chemical supply and provide for convenient, efficient and safe handling of chemicals. Dry storage conditions must be maintained for dry chemicals.

(ii) Storage tanks and pipelines for liquid chemicals shall be designed specifically for each chemical used.

(iii) Chemicals shall be stored in covered or unopened shipping containers, unless the chemical is transferred into an approved covered storage unit.

(f) Solution tanks -

(i) A means which is consistent with the nature of the chemical solution shall be provided in a solution tank to maintain a uniform strength of solution. Continuous agitation shall be provided to maintain slurries in suspension.

(ii) Means shall be provided to measure the solution level in the tank.

(iii) Chemical solutions shall be kept covered. Large tanks with access openings shall have such openings curbed and fitted with tight overhanging covers.

(iv) Overflow pipes, when provided, shall:

(A) Be turned downward, with the end screened;

(B) Have an air gap of two (2) pipe diameters or six (6) inches, whichever is greater; and,

(C) Be located where noticeable.

(v) Acid storage tanks shall be vented independently to the outside atmosphere.

(vi) Each tank shall be provided with a valved drain, protected against backflow in accordance with R.61-58.2(E)(2)(c)(iii).

(g) Feed lines -

(i) Feed lines shall be as short as possible in length of run, and of durable, corrosion resistant material. They shall be easily accessible throughout the entire length, protected against freezing, and readily cleanable;

(ii) Feed lines shall be designed consistent with scale-forming or solids depositing properties of the water, chemical, solution or mixture conveyed;

(iii) Feed lines shall be color coded and labeled; and,

(iv) Where lime is added, a spare feed line equal in length to the longest run of feed line, shall be provided.

(h) Handling -

(i) Provisions shall be made for disposing of empty bags, drums or barrels by an approved procedure which will minimize exposure to dust.

(ii) Provision shall be made for the proper transfer of dry chemicals from shipping containers to storage bins or hoppers, in such a way as to minimize the quantity of dust which may enter the room in which the equipment is installed.

(iii) Provision shall be made for measuring quantities of chemicals used to prepare feed solutions.

(i) Housing -

(i) Floor surfaces shall be smooth, impervious, slip-proof and well-drained.

(ii) Vents from feeders, storage facilities and equipment exhaust shall discharge to the outside atmosphere above grade and remote from air intakes.

(iii) Feeders used in conjunction with dry lime or carbon shall be housed in separate, individual rooms equipped with dust control systems.

(iv) Sufficient lighting for operator safety and sufficient heating to provide for proper operation of the chemical feed equipment shall be provided for all chemical feed rooms.

(3) Chemicals Specifications - All chemicals and products added to a public water supply as part of the treatment process shall be certified as meeting the specifications of the American National Standards Institute/National Sanitation Foundation Standard 60, Drinking Water Treatment Chemicals - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

F. Waste Handling and Disposal.

Waste handling and disposal practices shall meet all applicable rules and regulations of the Department. Provisions must be made for proper disposal of treatment waste such as iron sludge, filter backwash water, and brine waste. In locating waste disposal facilities, due consideration shall be given to preventing potential contamination of the water supply. For projects involving a surface water discharge of treatment residuals, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained from the Department. For projects involving land application of treatment residuals, a No Discharge (ND) permit must be obtained from the Department.

## R.61-58.3 SURFACE WATER SOURCES AND TREATMENT

A. Applicability.

This regulation applies to all new construction and all expansions or modifications of existing public water systems. If the Department can reasonably demonstrate that safe delivery of potable water to the public is jeopardized, a system may have to upgrade its existing facilities in order for an expansion or modification to meet the requirements of this regulation. This regulation prescribes minimum design standards for the construction of surface water intakes and treatment plants.

B. Surface Water Development.

(1) Quantity - Where the proposed source is to be the only source of water for the system , the quantity of water at the source shall:

(a) be adequate to meet the projected maximum daily water demand of the service area. For streams, the calculations shall be based on the lowest mean daily flow for the drought of record. For withdrawals from reservoirs, the calculation shall be based on the drought of record and shall also include requirements for other water uses in the reservoir and downstream;

(b) provide a reasonable surplus for twenty (20) years of anticipated growth;

(c) be adequate to compensate for all losses such as silting, evaporation, seepage, etc. and;

(2) Quality - An engineering evaluation shall be made considering all factors, both natural and man made, which will affect the quality of the source water. The evaluation shall include, but not be limited to:

(a) determining possible future uses of impoundments or reservoirs;

(b) determining degree of control of watershed by owner;

(c) assessing degree of hazard to the source from the accidental spillage of materials that may be toxic, harmful or detrimental to treatment processes;

(d) obtaining samples over a sufficient period of time to assess the microbiological, physical, chemical and radiological characteristics of the water;

(e) assessing the capability of the proposed treatment process to comply with the drinking water standards set forth in the Act and under R.61-58.5 , R.61-58.10, and R.61-58.13.

(3) Intake Structures - The design of intake structures shall provide for:

(a) withdrawal of water from more than one level if quality varies with depth;

(b) separate facilities for release of less desirable water held in storage;

(c) capability for the cleaning of the inlet line;

(d) adequate protection against rupture by dragging anchors, etc.;

(e) inlet ports located above the bottom of the stream, lake or impoundment, but at sufficient depth to be kept submerged at low water levels;

(f) where shore wells are not provided, a diversion device capable of keeping large quantities of fish or debris from entering an intake structure;

(g) screens or gratings over the inlet to protect the pumps;

(h) a means for periodic cleaning of the screens or gratings;

(i) shore wells where necessary, which shall:

(i) have motors and electrical controls located above grade, and protected from flooding;

(ii) be accessible;

(iii) be designed against flotation;

(iv) be equipped with removable or traveling screens before the pump suction well;

(v) provide for introduction of chlorine or other chemicals in the raw water transmission main if necessary for quality control;

(vi) have intake valves and provisions for backflushing or cleaning by a mechanical device and testing for leaks, where practical; and,

(vii) have provisions for withstanding surges where necessary.

(4) Off-Stream Storage

(a) Reservoirs shall be constructed to ensure that water quality is protected by controlling runoff into the reservoir.

(b) Dikes must be structurally sound, constructed of low permeability material and protected against wind action and erosion. Vegetation and other unsuitable materials shall be removed from the dikes. Minimum dike width shall be eight (8) feet at the crest.

(c) The point of influent flow must be separated from the point of withdrawal to ensure turnover.

(5) Impoundments and Reservoirs - Unless specifically approved by the Department, the design of impoundments and reservoirs shall provide for:

(a) removal of brush, trees, and stumps to high water elevation;

(b) proper erosion control measures during construction; and,

(c) abandonment of all wells which will be inundated, in accordance with R.61-58.2(B)(15).

(6) Raw Water Pumping Facilities

(a) The facility shall be elevated to a minimum of one (1) foot above the one hundred (100) year flood elevation, or protected to such elevation, shall be readily accessible at all times unless permitted to be out of service for the period of inaccessibility, shall be graded around the station so as to lead surface drainage away from the station, and shall be protected to prevent vandalism and entrance by animals and unauthorized persons.

(b) The facility shall have adequate space for the installation of additional units if needed, and for the safe servicing of all equipment. The facility shall also be of durable construction, fire and weather resistant and with outward-opening doors.

(c) Pumping Equipment -

(i) At least two (2) pumping units shall be provided. The pumping facility shall be sized adequately to supply the full plant capacity with any pump out of service. The pumping units shall:

(A) Be driven by a prime mover able to operate against the maximum head and air temperature which may be encountered;

(B) Have spare parts and tools readily available, and,

(C) Be equipped with elapsed time hour meters for each pump or another acceptable mechanism to monitor run times.

(D) Be sized to operate from minimum to maximum pumping conditions without overloading the motor.

(ii) Suction lift shall be within allowable limits, preferably less than fifteen (15) feet and should be avoided if possible. If suction lift is necessary, provision shall be made for priming the pumps.

(iii) Prime water must not be of lesser sanitary quality than that of the water being pumped. Means shall be provided to prevent back-siphonage. When an air-operated ejector is used, the screened intake shall draw clean air from a point at least ten (10) feet above the ground or other source of possible contamination, unless the air is filtered by an apparatus approved by the Department. Vacuum priming may be used.

(iv) For pumps designed so that bearing lubrication fluids come into contact with the water being pumped, only water lubricated pumps may be used unless otherwise approved by the Department.

(d) Equipment Servicing - Pump facilities shall be designed so that proper maintenance of the equipment can be provided.

(e) Operator Access - Pump facilities shall be designed for easy access by stairs or ladders when necessary.

(f) Heating - In pump houses not occupied by personnel, only enough heat need be provided to prevent freezing of equipment or treatment process.

(g) Ventilation - Ventilation shall conform to existing local, federal, and/or state codes. Adequate ventilation shall be provided for all pumping stations.

(h) Lighting - The facility shall be adequately lighted throughout. All electrical work shall conform to the requirements of the National Electric Code or applicable state and local codes.

(i) Water Seals - Water seals shall not be supplied with water of a lesser sanitary quality than that of the water being pumped. Where pumps are sealed with potable water and are pumping water of lesser sanitary quality the seal shall be provided with a break tank or back-flow preventer. If a break tank is used, it shall be open to atmospheric pressure, have an air gap of at least six (6) inches or two (2) pipe diameters, whichever is greater, and be installed between the feeder line and the spill line of the tank. Where a back-flow preventer is used, it shall be a reduced pressure principle back-flow type installed in the feed line.

(j) Controls - Pumps, their prime movers and accessories, shall be controlled in such a manner that they will operate at rated capacity without dangerous overload. Where two or more pumps are installed, provision shall be made for alternation. Provision shall be made to prevent energizing the motor in the event of a backspin cycle. Electrical controls shall be located above grade.

(k) Water Pre-lubrication - When automatic pre-lubrication of pump bearings is necessary and an auxiliary power supply is provided, the pre-lubrication line shall be provided with a valved bypass around the automatic control so that the bearings can, if necessary, be lubricated manually before the pump is started.

C. General Design Requirements.

(1) Plant Layout - Design shall provide for adequate access roads, site drainage, protection of basins from spillage (including during delivery of chemical shipments), and adequate protection from vandalism. Consideration shall also be given to functional aspects of the plant layout and future expansion.

(2) Building layout - Design shall provide for adequate ventilation, lighting, telephone service, heating and air conditioning, floor drainage, and, if necessary, dehumidification equipment. Consideration shall also be given to accessibility of equipment for operation, servicing, and removal, telephone communication capability, flexibility of operation, operator safety, and convenience of operation (filters, basins, etc. visible to the operator).

(3) Electrical controls - Main switch gear electrical controls shall be located above grade and be protected from standing water.

(4) Auxiliary Power - Where elevated storage equals less than one half maximum daily demand, portable or in-place auxiliary power shall be provided for all systems serving three hundred (300) or more service connections. An air quality permit may be required for the emissions from the auxiliary generators. Auxiliary power requirements may be waived if one or more of the following are applicable:

(a) A verifiable history of worst case power outages and verification that the available elevated storage can provide for a similar time period of outage.

(b) Two (2) or more independent sources from the serving electrical utility are available. or,

(c) An alternate water source is available via connections with other systems.

Auxiliary power shall be sized to provide for sufficient pumping and treatment capacity to meet one half (1/2) of the maximum daily demand or to supplement the existing storage to meet one half (1/2) of the maximum daily demand.

(5) Sample taps - Sample taps shall be provided so that representative water samples can be obtained from:

(a) each raw water source;

(b) appropriate locations throughout the treatment process so that the operator can maintain proper control of the treatment process;

(c) effluent from each filter and the combined filter effluent prior to any post chemical addition; and,

(d) the entry point(s) to the distribution system.

Taps shall be consistent with sampling needs and shall not be of the petcock type. Taps used for obtaining samples for bacteriological analysis shall be of the smooth-nosed type without interior or exterior threads. Taps shall not be of the mixing type, and shall not have a screen, aerator, or other such appurtenances.

(6) Monitoring Equipment

(a) Complete bacteriological and wet chemistry testing equipment is required for all surface water plants for daily monitoring of raw, coagulated, settled, filtered and finished water quality.

(b) Laboratory equipment and facilities shall be compatible with the raw water source, the intended use of the treatment plant and the complexity of the treatment process involved. Plants treating surface water shall have as a minimum the capability to monitor turbidity, appropriate disinfectant residual, pH, temperature, alkalinity, calcium hardness, and if added, fluoride, total phosphate or orthophosphate and silica.

(7) Plant Water - The treatment plant water service line and the plant finished water sample tap shall be supplied from a source of finished water at a point where all chemicals have been thoroughly mixed.

(8) Wall Castings - Consideration shall be given to providing extra wall castings built into the structure to facilitate future uses whenever pipes pass through walls of concrete structures.

(9) Flow Meters - Flow meters shall be provided for measuring raw and finished water, all backwash water, and where deemed necessary, other internal water uses at all surface water plants. Meters shall measure an instantaneous flow and have the capability to measure totalized flow.

(10) Piping Identification - To facilitate identification of piping in treatment plants and pumping stations, all pipes shall be color coded and marked with the name of the liquid or gas being carried and its direction of flow.

(11) Proprietary Treatment Units/ Innovative Treatment Techniques - Proprietary treatment

units and alternative treatment technology may be considered if pilot tests demonstrate the ability of the technology to provide water which meets all drinking water standards utilizing the proposed raw water source. If the plant is permitted at rates which exceed the unit process rates specified in R.61-58.3(D), the system shall submit operating data within eighteen (18) months which justify continued operation at the higher rates. From the review of these data, the Department may revise the permitted treatment rate.

(12) Manuals and Parts Lists - An operation and maintenance manual shall be provided for each treatment plant. This manual shall, at a minimum, include repair information, parts lists for each piece of equipment, and procedures for the start up and shut down of the plant including all necessary chemical treatment systems.

(13) Safety - All design must meet applicable safety codes and minimum Occupational Safety and Health Administration (OSHA) standards.

D. Surface Water Treatment.

(1) Presedimentation - Presedimentation basins, where used, shall be designed such that:

(a) incoming water is dispersed across the full width of the line of travel;

(b) short circuiting shall be prevented; and,

(c) provisions for bypassing presedimentation basins are included.

(2) Conventional Sedimentation

(a) Rapid Mix - The rapid mix shall be designed so as to ensure the rapid dispersion of chemicals throughout the water to be treated.

(i) Mechanical Mixer - The mechanical mixer shall have sufficient horsepower to provide adequate dispersion of treatment chemicals and be equipped with variable speed drive.

(ii) Location - The rapid mix and flocculation basins shall be as close together as possible.

(iii) In-line mixers must be specifically approved by the Department, and shall be designed based on manufacturers recommendation and studies using the raw water source. In-line mixers shall be accessible without excavation.

(iv) A by-pass around the rapid mix or in-line mixers is prohibited.

(b) Flocculation - A minimum of two (2) parallel flocculation basins are required.

(i) Conventional Basin Design - Inlet and outlet design shall prevent short circuiting and destruction of floc. A drain or pumps shall be provided to handle de-watering and sludge removal.

(ii) Detention - The flow through velocity shall not be less than five tenths (0.5) nor greater than one and one half (1.5) feet per minute with detention time for floc formation of at least thirty (30) minutes.

(iii) Equipment - Multi-stage agitators shall be provided. The velocity

gradient (G) shall decrease with each stage. G values shall be in the range of five (5) to one hundred (100) second $^{-1}$.

(iv) Piping - Flocculation and sedimentation basins shall be as close together as possible. The velocity of flocculated water through pipes and conduits to settling basins shall not be less than five tenths (0.5) nor greater than one and one half (1.5) feet per second. Allowances shall be made to minimize turbulence at bends and changes in direction

(v) Other designs - Baffling may be used to provide flocculation in small plants only after consultation with the Department. The design shall be such that the velocities and flows noted above will be maintained.

(c) Sedimentation - A minimum of two (2) sedimentation basins are required.

(i) Detention time - Sedimentation basin design considerations and calculations shall include basin overflow rate, weir loading rate, flow through velocity and theoretical detention time. For conventional sedimentation basins with detention times of less than four (4) hours, an acceptable alternate basis for design must be provided and must be approved by the Department.

(ii) Inlet Devices - Inlets shall be designed to distribute water equally and at uniform velocities. The structures shall be designed so as to dissipate inlet velocities and provide uniform flows across the basin.

(iii) Outlet Devices - Outlet devices shall be designed to maintain velocities suitable for settling in the basin and to minimize short circuiting.

(iv) Outlet Flow Rate - The approach velocity at the outlet weir shall be such that the resuspension of floc is minimized.

(v) Velocity - The velocity through settling basins shall not exceed five tenths (0.5) of a foot per minute, except as specifically approved by the Department. The basins shall be designed to minimize short circuiting. Baffles shall be provided, as necessary.

(vi) Overflow - An overflow weir (or pipe) shall be installed which will establish the maximum water level desired on top of the filters. It shall overflow at a location observable to the operator.

(vii) Drainage - Basins shall be provided with the means for draining, either by gravity or pumps. The amount of time required to drain the basin shall not be such that it interferes with plant operation.

(viii) Sludge handling - Facilities are required by the Department for the disposal of sludge and shall be designed in accordance with R.61-58.3(F). Provisions shall be made for the operator to observe and sample sludge being withdrawn from the basin.

(ix) Washdown Hydrants - Washdown hydrants shall be provided and shall be equipped with backflow prevention devices acceptable to the Department.

(3) Solids Contact Clarification - A minimum of two (2) solids contact units are required

unless continuous sludge withdrawal is provided.

(a) Chemical Feed - Chemicals shall be applied at such points and by such means as to ensure satisfactory mixing of the chemicals with the water.

(b) Mixing - Rapid mix device or chamber ahead of the solids contact unit may be required by the Department to assure proper mixing of the chemicals applied. Mixing devices employed shall be so constructed as to provide adequate mixing of the raw water with previously formed sludge particles, and prevent deposition of solids in the mixing zone.

(c) Flocculation - Flocculation Equipment shall:

(i) have variable speed drive;

(ii) provide for coagulation to occur in a separate chamber or baffled zone within the unit; and,

(iii) provide the flocculation and mixing period to be not less than thirty (30) minutes, except as approved by the Department.

(d) Sludge removal - Sludge removal design shall provide that:

(i) sludge pipes shall not be less than three (3) inches in diameter and shall be arranged so as to facilitate cleaning;

(ii) entrance to sludge withdrawal piping shall be designed to prevent clogging;

(iii) valves shall be located outside the tank for accessibility;

(iv) the operator may observe and sample sludge being withdrawn from the unit; and,

(v) blowdown processes are automated.

(e) Sludge handling - Facilities are required by the Department for the disposal of sludge and shall be designed in accordance with R.61-58.3(F).

(f) Cross-connections

(i) Blow off outlets and drains shall terminate with proper air gap discharge at a location satisfactory to the Department.

(ii) Cross-connection control shall be included for the potable water lines used to backflush sludge lines.

(g) Detention time - The detention time shall be established on the basis of raw water characteristics and other local conditions that affect the operation of the unit.

Design considerations and calculations shall include theoretical detention time, weir loading rate, and surface loading rate.

(h) Weirs or orifices - The units shall be equipped with either overflow weirs or orifices.

(i) Weirs shall be adjustable, and at least equivalent in length to the perimeter of the tank. They shall be constructed so that water at the surface does not travel over ten (10) feet horizontally to the collection trough.

(ii) Weir loading shall not exceed fifteen (15) gallons per minute per foot of weir length for units used for softeners or clarifiers removing heavy alum floc (high turbidity raw water), or ten (10) gallons per minute per foot of weir length for units used for clarifiers removing light alum floc (low turbidity raw water).

(iii) Weirs or orifices shall produce uniform rising rates over the entire area of the tank.

(iv) Where orifices are used, the loading per foot shall be equivalent to specified weir loadings.

(i) Overflow rates - Unless supporting data is submitted to the Department the following rates shall not be exceeded:

(i) One and seventy-five hundredths (1.75) gallons per minute per square foot of area at the slurry separation line, for units used for softeners; and,

(ii) One (1.0) gallon per minute per square foot of area at the sludge separation line for units used for turbidity removal.

(4) Tube or Plate Settlers - Pilot test data is required prior to approval of settler units. The pilot tests must demonstrate that the unit is capable of treating the source water to comply with all drinking water standards during the worst conditions of raw water quality.

(a) Inlet and outlet considerations - Inlet and outlet devices shall be designed such that proper settling velocities are maintained and short circuiting is minimized.

(b) Drainage - Drain piping from the settler units shall be sized to facilitate a quick flush of the settler units, and to prevent flooding of the other portions of the plant.

(c) Application rate for tubes - A maximum rate of two (2) gallons per minute per square foot of cross-sectional area is allowed for tube settlers, unless pilot or full scale demonstration testing indicate that higher rates do not adversely affect water quality.

(d) Application rates for plates - A maximum plate loading rate of five tenths (0.5) gallons per minute per square foot, based on eighty (80) percent of the projected horizontal plate area is allowed, unless pilot or full scale demonstration testing indicate that higher rates do not adversely affect water quality.

(e) Flushing lines - Flushing lines shall be provided to facilitate maintenance, and shall be properly protected against backflow and back siphonage.

(5) Filtration - The following criteria applies to both conventional down-flow filters and to up-flow filters. All filters treating surface water must meet the performance standards set forth in R.61-58.10(E).

The application of any one type of filtration must be supported by water quality data representing a reasonable period of time to characterize the variations in water quality. Experimental treatment studies may be required to demonstrate the applicability of the method of filtration proposed. The maximum loss of head should be designed to occur at the point of terminal filter turbidity increase.

(a) Rapid Rate Gravity Filters

(i) Pretreatment - The use of rapid rate gravity filters shall require pretreatment.

(ii) Number - At least two (2) units shall be provided. Provisions shall be made to assure continuity of service with a filter unit temporarily removed from operation. The plant shall be designed so that the design filtration rate is not exceeded during backwash operations. In addition, provisions shall be made so that hydraulic surges through the filters are minimized during flow rate changes and when filters are removed from service for backwashing.

(iii) Rate of Filtration - The rate of filtration shall be determined through considerations of such factors as the quality of the raw water, the degree of pretreatment provided, the filter media provided and other considerations required by the Department. The nominal rate shall be four (4) gallons per minute per square foot of filter area except as higher rates are justified by the professional engineer to the satisfaction of the Department.

(iv) Structural Details and hydraulics - The filter structure shall be designed to provide:

(A) vertical walls within the filter;

(B) no protrusion of the filter walls into the filter media;

(C) head room to permit normal inspection and operation;

(D) access to at least fifty (50) percent of the perimeter.

(E) minimum depth of filter of eight and one half (8-1/2) feet measured from the top of the underdrain to the top of the filter bay;

(F) If a filter is designed to operate to a specified loss of head then the filter shall be designed with that water level or greater above the surface of the filter media;

(G) trapped effluent to prevent backflow of air to the bottom of the filters;

(H) prevention of floor drainage to the filter with a minimum four (4) inch curb around the filters;

(I) maximum influent velocity of treated water in pipes and conduits to filters of two (2) feet per second;

(J) cleanouts and straight alignment for influent pipes or conduits where solids loading is heavy, or following lime-soda softening;

(K) washwater drain capacity to carry maximum backwash flow;

(L) walkways around filters, to be not less than twenty-four (24) inches wide;

(M) safety handrails or walls around filter areas adjacent to walkways; and,

(N) no roof drainage into the filter or basins and conduits preceding the filters.

(v) Washwater Troughs - Washwater troughs shall be designed to provide:

(A) the bottom elevation of the trough must be above the maximum level of expanded media during washing;

(B) a two (2) inch freeboard at the maximum rate of wash;

(C) the top or edge to be level;

(D) spacing so that each trough serves the same number of square feet of filter area; and,

(E) maximum horizontal travel of suspended particles to reach trough not to exceed three (3) feet.

(vi) Filter Material - One or more of the following filter media shall be used and shall have a depth of at least thirty (30) inches.

(A) Anthracite - Clean crushed anthracite, or a combination of anthracite and other media may be considered. If used alone, the anthracite shall have an effective size of 0.45 millimeters to 0.7 millimeters and a uniformity coefficient of not less than 1.3 nor greater than 1.65. If used in conjunction with sand or other media, the anthracite shall have an effective size of 0.45 millimeters to 1.2 millimeters and a uniformity coefficient of not less than 1.3 nor greater than 1.85.

(B) Sand Media - Sand media shall have an effective size of 0.45 millimeters to 0.55 millimeters, and a uniformity coefficient of not less than 1.3 nor greater than 1.65.

(C) Granular Activated Carbon - Use of granular activated carbon media, if used alone, may be considered only with approval of the Department, and must meet the requirements for anthracite media. There shall be provision for a free chlorine residual in the water following the filters and prior to distribution. There must be a means for periodic treatment of filter material for control of bacteria and other growths, and there must be provisions for testing, regeneration, and periodic replacement of the carbon.

(D) Torpedo Sand - A three (3) inch layer of torpedo sand shall be used as a supporting media for the filter sand. Such torpedo sand shall

have an effective size of 0.8 millimeters to 2.0 millimeters, and a uniformity coefficient not less than 1.3 nor greater than 1.7 millimeters.

(E) Gravel - Gravel, when used as the supporting media, shall consist of hard, rounded particles and shall not include flat or elongated particles. The coarsest gravel shall be 2.5 inches in size when the gravel rests directly on the strainer system, and shall extend above the top of the perforated laterals or strainer nozzles. The size and depth of gravel required is dependent upon the type of underdrain used. Size and depth of gravel required when using proprietary filter bottoms shall be in accordance with the manufactures recommendations.

(F) Other Filter Media Design - Other filter media design will be considered based on pilot test data and operating experience.

(vii) Filter Bottoms and Strainer Systems

(A) All filter bottom and strainer systems shall be designed to ensure both an even distribution of washwater with minimum head loss and a uniform rate of filtration.

(B) The design of manifold type collection systems shall be to provide the ratio of the area of the final openings of the strainer system to the area of the filter of 0.003; provide the total cross-sectional area of the laterals of twice the total area of the final openings; and provide the cross-sectional area of the manifold at one and one half (1.5) to two (2) times the total area of the laterals.

(C) Proprietary bottoms shall be permanently grouted or fastened in place.

(D) Porous plate bottoms shall not be used where iron or manganese may clog them or with waters treated with lime prior to filtration.

(viii) Surface Wash or Subsurface Wash - Surface wash or subsurface wash facilities shall be required for all filters treating surface water, unless an air scouring system is provided, and may be accomplished by a system of fixed nozzles or a revolving type apparatus. All surface wash or subsurface wash devices shall be designed with:

(A) provisions for water pressures of at least forty-five (45) pounds per square inch;

(B) a properly installed vacuum breaker or other approved device to prevent back siphonage; and,

(C) a rate of flow of two (2) gallons per minute per square foot of filter area with fixed nozzles or one half (0.5) gallons per minute per square foot with revolving arms.

(ix) Air Scouring - Air scouring may be used in lieu of or in conjunction with surface or subsurface wash, and is recommended for filtration rates greater than four (4) gallons per minute per square foot. The air scouring system shall be

designed such that:

(A) air flow shall be three (3) to five (5) standard cubic feet per minute per square foot of filter area when the air is introduced in the underdrain; a lower rate must be used when the air scour distribution system is placed above the underdrain;

(B) excessive loss of filter media during backwashing is avoided;

(C) it is followed by a fluidization wash which is sufficient to restatify the media;

(D) the air supply remains free from contamination;

(E) clogging of the air scour nozzles and the entering of the media into the air scour distribution system is avoided;

(F) air delivery piping does not pass down through the filter media; and,

(G) regular maintenance and/or replacement of the air delivery piping may be performed.

(x) Appurtenances - Each filter shall have:

(A) sampling taps for filtered water, backwash water and rewash water;

(B) an indicating loss of head gauge;

(C) indicating flow rate control. Equipment that simply maintains a constant water level on the filters is not acceptable, unless the rate of flow onto the filter is properly controlled;

(D) provisions for filtering water to waste with a properly installed vacuum breaker or other approved device for backflow prevention;

(E) continuous recording device or computer data for loss of head and rate of flow instrumentation; and,

(F) continuous turbidity monitoring equipment for raw and settled water. Each filter shall be equipped with a continuous, on-line turbidimeter. The filter effluent turbidimeters shall be nephelometric type and equipped with alarms to be set to enunciate at five tenths (0.50) nephelometric turbidity units. Continuous recorders or computer data which record at no greater than fifteen (15) minute intervals are required for each unit.

(xi) Backwash - Provisions shall be made for washing filters as follows:

(A) A minimum rate of fifteen (15) gallons per square foot per minute, consistent with water temperatures and specific gravity of the filter media or a rate necessary to provide for a fifty (50) percent

expansion of the filter bed is required.

(B) Filtered water shall be provided at the required rate by washwater tanks, a washwater pump, from the high service main, a combination of these, or by other means acceptable to the Department;

(C) Washwater pumps in duplicate are required unless an alternate means of obtaining washwater is available;

(D) Capacity for at least twenty (20) minute wash of one filter is required at the design rate of wash;

(E) A washwater regulator or valve on the main washwater line to obtain the desired rate of filter wash with the washwater valves on the individual filters open wide;

(F) A rate-of-flow indicator, preferably with a totalizer, is required on the main washwater line, and shall be located so that it can be easily read by the operator during the washing process;

(G) The design shall prevent rapid changes in backwash water flow; and,

(H) A treatment of filter backwash designed in accordance with R.61-58.3 (F) shall be provided.

(b) High Rate Gravity Filters - No rates above four (4) gallons per minute per square foot will be considered without full scale pilot tests of at least twelve (12) month duration. High rate approval will not be considered for a plant with a flashy raw water source unless adequate off-stream storage is provided. High rate approval for existing plants requires an engineering evaluation and will be approved only where a sufficient number of experienced and qualified operators are employed. Where high rate approval will not allow a plant to maintain minimum unit process detention times specified in R.61-58.3.D(2), evaluations of those unit processes must be included in the pilot test and high rate engineering evaluation. The design of high rate gravity filters shall be in accordance with all applicable requirements of R.61-58.3.D(5).

(c) Rapid Rate Pressure Filters - Pressure filters will not be allowed as primary filtration on surface waters.

(d) Diatomaceous earth filtration will not be allowed as primary filtration on surface waters.

(i) Conditions of use - Diatomaceous earth filters are expressly excluded from consideration for bacteria removal, color removal, or turbidity removal where either the gross quantity of turbidity is high or the turbidity exhibits poor filterability characteristics, and filtration of waters with high algae counts.

(ii) Pilot plant study - Installation of a diatomaceous earth filtration system shall be preceded by a pilot plant study on the water to be treated.

(A) Conditions of the study such as duration, filter rates, head loss accumulation, slurry feed rates, turbidity removal, bacteria removal, etc.,

shall be approved by the Department prior to the study.

(B) Satisfactory pilot plant results shall be obtained prior to preparation of final construction plans and specifications.

(C) The pilot plant study shall demonstrate the ability of the system to meet applicable drinking water standards at all times.

(iii) Types of filters - Pressure or vacuum diatomaceous earth filtration units will be considered for approval.

(iv) Treated water storage - Treated water storage capacity in excess of normal requirements shall be provided to allow operation of the filters at a uniform rate during all conditions of system demand at or below the approved filtration rate, and guarantee continuity of service during adverse raw water conditions without by-passing the system.

(v) Number of filtration units - At least two (2) units shall be provided.

(vi) Precoat - A uniform precoat of at least 1/16 inch shall be applied hydraulically to each septum by introducing a slurry to the tank influent line and employing either a filter-to-waste or recirculation system.

(vii) Body feed - A body feed system to apply additional amounts of diatomaceous earth slurry during the filter run is required. Continuous mixing of the body feed slurry shall be provided.

(viii) Filtration

(A) Rate of filtration - The filtration rate shall be controlled by a positive means and shall not exceed one and a half (1.5) gallons per minute per square foot of filter.

(B) Head loss - The head loss shall not exceed thirty (30) pounds per square inch for pressure diatomaceous earth filters, or a vacuum of fifteen (15) inches of mercury for a vacuum system.

(C) Recirculation - A recirculation or holding pump shall be employed to maintain differential pressure across the filter when the unit is not in operation in order to prevent the filter cake from dropping off the filter elements. A minimum recirculation rate of one tenth (0.1) gallon per minute per square foot of filter area shall be provided.

(D) Septum or filter element - The filter elements shall be structurally capable of withstanding maximum pressure and velocity variations during filtration and backwash cycles, and shall be spaced such that no less than one (1) inch is provided between elements or between any element and a wall.

(E) Inlet design - The filter influent shall be designed to prevent scour of the diatomaceous earth from the filter element.

(ix) Backwash - A satisfactory method to thoroughly remove and dispose of

spent filter cake shall be provided. Treatment is required for the backwash water and shall be designed in accordance with applicable portions of R.61-58.3 (F).

(x) Appurtenances - The following shall be provided for every filter:

(A) sampling taps for raw and filtered water;

(B) loss of head or differential pressure gauge;

(C) rate-of-flow indicator, with totalizer;

(D) a throttling valve used to reduce rates below normal during adverse raw water conditions; and,

(E) an evaluation of the need for body feed, recirculation, and any other pumps, in accordance with R.61-58.4(B)(1)(d).

(xi) Monitoring - A continuous monitoring turbidimeter with recorder is required on the filter effluent.

(e) Direct Filtration - The use of direct filtration technology will be considered only where sufficient raw water quality and engineering data is submitted to justify such. No rates above four (4) gallons per minute per square foot will be considered without full scale pilot tests of at least twelve (12) month duration. The following shall be met for direct filtration approval:

(i) Off stream raw water storage must be provided, unless a consistent raw water quality can be demonstrated to the satisfaction of the Department.

(ii) The flocculation chamber design shall be based on pilot plant studies in conjunction with applicable portions of R.61-58.3(D)(2).

(iii) Each filter must meet the basic requirements of a rapid rate gravity filter as given in R.61-58.3(D)(5).

(iv) Filters shall be provided with either rapid rate dual or mixed media specified for filtration rates of four (4) gallons per minute per square foot or greater.

(v) Surface wash, subsurface wash and/or air scour facilities designed in accordance with R.61-58.3(D)(5)(a)(viii) and R.61-58.3(D)(5)(a)(ix) for each filter.

(vi) Each direct filtration plant shall have continuous turbidity monitoring equipment for raw and settled water. Each filter shall be equipped with a continuous, on-line turbidimeter. The filter effluent turbidimeters shall be nephelometric type and equipped with alarms set to enunciate at five tenths (0.50) nephelometric turbidity units. Continuous recorders or computer data are required for each unit.

(vii) Continuous recording devices may be required for loss of head and rate of flow instrumentation.

(viii) Provisions for filtration to waste with appropriate measures for backflow prevention are required.

(6) Disinfection - Disinfection may be accomplished with gas chlorine, chlorine dioxide, ozone or chloramines. Other agents will be considered by the Department provided that reliable feed equipment is available and test procedures for a residual are recognized, and the agent meets the requirements of an acceptable drinking water additive. Continuous disinfection will be required at all surface water supplies. Due consideration shall be given to the contact time of the disinfectant in water with relation to pH, ammonia, taste-producing substances, temperature, bacterial quality, and other pertinent factors. Consideration also must be given to the formation of disinfection by-products and meeting the contact times prescribed in R.61-58.10.

(a) Chlorination - Where chlorine is used the following shall apply:

(i) Type - Only vacuum type gas chlorinators are acceptable.

(ii) Capacity - The chlorinator capacity shall be such that a free chlorine residual of at least five (5) milligram per liter can be attained in the water after a contact time of at least thirty (30) minutes at maximum flow rates. The equipment shall be of such design that it will operate accurately over the desired feeding range.

(iii) Number of units - at least one (1) backup chlorinator shall be provided in addition to the number required for each primary feed point. The backup chlorinator shall be equal to the capacity of the largest chlorinator in use.

(iv) Automatic Proportioning - Automatic proportioning chlorinators will be required where the rate of flow or chlorine demand is not reasonably constant or where the rate of flow of the water is not manually controlled.

(v) Residual Chlorine - Where alternate disinfectants are used in the treatment process, the capability for the addition of either free or combined chlorine in the finished water shall be provided. Residual chlorine must be sufficient to meet the applicable requirements of R.61-58.10.

(b) Cross connection protection - The chlorinator water supply piping shall be designed to prevent contamination of the treated water supply by sources of questionable quality.

(c) Chlorine gas - Consideration shall be given to the location of gas chlorine facilities and the safety of the public in the surrounding area. Consideration may be given for facilities that propose the use of chlorine gas in inhabited areas when the use of safety devices which will not allow the release of chlorine gas (e.g. chlorine scrubbers) are provided. Only vacuum gas chlorinator systems will be approved.

(i) Chlorine gas feed shall be enclosed and separated from other operating areas. Concrete, wood, and other construction materials shall be sealed to prevent the escape of chlorine gas from the chlorine building. The chlorine room shall be provided with a shatter resistant inspection window installed in an interior wall or an inspection window in the door. It shall be constructed in such a manner that all openings between the chlorine room and the remainder of the plant are sealed, and shall be provided with doors ensuring ready means of exit and opening only to the building exterior.

(ii) Full and empty cylinders of chlorine gas shall be isolated from operating areas, restrained in position to prevent upset, stored in rooms separate from ammonia storage, and stored in areas not in direct sunlight or exposed to excessive heat.

(iii) If the chlorine room is large enough for a person to enter, the room shall be constructed such that:

(A) It has a ventilating fan with a capacity which provides one complete air change per minute;

(B) The ventilating fan shall be located near the ceiling and pull suction through a duct extending to within twelve (12) inches of the floor and discharge as far as practical from the door and air inlet. The point of discharge shall be located so as not to contaminate air inlets to any rooms or structures. A sealed motor or other means shall be used to ensure the reliability of the fan;

(C) Air inlets shall be located near the ceiling;

(D) Air inlets and outlets shall have mechanical louvers;

(E) Switches for fans and lights are outside of the room, at the entrance;

(F) Vents from feeders and storage areas discharge to the outside atmosphere, above grade and away from inlet vent; and,

(G) Ventilation shall not be automatically controlled.

(iv) If the room is too small for a person to enter, the room must meet only R.61-58.3(D)(2)(c)(iii)(E) and (F).

(v) Chlorine feed lines shall meet the following requirements:

(A) Chlorine gas under pressure shall be piped with schedule eighty (80) stainless steel or schedule eighty (80) seamless carbon steel. No chlorine gas under pressure will be piped beyond the chlorinator room.

(B) Chlorine gas under vacuum shall be piped with schedule eighty (80) PVC or reinforced fiberglass.

(C) Chlorine solution shall be piped with schedule eighty (80) PVC.

(vi) Heaters shall be provided to maintain proper temperature for operation.

(vii) There shall be no equipment housed in the chlorine room except chlorinators, chlorine cylinders, weighing scales, heater, ventilation fan, and light(s).

(viii) Weighing scales shall be provided for weighing cylinders, at all installations utilizing chlorine gas unless provisions for automatic switchover of

cylinders and an acceptable alternate means to determine daily dosage are provided.

(ix) Chlorine feed systems shall be designed to ensure continuous feed of chlorine.

(x) If a floor drain is provided, it shall be equipped with a water seal or trap to prevent escaped gases from exiting through the building sewer.

(xi) A chlorine leak detection and alarm system shall be provided.

(d) Ozone - Ozone is a suitable disinfectant for surface water. When used as a pre-treatment chemical for surface water, provisions shall be made for post chlorination or chloramination. Consideration shall be given to potential algae growth, removal of assimilated carbon from treated waters, and the formation of oxidized organics. On-site generation facilities shall be constructed in accordance with manufacturer's standards.

(i) Pilot plant tests - Pilot plant tests shall be performed with the water to be treated to establish the optimum dosage, contact time, depth of conductor and the need for multiple application points.

(ii) Number of Units - At least two (2) generators shall be provided. The facility shall be adequately sized to provide the maximum treatment capacity with one generator out of service.

(iii) Building Design - Ozone generators shall be housed in a separate room with separate heating and ventilation. The building layout must provide for easy access to the equipment. Ventilation equipment shall be two (2) speed with the normal speed providing the normal distribution of heat or air movement. The second speed must be capable of providing a complete turnover of the air in the room every two (2) minutes to exhaust any ozone leakage in an emergency.

(iv) Piping Materials

(A) All dry ozone gas piping shall be mechanical jointed number 304 or 316 stainless steel or welded 304L or 316L stainless steel. All wet ozone gas piping shall be number 316 or 316L stainless steel. All flexible couplings shall be stainless steel.

(B) Valves shall be stainless steel face and body.

(C) Gasket materials shall be resistant to deterioration by the ozone.

(v) Reinforced concrete or stainless steel are acceptable materials. All concrete joints shall be sealed using a synthetic rubber material resistant to deterioration by ozone.

(e) Other disinfection agents - Any proposal for the use of other disinfecting agents shall be approved by the Department prior to preparation of final plans and specifications.

(f) Ammonia Gas - Consideration shall be given to the location of ammonia gas facilities and the safety of the public in the surrounding area. Only vacuum ammonia systems will be approved.

(i) Ammonia gas feed shall be enclosed and separated from other operating areas. Concrete, wood, and other construction materials shall be sealed to prevent the escape of ammonia gas from the room. The ammonia room shall be provided with a shatter resistant inspection window installed in an interior wall or an inspection window in the door. It shall be constructed in such a manner that all openings between the ammonia room and the remainder of the plant are sealed, and shall be provided with doors ensuring ready means of exit and opening only to the building exterior.

(ii) Full and empty cylinders of ammonia gas shall be isolated from operating areas, restrained in position to prevent upset, stored in rooms separate from chlorine storage, and stored in areas not in direct sunlight or exposed to excessive heat.

(iii) If the ammonia room is large enough for a person to enter, the room shall be constructed such that:

(A) It has a ventilating fan with a capacity which provides one complete air change per minute;

(B) The ventilating fan shall be located and pull suction near the ceiling and discharge as far as practical from the door and air inlet. The point of discharge shall be located so as not to contaminate air inlets to any rooms or structures. A sealed motor or other means shall be used to ensure the reliability of the fan;

(C) Air inlets shall be located near the floor;

(D) Air inlets and outlets shall have mechanical louvers;

(E) Switches for fans and lights are outside of the room, at the entrance;

(F) Vents from feeders and storage areas discharge to the outside atmosphere, above grade and away from inlet vent; and,

(G) Ventilation shall not be automatically controlled.

(iv) If the room is too small for a person to enter, the room must meet only R.61-58.3(D)(2)(f)(iii)(E), and (F).

(v) Ammonia feed lines shall not carry ammonia gas beyond the ammonia room.

(vi) There shall be no equipment housed in the ammonia room except ammoniators, ammonia cylinders, weighing scales, heater, ventilation fan, and light(s).

(vii) Weighing scales shall be provided for weighing cylinders, at all plants utilizing ammonia gas from cylinders. Where bulk storage tanks are installed, they shall be equipped with a pressure gauge.

(viii) Ammonia leak detectors with alarms shall be provided.

(g) Chlorine Dioxide - Chlorine Dioxide is a suitable disinfectant for surface water. Chlorine dioxide shall be generated on site. The unit shall be flow paced and not have a holding tank for the chlorine dioxide solution generated. All applicable EPA disinfectant by-product rules shall be observed.

(i) Sizing of the chlorine dioxide generator - Chlorine dioxide demand studies shall be conducted to determine estimated feed rates and points of feed.

(ii) Building Design -

(A) Chlorine dioxide generators shall be located in a room separate from chlorine cylinders.

(B) Number of Units: Where chlorine dioxide is used as the primary disinfectant, at least two (2) flow pacing chlorine dioxide generators shall be provided. The facility shall be adequately sized to supply the maximum treatment capacity with any one generator out of service. If chlorine dioxide is not used as a primary disinfectant (i.e. an oxidant only), a second generator is not required.

(iii) Piping Materials -

(A) All piping from the chlorine dioxide generator shall be schedule 80 PVC.

(B) Gasket materials shall be kynar or other compatible material.

(C) All tubing connector fittings shall be kynar or other compatible material.

(7) Aeration - Aeration treatment devices, as described herein, may be used for oxidation, separation of gases or for taste and odor control.

(a) General Requirements

(i) Sample taps must be provided following aeration equipment.

(ii) Where aeration equipment discharges directly to the distribution system, air release valves must be provided.

(b) Natural Draft Aeration - Design shall provide that:

(i) Water is distributed uniformly over the top tray;

(ii) Water is discharged through a series of three (3) or more trays with the separation of trays not less than twelve (12) inches;

(iii) Trays are loaded at a rate of one (1) gallon per minute to five (5) gallons per minutes for each square foot of total tray area;

(iv) Trays have slotted, woven wire cloth or perforated bottoms;

(v) Perforation are three sixteenth (3/16) to one-half (1/2) inches in diameter, spaced one (1) to three (3) inches on centers, when perforations are used in the distribution pan;

(vi) Construction of durable material resistant to the aggressiveness of the water and dissolved gases;

(vii) Protection of aerators from loss of spray water by wind carriage by enclosure with louvers sloped to the inside at an angle of approximately forty-five (45) degrees;

(viii) Protection from insects by number twenty-four (24) mesh screen; and,

(ix) Aerated water receives disinfection treatment.

(c) Forced or Induced Draft Aeration - Devices shall be designed to:

(i) Provide an adequate countercurrent of air through the enclosed aeration column;

(ii) Include a blower in a screened enclosure and with a watertight motor;

(iii) Exhaust air directly to the outside atmosphere;

(iv) Include a down-turned, number twenty-four (24) mesh screened air outlet and inlet;

(v) Be such that air introduced in the column shall be as free from noxious fumes, dust, and dirt as possible;

(vi) Be such that sections of the aerator can be easily reached or removed for maintenance of the interior;

(vii) Provide loading at a rate of one (1) to five (5) gallons per minute for each square foot of total tray area;

(viii) Ensure that the water outlet is adequately sealed to prevent the unwarranted loss of air;

(ix) Discharge through a series of five (5) or more trays, with separation of trays not less than six (6) inches;

(x) Provide distribution of water uniformly over the top tray; and,

(xi) Be of a durable corrosive resistant material.

(d) Pressure Aeration - This method may be used for oxidation purposes if pilot plant study indicates method is applicable. It is not acceptable for removal of dissolved gases. Filters following pressure aeration shall have adequate exhaust devices for release of air. Pressure aeration devices shall be designed to give thorough mixing of compressed air with water being treated. Screened and filtered air, free of noxious fumes, dust, dirt and other contaminants shall be provided.

(e) Other Methods of Aeration - Other methods of aeration may be used if applicable to the treatment needs. Such methods may include, but are not restricted to, spraying, diffused air, cascades, and mechanical aeration. The treatment processes shall be designed to meet the particular needs of the water to be treated and shall be subject to Department approval.

(8) Fluoridation - Commercial sodium fluoride, sodium silicofluoride and hydrofluorosilic acid shall be NSF approved and shall conform to American Waterworks Association Standards B701, B702 and B703, respectively. Fluoride chemicals shall meet the requirements of chemical additives in R.61-58.2(E)(3). The proposed method of fluoride feed shall be approved by the Department prior to preparation of final plans and specifications.

(a) Fluoride Compound Storage - Dry chemical storage shall be designed in accordance with R.61-58.3.E(2)(e). Storage units for hydrofluorosilic acid shall be isolated from operating areas and shall be vented to the atmosphere at a point outside any building.

(b) Dry Conveyors - Provisions shall be made for the proper transfer of dry fluoride compounds from shipping containers to storage bins or hoppers, in such a way as to minimize the quantity of fluoride dust.

(c) Injection Point - The fluoride compound shall not be added before lime addition, to avoid precipitation of fluoride.

(d) Chemical Feed Installations - Fluoride feed systems shall meet the following criteria:

(i) Scales or loss-of-weight recorders for weighing the quantity of chemicals added shall be provided;

(ii) Feed equipment shall have an accuracy to within five (5) percent of any desired feed rate;

(iii) The point of application of hydrofluorosilic acid, if into a pipe, shall be in the lower half of the pipe and project upward at an angle approximately forty (40) degrees and extend into the pipe one-third of diameter; and,

(iv) All fluoride feed lines shall be provided with adequate antisiphon devices.

(v) All fluoride feed systems shall be equipped with a fail-safe system to prevent the continued feed of fluoride at times when there is no flow of water through the fluoride feed point.

(e) Protective equipment - At least one (1) pair of rubber gloves, a respirator of a type certified by the National Institute for Occupational Safety and Health for toxic dusts or acid gas (as necessary), an apron or other protective clothing, and goggles or face masks shall be provided for use by the operator. Other protective equipment may be required, as deemed necessary by the Department.

(f) Dust Control

(i) Provisions shall be made for the transfer of dry fluoride compounds from

shipping containers to storage bins or hoppers in such a way as to minimize the quantity of fluoride dust which may enter the room in which the equipment is installed. The enclosure shall be provided with an exhaust fan and dust filter to the outside atmosphere of the building.

(ii) Provisions shall be made for disposing of empty bags, drums and barrels in a manner which will minimize exposure to fluoride dusts. A floor drain shall be provided to facilitate the washing of floors.

(9) Corrosion Control - Water that is corrosive due either to natural causes or to treatment given the water shall be rendered non-corrosive, and nonaggressive before being pumped to the distribution system.

(a) Alkali Feed - Corrosive water due to natural occurrence, created by the addition of alum or other coagulant, shall be treated by an alkali feed. Alkali feed can consist of lime, soda ash, bicarbonate, caustic soda, or a combination of any of the above. Lime feed systems shall include a mechanism for flushing the feed lines, including suction and pumping equipment, if used.

(b) Phosphates - The feeding of phosphates may be applicable for corrosion control. Phosphate chemicals shall meet the requirements of chemical additives in R.61-58.3(E)(3).

(c) Carbon dioxide addition

(i) Recarbonation basin design shall provide:

(A) a total detention time of at least twenty (20) minutes.

(B) two (2) compartments, each with a depth of eight (8) feet, consisting of a mixing compartment having a detention time of at least three (3) minutes, and a reaction compartment.

(ii) Adequate precautions shall be taken to prevent the possibility of carbon monoxide entering the plant from recarbonation compartments.

(iii) Provisions shall be made for draining the recarbonation basin and removing sludge.

(d) Other Treatment - Other treatment for controlling corrosive waters will be considered on a case by case basis. All chemicals must meet the requirements in R.61-58.3(E)(3). Any proprietary compound must receive the specific approval of the Department before use.

(e) Control - Laboratory equipment, acceptable to the Department, shall be provided to test for the compounds being fed.

(10) Taste and Odor Control - Provision shall be made for the addition of taste and odor control chemicals at all surface water treatment plants. These chemicals shall be added sufficiently ahead of other treatment processes to ensure adequate contact time for an effective and economical use of the chemicals.

(a) Flexibility - Plants treating water that is known to have taste and odor problems shall be provided with equipment that makes several of the control processes available to

allow the operator flexibility in operation.

(b) Chlorination - Chlorination can be used for the removal of some objectionable odors. Adequate contact time must be provided to complete the chemical reactions involved. Consideration shall be given to disinfection by-products if this method is used.

(c) Chlorine Dioxide - Chlorine dioxide may be used in the treatment of taste or odor. Provision shall be made for the proper storing and handling of sodium chlorite, so as to eliminate any danger of explosion. Consideration shall be given to disinfection by-products if this method is used.

(d) Powdered Activated Carbon - Where added, powder activated carbon feed systems shall meet the following criteria:

(i) Powdered activated carbon may be added prior to coagulation to provide maximum contact time, but shall not be added near the point of chlorine application.

(ii) Provisions shall be made for adequate dust control.

(iii) Provision shall be made for adding at least forty (40) milligrams per liter.

(e) Granular Activated Carbon Absorption Units - Rates of flow shall be consistent with the type and intensity of the problem. The rate used shall be supported by the results of pilot plant studies and shall be accordance with the requirements of R.61-58.3(D)(5).

(f) Copper Sulfate and Other Copper Compounds - Continuous or periodic treatment of water with copper compounds to kill algae or other growths shall be controlled to prevent copper in excess of one (1) milligrams per liter as copper in the plant effluent or distribution system. Care shall be taken in obtaining a uniform distribution. Department approval shall be obtained prior to the use of any such compound.

(g) Aeration - Aeration units used for taste and odor removal shall be designed in accordance with R.61-58.3(D)(7).

(h) Potassium Permanganate - The application of potassium permanganate may be considered, provided that dosages are determined by permanganate demand testing.

(11) Membrane Technology - All applications for projects involving membrane technology must be preceded by an engineering report and may require a pilot study. The engineering report must meet the requirements of R.61-58.1.C.

(a) General Requirements

(i) Membrane material - No membrane material shall be used in a public water system unless the material or product has been tested and certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. This requirement shall be met under testing conducted by a third party product certification organization accredited for this purpose by the American National Standards Institute.

(ii) Loading rates must be determined by pilot testing and/or manufacturers recommendations.

(iii) Scale Inhibitors and Cleaning Solutions - Where required, scale inhibitors and cleaning solutions must meet the requirements of chemical additives R.61-58.3.E(3).

(b) Electrodialysis Reversal - Electrodialysis reversal treatment shall not be used on surface water or groundwater under the direct influence of surface water.

E. Chemical Application.

(1) General - No chemical shall be applied to treat drinking waters unless specifically approved by the Department.

(a) Plans and specifications - Plans and Specifications shall be submitted for review and approval, as required by in R.61-58.1, and shall include:

(i) descriptions of feed equipment, including maximum and minimum feed ranges and pump curves for solution feeders,

(ii) location of feeders, piping layout and points of chemical application;

(iii) storage and handling facilities;

(iv) specifications for chemicals to be used;

(v) operating and control procedures including proposed application rates;

(vi) descriptions of testing equipment and procedures; and,

(vii) locations of sampling taps for testing.

(b) Chemical application - Chemicals shall be applied to the water at such points and by such means as to:

(i) provide maximum efficiency of treatment;

(ii) ensure maximum safety to consumer;

(iii) provide maximum safety to operators;

(iv) ensure satisfactory mixing of the chemicals with the water;

(v) provide maximum flexibility of operation through various points of application, when appropriate,

(vi) prevent backflow or back-siphonage between multiple points of feed through the use of separate feed equipment for each point and backflow preventers where a manifold system is used for standby, multiple feed use;

(vii) provide a separate injection point and a separate feed line for each chemical application that is added and spacing to prevent inter-reaction of

chemicals; and,

(viii) provide chemical injection points which are readily accessible. All below-grade injection points shall be housed in a vault or similar structure.

(c) General equipment design - General equipment design shall be such that:

(i) chemical-contact materials and surfaces are corrosion resistant;

(ii) corrosive chemicals are introduced in such a manner as to minimize potential for corrosion; and,

(iii) chemicals that are incompatible are not fed, stored or handled together.

(2) Facility Design

(a) Chemical feeders

(i) A separate feeder shall be used for each separate chemical applied, and for each injection point.

(ii) Spare parts shall be available for all feeders to replace parts which are subject to wear and damage.

(iii) Dry chemical feeds shall:

(A) measure chemicals volumetrically or gravimetrically;

(B) provide adequate solution water and agitation of the chemical in the solution pot;

(C) provide gravity feed from solution pots; and,

(D) completely enclose chemicals to prevent emission of dust into the operating room and/or provide dust collection units.

(iv) When a booster pump is required, duplicate equipment shall be provided; and, when necessary, standby power shall be provided. Where chemical feed is necessary for the protection of the supply, such as chlorination, coagulation, or other essential processes:

(A) A minimum of two (2) feeders shall be provided; and,

(B) The standby unit or a combination of units of sufficient capacity shall be available to replace the largest unit during shut-downs.

(v) Chemical feed equipment shall be located in a separate room to reduce hazards and dust problems; shall be conveniently located near points of application to minimize length of feed lines; and, shall be readily accessible for servicing, repair, and observation of operation.

(vi) Feeders shall be able to supply, at all times, the necessary amount of chemicals at an accurate rate.

(b) Control

(i) Feeders with automatic controls shall be designed so as to allow override by manual controls.

(ii) Chemical feed rates shall be proportional to flow.

(iii) Meters, scales, calibration columns, or other acceptable means to measure chemicals being fed must be provided in order to determine chemical feed rates.

(iv) Provisions shall be made for measuring the quantities of chemicals used.

(c) Cross-connection control

(i) Cross connection control shall be provided to ensure that liquid chemical solutions cannot be siphoned through solution feeders into the water supply.

(ii) The service water lines discharging to the solution tanks shall be properly protected from backflow as required by the Department.

(iii) No direct connection shall exist between any sewer and a drain or overflow from the feeder, solution chamber or tank. All drains shall terminate at least six (6) inches or two (2) pipe diameters, whichever is greater, above the overflow rim of a receiving sump, conduit or waste receptacle.

(d) Service Water Supply - Service water supply shall be ample in supply and adequate in pressure; shall be properly treated potable water; shall be properly protected against backflow; and, a means shall be provided to measure the quantity of water used in preparing specific solution concentrations by dilution;.

(e) Storage of chemicals

(i) Space shall be provided for at least thirty (30) days of chemical supply and provide for convenient, efficient and safe handling of chemicals. Dry storage conditions must be maintained for dry chemicals.

(ii) Storage tanks and pipelines for liquid chemicals shall be designed specifically for each chemical used.

(iii) Chemicals shall be stored in covered or unopened shipping containers, unless the chemical is transferred into an approved covered storage unit.

(iv) Liquid chemical storage tanks shall have:

(A) a liquid level indicator;

(B) an overflow; and,

(C) secondary containment capable of receiving and containing accidental spills or overflows. Consideration must be given to reactivity of chemicals stored in a single containment area.

(f) Solution tanks

(i) A means which is consistent with the nature of the chemical solution shall be provided in a solution tank to maintain a uniform strength of solution. Continuous agitation shall be provided to maintain slurries in suspension.

(ii) Two solution tanks of adequate volume may be required for a chemical to ensure continuity of supply in servicing a solution tank.

(iii) Means shall be provided to measure the solution level in the tank.

(iv) Chemical solutions shall be kept covered. Large tanks with access openings shall have such openings curbed and fitted with tight overhanging covers.

(v) Surface locations for solution tanks shall:

(A) be free from sources of possible contamination; and,

(B) ensure positive drainage from ground waters, accumulated water, chemical spills and overflows from around tank.

(vi) Overflow pipes, when provided, shall:

(A) be turned downward, with the end screened;

(B) have an air gap of two (2) pipe diameters or six (6) inches, whichever is greater; and,

(C) be located where noticeable.

(vii) Acid storage tanks shall be independently vented to the outside atmosphere.

(viii) Each tank shall be provided with a valved drain, protected against backflow in accordance with R.61-58.3(E)(2)(c)(iii).

(ix) Solution tanks shall be provided with protective curbing, drains or other secondary containment capable of receiving and containing accidental spills or overflows.

(g) Day tanks

(i) Day tanks shall be provided where bulk storage of liquid chemical is provided.

(ii) Day tanks shall meet all the requirements of R.61-58.3.E(2)(f).

(iii) Day tanks shall be scale-mounted, or have a calibrated gauge painted or mounted on the side so liquid level can be observed in a gauge tube or through translucent sidewalls of the tank. In opaque tanks, a gauge rod extending above a reference point at the top of the tank, attached to a float may be used. The ratio of the area of the tank to its height shall be such that unit readings are meaningful in

relation to the total amount of chemical fed during a day.

(iv) Hand pumps may be provided for transfer from a carboy or drum. A tip rack may be used to permit withdrawal into a bucket from a spigot. Where motor-driven transfer pumps are provided, a liquid level limit switch and an overflow from the day tank, which will drain back into the bulk storage tank or other approved location, shall be provided.

(v) Tanks shall be properly labeled to designate the chemical contained.

(h) Feed lines

(i) Feed lines shall be as short as possible in length of run, and of durable, corrosion resistant material. They shall be easily accessible throughout the entire length, protected against freezing, and readily cleanable.

(ii) Feed lines shall be designed consistent with scale-forming or solids depositing properties of the water, chemical, solution or mixture conveyed.

(iii) Feed lines shall be color coded and labeled .

(iv) Where lime is added, a spare feed line equal in length to the longest run of feed line, shall be provided.

(i) Handling

(i) Carts, elevators and other appropriate means shall be provided for lifting chemical containers.

(ii) Provisions shall be made for disposing of empty bags, drums or barrels by an approved procedure which will minimize exposure to dust.

(iii) Provision shall be made for the proper transfer of dry chemicals from shipping containers to storage bins or hoppers, in such a way as to minimize the quantity of dust which may enter the room in which the equipment is installed.

(iv) Provision shall be made for measuring quantities of chemicals used to prepare feed solutions.

(j) Housing

(i) Floor surfaces shall be smooth, impervious, slip-proof and well-drained.

(ii) Vents from feeders, storage facilities and equipment exhaust shall discharge to the outside atmosphere above grade and remote from air intakes.

(iii) Feeders used in conjunction with dry lime or carbon shall be housed in separate, individual rooms equipped with dust control systems.

(iv) Sufficient lighting for operator safety and sufficient heating to provide for proper operation of the chemical feed equipment shall be provided for all chemical feed rooms.

(3) Chemicals Specifications - All chemicals and products added to a public water supply as part of the treatment process shall be certified as meeting the specifications of the American National Standards Institute/National Sanitation Foundation Standard 60, Drinking Water Treatment Chemicals - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

F. Waste Handling and Disposal.

Waste handling and disposal practices shall meet all applicable rules and regulations of the Department. Provisions must be made for proper disposal of water treatment plant waste such as sanitary, laboratory, clarification sludge, softening sludge, iron sludge, filter backwash water, filter to waste, and brine waste. In locating waste disposal facilities, due consideration shall be given to preventing potential contamination of the water supply. For projects involving a surface water discharge of water treatment residuals or waste water, a National Pollutant Discharge Elimination System (NPDES) permit must be obtained from the Department. For projects involving land application of water treatment residuals or waste water, a No Discharge (ND) permit must be obtained from the Department.

(1) Sanitary Waste - The sanitary waste from water treatment plants, pumping stations, etc., must receive treatment. Waste from these facilities must be discharged directly to a sanitary sewer system, when feasible, or to an adequate on-site waste treatment facility.

(2) Alum Sludge - Mechanical concentration or lagooning may be used as a method of handling alum sludge. Acid treatment of sludge for alum recovery may be a possible alternative. Alum sludge can be discharged to a sanitary sewer only if acceptable to the receiving sewer system and approved by the Department before final designs are made.

(a) Lagoons shall be designed to meet the following requirements:

(i) A minimum of two (2) lagoons are required for handling alum sludge.

(ii) The location shall be such that the top of the dike is at least one (1) foot above the one hundred (100) year flood plain;

(iii) Where necessary, dikes, deflecting gutters or other means of diverting surface water runoff shall be provided so that it does not flow into the lagoon;

(iv) A minimum usable depth of five (5) feet with adequate freeboard shall be provided so as not to interfere with normal plant operation;

(v) Dikes shall be constructed of relatively impervious material and compacted to at least ninety (90) percent Standard Proctor Density to form a stable structure. Vegetation and other unsuitable materials shall be removed. Minimum dike width shall be eight (8) feet. Dike slopes shall not be steeper than one (1) foot vertical to three (3) feet horizontal;

(vi) A minimum separation of four (4) feet between the bottom of the lagoon and the maximum groundwater elevation shall be maintained;

(vii) A synthetic liner of at least twenty (20) mil (0.20 inches) thickness or a natural liner consisting of one foot of compacted clay having a hydraulic conductivity (coefficient of permeability) of no more than .0000001 centimeters per second shall be used;

(viii) A monitoring system shall be constructed to measure the water quality in

the upper most aquifer. One (1) upgradient monitoring well and an adequate number of down gradient monitoring wells, so as to fully define any potential leacheate plume, shall be provided;

(ix) An adjustable decanting device must be provided;

(x) Effluent sampling point and flow measurement device must be provided;

(xi) Erosion control through grassing, rip-rap, or other means is required on both the inside and outside dike surfaces; and,

(xii) Adequate safety provisions must be installed.

(b) Mechanical concentration or de-watering - A pilot study is required before the design of a mechanical de-watering installation. Provisions shall be made for holding basins so as to maintain continuity of service of the water plant. Vacuum filters, centri-fuges, filter presses, belt presses, or other devices will be considered.

(3) Lime softening sludge - Methods of treatment and disposal are as follows:

(a) Lagoons

(i) Temporary lagoons which must be cleaned periodically shall be designed on the basis of seven tenths (0.7) acres per million gallons per day per one hundred (100) milligrams per liter of hardness removed based on a usable lagoon depth of five (5) feet. At least two (2) lagoons must be provided in order to give flexibility in operation. An acceptable means of final sludge disposal must be provided. Provisions must be made for convenient cleaning.

(ii) Permanent lagoons shall have a volume of at least four (4) times that for temporary lagoons.

(iii) The design of both temporary lagoons and permanent lagoons shall meet the requirements for lagoons in paragraph 2(a) above.

(b) Discharge of lime sludge to sanitary sewers shall be avoided if possible since it may cause both liquid volume and sludge volume problems at the sewage treatment plant. This method shall be used only when the sewer system has the capability to adequately handle the lime sludge and is acceptable to both the sewer system and the Department.

(c) Mechanical de-watering of sludge may be considered. Pilot studies on a particular plant waste are required.

(d) Calcination of sludge may be considered. Pilot studies on a particular plant waste are required.

**R.61-58.4 FINISHED WATER PUMPING, STORAGE AND DISTRIBUTION FACILITIES**

A. Applicability.

This regulation applies to all new construction and all expansions or modifications of existing public water systems. If the Department can reasonably demonstrate that safe delivery of potable water to the public is jeopardized, a system may have to upgrade its existing facilities in order for an expansion or modification to meet the requirements of this regulation. This regulation prescribes minimum design standards for the construction of finish water pumping, storage, and distribution facilities.

B. Pumping Facilities.

(1) Requirements for Pump Stations - Pumping facilities shall be designed to maintain the sanitary quality of pumped water.

(a) Location -

(i) The pumping station shall be located so that the site will meet the requirements for sanitary protection of water quality, hydraulics of the system and protection against interruption of service by fire, flood or any other hazard.

(ii) The station shall be elevated to a minimum of one (1) foot above the one hundred (100) year flood elevation, or protected to such elevation, shall be readily accessible at all times unless permitted to be out of service for the period of inaccessibility, shall be graded around the station so as to lead surface drainage away from the station, and shall be protected to prevent vandalism and entrance by animals and unauthorized persons.

(b) General Design Considerations - Pump stations shall be of durable construction, fire and weather resistant and with outward-opening doors. The floor elevation of pump stations shall be at least six (6) inches above finished grade, have waterproofed underground structure, and have all floors drained in such a manner that the quality of the potable water will not be endangered. All floors shall slope to a suitable drain and provide a suitable outlet for drainage from pump glands without discharging onto the floor.

(c) Pumping Equipment -

(i) At least two (2) pumping units shall be provided. The pumping station shall be sized adequately to supply the maximum daily demand with any pump out of service. The pumping units shall:

(A) Be driven by a prime mover able to operate against the maximum head and air temperature which may be encountered;

(B) Have spare parts and tools readily available;

(C) Be equipped with elapsed time hour meters for each pump or another acceptable mechanism to monitor run times; and.

(D) Be sized to operate from minimum to maximum pumping conditions without overloading the motor.

(ii) Prime water must not be of lesser sanitary quality than that of the water

being pumped. Means shall be provided to prevent back-siphonage. When an air-operated ejector is used, the screened intake shall draw clean air from a point at least ten (10) feet above the ground or other source of possible contamination, unless the air is filtered by an apparatus approved by the Department. Vacuum priming may be used.

(iii) For pumps designed so that bearing lubrication fluids come into contact with the water being pumped, only water lubricated pumps may be used unless otherwise approved by the Department.

(d) Equipment Servicing - Pump stations shall be designed so that proper maintenance of the equipment can be provided.

(e) Operator Access - Pump stations shall be designed for easy access by stairs or ladders when necessary.

(f) Heating - In pump houses not occupied by personnel, only enough heat need be provided to prevent freezing of equipment or treatment process.

(g) Ventilation - Ventilation shall conform to existing local, federal, and/or state codes. Adequate ventilation shall be provided for all pumping stations.

(h) Lighting - Pump stations shall be adequately lighted throughout. All electrical work shall conform to the requirements of the National Electric Code or applicable state and local codes.

(i) Auxiliary Power - Where elevated storage equals less than one half maximum daily demand, portable or in-place auxiliary power shall be provided for all systems serving three hundred (300) or more service connections. An air quality permit may be required for the air emissions from the auxiliary generators. Auxiliary power requirements may be waived if one or more of the following are applicable:

(i) a verifiable history of worst case power outages and verification that the available elevated storage can provide for a similar time period of outage;

(ii) two (2) or more independent sources from the serving electrical utility are available; or,

(iii) an alternate water source is available via connections with other systems.

Auxiliary power shall be sized to provide for sufficient pumping capacity to meet the one half (1/2) of the maximum daily demand or to supplement the existing storage to meet one half (1/2) of the maximum daily demand.

(j) Protection From Trespassers - Fencing, locks on doors, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage.

(2) Booster Pump Stations - Booster pump stations shall meet all applicable portions of R.61-58.4(B)(1)Paragraph in addition to the requirements below.

(a) Booster pumps shall be located or controlled so that they will not produce less than twenty-five (25) pounds per square inch anywhere in the affected distribution system when the pump is in normal operation. An automatic cutoff switch or throttling valve

shall be installed to prevent the pressure anywhere in the affected distribution system from dropping below twenty (20) pounds per square inch. Automatic or remote control devices shall have a range between the start and cutoff pressure which will prevent excessive cycling, and a bypass line shall be provided. Fire booster pumps must have a device to monitor suction pressure and throttle the output of the pump to maintain the suction pressure above twenty (20) pounds per square inch anywhere in the affected distribution system, but, not shut the pump off.

(b) In-line booster pumps shall be accessible for servicing and repairs.

(3) Automatic Pump Stations - All automatic pump stations shall be provided with a warning light or telemetry system which will report when the station is out of service. All remote controlled stations shall be electrically operated and controlled and shall have signaling apparatus of proven performance. Installation of electrical equipment shall conform with the applicable state and local electrical codes and the National Electrical Code. A sign with a twenty-four (24) hour telephone number for emergencies shall be displayed on the outside of the station in a visible location, unless the system has twenty-four (24) hour monitoring.

(4) Appurtenances -

(a) Valves - Pumps shall be adequately valved to permit satisfactory operation, maintenance and repair of the equipment. Each pump shall have a positive-acting check valve on the discharge side between the pump and the shut-off valve.

(b) Piping - In general, suction and discharge piping shall:

(i) be designed so that the friction losses will be minimized;

(ii) not be subject to contamination;

(iii) be sloped in one direction to drain;

(iv) have watertight joints;

(v) have adequate clean-outs;

(vi) be protected against surge or water hammer; and,

(vii) be manifolded or have an individual suction line to ensure similar hydraulic and operating conditions.

(c) Gauges - Each pump shall:

(i) Have a standard pressure gauge on its discharge line; and,

(ii) Have a compound gauge on its suction line;

(d) Water Seals - Water seals shall not be supplied with water of a lesser sanitary quality than that of the water being pumped. Where pumps are sealed with potable water and are pumping water of lesser sanitary quality the seal shall be provided with a back-flow preventer appropriate for the degree of hazard in question.

(e) Controls - Pumps, their prime movers and accessories, shall be controlled in such

a manner that they will operate at rated capacity without dangerous overload. Where two or more pumps are installed, provision shall be made for alternation. Provision shall be made to prevent energizing the motor in the event of a backspin cycle. Electrical controls shall be located above grade.

(f) Water Pre-lubrication - When automatic pre-lubrication of pump bearings is necessary and an auxiliary power supply is provided, the pre-lubrication line shall be provided with a valved bypass around the automatic control so that the bearings can, if necessary, be lubricated manually before the pump is started.

C. Finished Water Storage.

(1) General -

(a) Sizing - Where fire flows are provided, tanks shall be sized to provide two (2) hours of supply for a combined flow of peak hour domestic plus fire flow; or, the storage capacity (or equivalent capacity) shall equal one half (1/2) the maximum daily consumption, whichever is greater. Either requirement may be reduced when the source and treatment facilities have sufficient capacity with auxiliary power to supplement peak demands of the system.

(b) Isolation of Tank - Storage structures shall be designed so they can be isolated from the distribution system for the purpose of draining, maintenance and repair. A sample tap shall be provided on the tank or on the tank side of the isolation valve.

(c) Level controls - Adequate controls shall be provided to automatically maintain levels in distribution system storage structures. Where telemetry is not provided for water level measurement, a float type level gauge and visible target shall be provided. Altitude valves or equivalent controls may be required for a second and subsequent structures on the system.

(d) All tanks shall be readily accessible at all times for inspection and maintenance.

(2) Atmospheric Ground Storage, Elevated Tanks, and Standpipes.

(a) General - The materials and designs used for finished water storage structures shall provide stability and protection of the stored water. Steel structures shall be designed in accordance with current American Waterworks Association (AWWA) Standard D-100 concerning steel tanks, standpipes, reservoirs, and elevated tanks whenever they are applicable. Other materials of construction are acceptable when properly designed to meet the requirements of this Section.

(b) Location of ground-level reservoirs

(i) The bottom of reservoirs and standpipes shall be above the one hundred (100) year flood level.

(ii) When the bottom must be below normal ground surface, it shall be placed above the ground water table. Sewers, drains, standing water, and similar sources of possible contamination must be kept at least fifty (50) feet from the reservoir. Water main pipe, pressure tested in place to fifty (50) pounds per square inch without leakage, may be used for gravity sewers at distances greater than twenty (20) feet and less than fifty (50) feet.

(iii) The top of a reservoir shall not be less than two (2) feet above normal ground surface. Clearwells constructed under filters may be exempted from this requirement when the total design gives the same protection.

(c) Sanitary Protection - All finished ground level or elevated water storage structures shall have suitable watertight roofs which exclude birds, animals, insects, and excessive dust.

(d) Protection from trespassers - Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage.

(e) Drains - Adequately sized drains shall be provided. No drain on a water storage structure may have a direct connection to a sewer or storm drain. A flap valve or other means of covering the open outlet of the drain shall be provided.

(f) Overflow - The overflow pipe shall be of sufficient diameter to permit the discharge of water equal to or greater than the filling rate; but shall not be less than four (4) inches in diameter. All atmospheric storage structures shall be provided with an overflow which is brought down to an elevation between twelve (12) and twenty-four (24) inches above the ground surface, and discharges over a drainage inlet structure or a splash pad. A flap valve or number four (4) mesh non-corrodible screen shall be provided on the outlet. No overflow may be connected directly to a sewer or storm drain. All overflow pipes shall be located so that any discharge is visible.

(g) Access - Finished water storage structures shall be designed with reasonably convenient access to the interior for cleaning and maintenance. Manholes above the water-line shall:

(i) be framed at least four (4) inches above the surface of the roof at the opening on ground-level structures;

(ii) be fitted with a solid watertight cover which overlaps the framed opening and extends down around the frame at least two (2) inches; and,

(iii) have a locking device.

(h) Vents - Finished water atmospheric storage structures shall be vented. Overflows shall not be considered as vents. Open construction between the sidewall and roof is not permissible. Twenty-four (24) mesh non-corrodible screens, or equivalent, shall be used on all vents. Vents shall be constructed to:

(i) prevent the entrance of surface water and rainwater;

(ii) exclude birds and animals;

(iii) exclude insects and dust, as much as this function can be made compatible with effective venting; and

(iv) prevent imploding of the tank during a rapid discharge of water from the tank.

(i) Roof and sidewall - The roof and sidewalls of all structures must be watertight

with no openings except properly constructed vents, manholes, overflows, risers, drains, pump mountings, control ports, or piping for inflow and outflow.

(i) Any pipes running through the roof or sidewall of a finished water storage structure must be welded, or properly gasketed in metal tanks. In concrete tanks, these pipes shall be connected to standard wall castings which were poured in place during the forming of the concrete. These wall castings should have seepage rings imbedded in the concrete.

(ii) Openings in a storage structure roof or top, designed to accommodate control apparatus or pump columns, shall be curbed and sleeved with proper additional shielding to prevent the access of surface or floor drainage water into the structure.

(iii) Valves and controls shall be located outside the storage structure so that the valve stems and similar projections will not pass through the roof or top of the reservoir.

(j) Drainage of roof - The roof of the storage structure shall be well drained. Downspout pipes shall not enter or pass through the reservoir. Parapets, or similar construction which would tend to hold water and snow on the roof, will not be approved unless adequate waterproofing and drainage are provided.

(k) Safety - The safety of employees must be considered in the design of the storage structure.

(i) Ladders, ladder guards, balcony railings, and safely located entrance hatches shall be provided where applicable.

(ii) A platform at the top of the ladder to provide a place for the climber to stand on while unhooking the safety harness shall be provided.

(iii) Elevated tanks with riser pipes over eight (8) inches in diameter shall have protective bars over the riser opening inside the tank.

(l) Freezing - All finished water storage structures and their appurtenances, especially the riser pipes, overflows, and vents, shall be designed to prevent freezing which will interfere with proper functioning.

(m) Internal catwalk - Every catwalk over finished water in a storage structure shall have a solid floor with raised edges so designed that shoe scrapings and dirt will not fall into the water.

(n) Silt stop - The discharge pipes from all reservoirs shall be located in a manner that will prevent the flow of sediment into the distribution system. Removable silt stops should be provided where feasible.

(o) Grading - The area surrounding a ground-level structure shall be graded in a manner that will prevent surface water from standing within a fifty (50) foot radius.

(p) Painting and/or cathodic protection - Proper protection shall be given to metal surfaces by paints or other protective coatings, by cathodic protective devices, or by both. All paint coatings which come into contact with drinking water shall be certified as

meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute. Hot applied wax, cold applied wax, grease, and coal tar coatings are not acceptable.

(q) Disinfection - Finished water storage structures shall be disinfected in accordance with current American Waterworks Association (AWWA) Standard for the disinfection of water storage facilities. Prior to sampling, the chlorine residual must be reduced to normal system residual levels or be non-detectable in those systems not chlorinating. A minimum of two (2) samples must be collected and analyzed for total coliform bacteria. These samples must be collected at least twenty-four (24) hours apart and the results must show the absence of total coliform bacteria. The chlorine residual must also be measured and reported. If the membrane filter method of analysis is used for the coliform analysis, non-coliform growth must also be reported. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) ml, the sample result is invalid and must be repeated. All samples must be analyzed by a certified laboratory. The Department may request that heterotrophic plate count analyses be conducted on a case-by-case basis where disinfection problems are suspected.

(3) Washwater Tanks - Washwater tanks shall be designed in accordance with R.61-58.4(C)(1) and shall be sized, in conjunction with available pump units and finished water storage, to provide the backwash water required by R.61-58.3(D)(5)(a)(xi). Consideration must be given to the backwashing of several filters in rapid succession.

(4) Clearwell -

(a) Clearwell storage shall be sized, in conjunction with distribution system storage, to relieve the filters from having to follow fluctuations in water use.

(b) When finished water storage is used to provide the contact time for chlorine, special attention shall be given to size and baffling.

(c) An overflow shall be provided.

(d) Finished water must not be stored or conveyed in a compartment adjacent to unsafe water when the two compartments are separated by a single wall.

(5) Hydropneumatic (Pressure) tanks - Hydropneumatic (pressure) tanks, when provided as the only storage facility, are acceptable only in small water systems. For systems serving more than three hundred (300) taps or more than one thousand (1000) people, elevated storage shall be provided. Pressure tank storage shall not be considered for fire protection purposes, unless standby power is provided and the pumping capacity from wells or ground storage exceeds the fire flow demand with the largest well or pump out of service. Pressure tanks five hundred (500) gallons and larger shall meet the requirements of the American Society of Mechanical Engineers for the construction and installation of unfired pressure vessels and shall carry its approval stamp.

(a) The tank shall be located above normal ground surface and shall be fenced to protect it from vandalism.

(b) Sizing - For surface and ground water systems where the pump yield equals or exceeds the instantaneous demand, the tank shall be sized so the pump cycles a maximum of six (6) times per hour. Where the pump yield is less than the instantaneous demand the tank shall be sized to provide the difference for a minimum twenty (20) minute demand

period based on the actual usable volume of the tank.

(c) Bypass Piping - A flow through arrangement is required for all hydropneumatic storage tanks. However, the tank shall also be equipped with bypass piping to permit the tank to be removed from service for repairs or painting without removing well(s) or booster pump(s) from service. Bypass piping is not required for tanks less than 500 gallons.

(d) Appurtenances - All hydropneumatic tanks shall be equipped with a drain, isolation valves, sample tap, pressure gauge, air make-up system (except for bladder tanks), pressure relief valve, and pressure operated start and stop controls for the pump. Each tank five hundred (500) gallons and larger shall have an access manhole, a minimum two (2) inch diameter drain, and a vacuum relief valve. An air compressor is required on tanks two thousand (2000) gallons and larger.

(e) Freezing - All hydropneumatic storage tanks and their appurtenances shall be designed to prevent freezing which will interfere with proper functioning.

(f) Painting and/or cathodic protection - Proper protection shall be given to metal surfaces by paints or other protective coatings, by cathodic protective devices, or by both. All paint coatings which come into contact with drinking water shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute. Hot applied wax, cold applied wax, grease, and coal tar coatings are not acceptable.

(g) Disinfection - Hydropneumatic storage tanks shall be disinfected in accordance with current American Waterworks Association (AWWA) Standard for the disinfection of water storage facilities. Prior to sampling, the chlorine residual must be reduced to normal system residual levels or be non-detectable in those systems not chlorinating. A minimum of two (2) samples must be collected and analyzed for total coliform bacteria. These samples must be collected at least twenty-four (24) hours apart and results must show the absence of total coliform bacteria. The chlorine residual must also be measured and reported. If the membrane filter method of analysis is used for the coliform analysis, non-coliform growth must also be reported. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) ml, the sample result is invalid and must be repeated. All samples must be analyzed by a certified laboratory. The Department may request that heterotrophic plate count analyses be conducted on a case-by-case basis where disinfection problems are suspected.

(h) The pressure range of hydropneumatic tanks shall not exceed twenty (20) pounds per square inch.

D. Distribution Systems.

(1) Materials Standards - Pipe, fittings, packing, jointing materials, valves and fire hydrants shall conform to Section C of the American Water Works Association (AWWA) Standards. All materials or products which come into contact with drinking water shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute. In the absence of American Water Works Association (AWWA) Standards, materials meeting applicable Product Standards and acceptable to the Department may be selected. SD 26 Class 160 and SD 21 Class 200 PVC pipe meeting ASTM Standard D1785 or D2241 are acceptable in sizes twelve

(12) inches and smaller. Asbestos cement pipe shall not be used in potable water systems except in the repair of existing asbestos cement lines. Metallic pipe and fittings shall be lead free in accordance with R.61-58.4(F). Thermoplastic pipe shall not be used above grade.

(2) Used Materials - Water mains which have been used previously for conveying potable water may be reused provided they meet the above standards and have been thoroughly cleaned and restored practically to their original condition.

(3) Gaskets and Joints - Gaskets, O-rings, and other products used for jointing pipes, setting meters or valves, or other appurtenances which will expose the material to the water shall comply with the requirements of R.61-58.4(D)(1) and shall not be made of natural rubber or any other material which will support microbiological growth. Lubricants which will support microbiological growth shall not be used for slip-on joints. The use of vegetable shortening to lubricate joints is prohibited. The use of solvent-weld PVC pipe and fittings in water mains four (4) inches and larger is prohibited.

(4) Line Sizing -

(a) Pressure - The minimum pressure in all public water mains under conditions of maximum instantaneous demand shall be twenty-five (25) pounds per square inch at every customer's tap. Twenty (20) pounds per square inch will be acceptable at any tap when fire flows or flushing flows are provided in excess of maximum peak hourly flow.

(b) Diameter - The minimum size of water mains for providing fire protection and serving fire hydrants shall be six (6) inches in diameter. Larger size mains will be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in R.61-58.4(D)(4)(a).

(5) No line extension shall be made of an existing line when the existing line does not meet the minimum pressure and flow requirements of this regulation.

(6) Dead ends -

(a) Dead ends shall be minimized by looping of all mains whenever practical.

(b) The lengths of small dead end lines shall not exceed the following:

(i) One (1) inch diameter --- 150 ft.

(ii) One and one quarter (1 1/4) inch --- 200 ft.

(iii) One and one half (1 1/2) inch --- 300 ft.

(iv) Two inches (2) --- 1500 ft.

Conditions may warrant having less than the above maximum lengths in order to meet the twenty-five (25) pounds per square inch pressure requirement.

(7) Flushing - The design shall provide for a readily accessible means of flushing all water lines at a minimum velocity of 2.5 feet per second. This does not apply to service lines.

(a) Where dead-end lines occur they shall be provided with a fire hydrant if flow and pressure are sufficient, or with a post hydrant or readily accessible blow-off valve in a box for flushing purposes, except for the following cases:

(i) Lines one and one half (1-1/2) inches in diameter and smaller will not require blow-offs. Two inch lines shorter than two hundred (200) feet will not require a blow-off. However, a service connection shall be installed at the end of the line or another acceptable means of bleeding chlorine through the lines must be provided.

(b) Blow-offs shall be sized to provide a minimum velocity of 2.5 feet per second in the line and maintain a residual pressure of twenty-five (25) pounds per square inch.

(c) Post-type hydrants are acceptable for flushing purposes on lines four (4) inch through eight (8) inch and can be used on three (3) inch lines where the design flow is increased to one hundred (100) gallons per minute in excess of peak hourly flow.

(d) Design head loss calculations, including elevation changes shall show twenty-five (25) pounds per square inch minimum residual when instantaneous demand occurs or twenty (20) pounds per square inch minimum residual when either fire flow or flushing flow in excess of peak hourly flow occurs, whichever is greater.

(e) Lines ten (10) inches and larger require flows in excess of five hundred (500) gallons per minute to achieve a two and a half (2.5) feet per second scouring velocity. This would require a standard fire hydrant or other approved blow-off, for flushing which must be designed to provide at least five hundred (500) gallons per minute in excess of peak hourly flow and a minimum residual pressure of twenty (20) pounds per square inch.

(f) No flushing device shall be directly connected to any sewer.

(8) Valves - Sufficient valves shall be provided on water mains so that customer inconvenience and sanitary hazards will be minimized during repairs.

(9) Hydrants -

(a) Where standard four (4) to six (6) inch diameter hydrants are proposed, the design flow shall not be less than five hundred (500) gallons per minute over and above peak hourly flow. Standard hydrants shall not be placed on systems using only hydropneumatic storage, unless standby power is provided and the pumping capacity from wells or ground storage exceeds the fire flow demand with the largest well or pump out of service. Standard hydrants shall not be connected to lines not designed to carry fire flows.

(i) Hydrant Leads - The hydrant leads shall be a minimum of six (6) inches in diameter. Auxiliary gate valves shall be installed in all hydrant leads.

(ii) Drainage - A gravel pocket or dry well shall be provided unless the natural soils will provide adequate drainage. Hydrant drains shall not be connected to or located within ten (10) feet of sanitary sewers.

(b) Where Post-type hydrants are proposed, they must meet the flow requirements for blow-offs in R.61-58.4.D(7). Post hydrants shall not be used on lines smaller than three (3) inches. Design calculations must be submitted when utilizing post hydrants on three (3) inch lines. These calculations must show one hundred (100) gallons per minute in excess of peak hourly flow can be maintained, and provide a residual pressure greater than or equal to twenty (20) pounds per square inch.

(10) Air Relief Valves, Valve, Meter and Blow-Off Chambers

(a) Air relief valves - Air relief valves shall be provided in accordance with sound engineering practice at high points in water mains as required. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur.

(b) Air relief valve piping - The open end of an air relief pipe from automatic valves or from a manually operated valve shall be extended to the top of the pit and provided with a screened downward facing elbow.

(c) Chamber drainage - Chambers, pits or manholes containing valves, blow-off, meters, air release valves, or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer.

(11) Installation of Mains -

(a) Standards - Construction specifications shall incorporate the provisions of Section C of the American Waterworks Association (AWWA) Standards and/or manufacturer's recommended installation procedures.

(b) Bedding - A continuous and uniform bedding shall be provided in the trench for all buried pipe. Back-fill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones, other than crushed bedding, shall not come in contact with the pipe and shall not be within six (6) inches of the pipe.

(c) Cover - All water mains shall be provided with a minimum thirty (30) inches of cover. Where this is not possible, pipe shall be steel, concrete, ductile iron, or other approved material and method approved by the Department, and, when necessary, insulated to prevent freezing.

(d) Blocking - All tees, bends, plugs and hydrants on lines two and one half inches in diameter and larger shall be provided with reaction blocking, tie rods or other approved restraining methods to prevent movement.

(e) Pressure and leakage testing - All newly installed pipe shall be pressure tested and leakage tested in accordance with American Water Works Association (AWWA) Standard C600.

(f) Disinfection - Disinfection of all new water mains shall be in accordance with current American Water Works Association (AWWA) Standard C651 for the disinfection of water mains. In general one approved method referred to as "continuous feed method" is as follows: Before being placed in service, all new mains shall be thoroughly flushed then chlorinated with not less than twenty-five (25) milligrams per liter of available chlorine. Water from the existing distribution system or other source of supply shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The solution shall be retained in the pipeline for not less than twenty-four (24) hours and then flushed thoroughly with a potable water of satisfactory bacteriological quality before starting the sampling program.

The contractor or owner shall collect a minimum of two (2) samples from each sampling site for total coliform analysis. The number of sites depends on the amount of new construction but must include all dead-end lines and be representative of the water in

the newly constructed mains. Prior to sampling, the chlorine residual must be reduced to normal system residual levels or be non-detectable in those systems not chlorinating. These samples must be collected at least twenty-four (24) hours apart and must show the water line to be absent of total coliform bacteria. The chlorine residual must also be measured and reported. If the membrane filter method of analysis is used for the coliform analysis, non-coliform growth must also be reported. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) milliliters, the sample result is invalid and must be repeated. All samples must be analyzed by a certified laboratory. The Department may request that heterotrophic plate count analyses be conducted on a case-by-case basis where disinfection problems are suspected.

(g) Detection of mains - All mains shall be detectable within three (3) feet with electronic locating equipment. Non-metallic pipes shall be installed with copper wire or other means of detection.

(h) Contaminated Areas - All water mains shall be located out of all contaminated areas. If the main must run through a contaminated site, the main material must protect the water system from being contaminated (e.g. Ductile Iron Pipe with chemical resistant gaskets).

(12) Separation of Water Mains and Sewers -

(a) Parallel installation - Water mains shall be laid at least ten (10) feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the Department may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least eighteen (18) inches above the top of the sewer.

(b) Crossings - Water mains crossing sewers shall be laid to provide a minimum vertical separation of eighteen (18) inches between the outside of the water main and the outside of the sewer. This shall be the case whether the water main is either above or below the sewer line. Whenever possible, the water main shall be located above the sewer line. Where a new water main crosses a new sewer line, a full length of pipe shall be used for both the water main and sewer line and the crossing shall be arranged so that the joints of each line will be as far as possible from the point of crossing and each other. Where a new water main crosses an existing sewer line, one full length of water pipe shall be located so both joints will be as far from the sewer line as possible. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the water main.

(c) Special Conditions - When it is impossible to obtain the distances specified in R.61-58.4(D)(12)(a) and (b) the Department may allow an alternative design. Any alternative design shall:

(i) maximize the distances between the water main and sewer line and the joints of each;

(ii) use materials which meet the requirements R.61-58.4(D)(1) for the sewer line; and,

(iii) allow enough distance to make repairs to one of the lines without damaging the other.

(d) Force mains - There shall be at least a ten (10) foot horizontal separation between water mains and sanitary sewer force mains. There shall be an eighteen (18) inch vertical separation at crossing as required in R.61-58.4(D)(12)(a) and (b).

(e) Sewer manholes - No water pipe shall pass through or come in contact with any part of a sewer manhole. Water lines may come in contact with storm sewers or catch basins if there is no other practical alternative, provided that ductile iron is used, no joints of the water line are within the storm sewer or catch basin and the joints are located as far as possible from the storm sewer or catch basin.

(f) Drain-fields and Spray-fields - Potable water lines shall not be laid less than twenty-five (25) feet horizontally from any portion of a waste-water tile-field or spray-field, or shall be otherwise protected by an acceptable method approved by the Department.

(13) Surface Water Crossings -

(a) Above-water crossings - The pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair or replacement.

(b) Underwater crossings - A minimum cover of two (2) feet shall be provided over the pipe. When crossing water courses which are greater than fifteen (15) feet in width, the following shall be provided:

(i) The pipe material and joints shall be designed appropriately;

(ii) Valves shall be located so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding; and,

(iii) A blow-off shall be provided on the side opposite the supply service, sized in accordance with R.61-58.4(D)(7).

(iv) Blow-offs shall not be directed toward creeks or other water bodies without proper precaution being taken to dechlorinate prior to discharge.

(14) Cross Connections and Interconnections -

(a) Cross connections - There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contamination materials may be discharged or drawn into the system.

(b) Cooling water - Neither steam condensate nor cooling water from engine jackets or other heat exchange devices shall be returned to the potable water supply.

(c) Interconnections - The approval of the Department shall be obtained for interconnections between potable water supplies.

(15) Water Services and Plumbing -

(a) Plumbing - Water services and plumbing shall conform to relevant local plumbing

codes or to the National Plumbing Code.

(b) Booster pumps - Individual home booster pumps shall not be allowed to meet the twenty-five (25) pounds per square inch minimum pressure at the service connection.

(16) Water Loading Stations - To prevent contamination of the public supply, the following criteria shall be met:

(a) Air Gap - A device shall be installed on the fill line to provide an air break and prevent a submerged discharge line.

(b) Hose length - The fill hose and cross connection control device must be constructed so that when hanging freely it will terminate at least two (2) feet above the ground surface.

(c) Fill line terminus - The discharge end of the fill line must be unthreaded and constructed to prevent the attachment of additional hose, piping or other appurtenances.

E. Public Buildings.

Water supply facilities in public buildings shall be designed to provide safe potable water to employees, customers, and guests.

(1) Source of Supply -

(a) Where a separate independent source is provided, it must be constructed in accordance with R.61-58.2 for groundwater systems or R.61-58.3 for surface water systems and treatment must be provided where necessary to meet the Water Quality Standards in R.61-58.5.

(b) Where an emergency or standby source is provided in addition to a service from a public water supply, it must be constructed in accordance with R.61-58.4(E)(1)(a) and maintained in operating condition. Where the main source of supply is from a public system, an approved double check assembly shall be installed after the meter in the main service line.

(c) Non-potable supplies shall not be connected to the potable water system.

(2) Quantity of Supply -

(a) The source of supply where service is provided from a public water system, shall be adequate to provide the instantaneous demand based on the number of fixtures to be provided.

(b) Where a separate source is provided, it must be designed to provide the maximum daily demand.

(3) On-Site Storage -

(a) On-site storage will be considered only where necessary to provide instantaneous demand or fire protection. In either case, the source of supply must be adequate to provide maximum daily demand.

(b) On-site storage, where used, must meet the requirements of R.61-58.4(C).

(4) Cross Connection Control - Public buildings shall be free of cross connections and be designed to meet applicable portions of R.61-58.7(F).

F. Lead Ban.

(1) Any pipe, solder, or flux which is used in the installation or repair of any public water system shall be lead free.

(2) Any pipe, solder, or flux which is used in any plumbing in a residential or nonresidential facility which provides water, through connection to a public water system, for human consumption shall be lead free.

(3) Lead free shall be defined, when used with respect to solders and flux, as those containing not more than two-tenths (0.2) percent lead.

(4) Lead free shall be defined, when used with respect to pipes and pipe fittings, as those containing not more than eight (8.0) percent lead.

(5) Leaded joints necessary for the repair of cast iron pipes shall be exempt from the lead free requirement.

(6) No person may import, manufacture, process, or distribute in commerce a new plumbing fitting or fixture, intended by the manufacturer to dispense water for human ingestion, that contains more than four (4) percent lead by dry weight.

G. Aquifer Storage and Recovery (ASR).

This section applies to the construction of new ASR wells and the modification of existing public water supply wells to allow its use as an ASR well.

(1) ASR Well Design, Construction, and Initial Development.

(a) All ASR wells must be designed, constructed and initially developed in accordance with all applicable sections of R.61-58.2.B.

(b) Underground Injection Control (UIC) Construction Permit: An UIC construction permit pursuant to State Regulation R.61-87 is required for all ASR wells.

(c) Preliminary Engineering Report (PER): A PER must be submitted and reviewed by the Department for all ASR wells in accordance with applicable portions of R.61-58.1.C prior to submission of the construction application.

(d) ASR Wellhead Piping must meet the following minimum requirements:

(i) A properly sized injection line must be provided.

(ii) The injection by-pass line, or main wellhead piping, must be provided with a means of recording instantaneous and totalized flows both in and out of the well.

(iii) A properly placed check valve must be provided in the injection by-pass line.

(iv) A means must be provided to manually isolate the injection line.

(v) Calculations must be provided to show the system can maintain pressure requirements at all services taps during injection.

(2) ASR Water Treatment: All ASR water treatment must be in accordance with all applicable portions of R.61-58.2.D. In addition, all water withdrawn from ASR wells must be properly disinfected in accordance with all applicable requirements of its source water (i.e., groundwater or surface water).

(3) ASR Well Final Development. An UIC permit for the operation of an ASR well must be obtained in accordance with R.61-87.

(a) Well Development Report: A well development report must be submitted and reviewed by the Department under R.61-87 which outlines the findings of the final ASR well development (e.g., injection and withdrawal rates, cycle testing, water quality data).

(b) Location of Discharge: All pumping discharge must be done in accordance with R.61-58.2.B(12)(c).

## R.61-58.5 MAXIMUM CONTAMINANT LEVELS IN DRINKING WATER

A. Applicability.

This regulation shall apply to each public water system, unless the water system meets all of the following conditions:

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

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

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

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

B. Maximum Contaminant Levels for Inorganic Chemicals.

(1) The Maximum Contaminant Levels (MCLs) for inorganic contaminants specified in R.61-58.5(B)(2) shall apply to all public water systems. Compliance with maximum contaminant levels for inorganic chemicals are calculated pursuant to Section (C) below:

(2) The maximum contaminant levels for inorganic chemicals are as follows:

| | Contaminant | Level (mg/L) |
|---|---|---|
| (a) | Arsenic | 0.010** |
| (b) | Asbestos | 7 Million Fibers/liter (longer than 10μm) |
| (c) | Barium | 2.0 |
| (d) | Cadmium | 0.005 |
| (e) | Chromium | 0.1 |
| (f) | Fluoride | 4.0 |
| (g) | Mercury | 0.002 |
| (h) | Nitrate (as Nitrogen) | 10 |
| (i) | Nitrite (as Nitrogen) | 1 |
| (j) | Total Nitrate and Nitrite (as Nitrogen) | 10 |
| (k) | Selenium | 0.05 |
| (l) | Antimony | 0.006 |
| (m) | Beryllium | 0.004 |
| (n) | Cyanide (as free Cyanide) | 0.2 |
| (o) | Thallium | 0.002 |

** The MCL for arsenic is 0.05 milligrams per liter (mg/L) for all public water systems until January 23, 2006.

(3) At the discretion of the Department, nitrate levels not to exceed twenty milligrams per liter may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the Department that:

(a) Such water will not be available to children under six months of age; and,

(b) The non-community water system is meeting the public notification requirements under R.61-58.6(E)(9), including continuous posting of the fact that nitrate levels exceed ten (10) milligrams per liter and the potential health effects of exposure; and,

(c) No adverse health effects shall result from the consumption of this water.

C. Primary Inorganic Chemical Sampling and Analytical Requirements.

(1) The monitoring requirements for inorganic contaminants specified in Section B (2)(b), (c), (d), (e), (g), (k), (l), (m), (n), and (o) above apply to community water systems and non-transient non-community water systems. The monitoring requirements for inorganic contaminants specified in Section B (2)(a) and (f) above only apply to community water systems. Beginning January 22, 2004, the monitoring requirements for the inorganic contaminant specified in Section B (2)(a) above will apply to community water systems and non-transient, non-community water systems. The monitoring required for inorganic contaminants specified in Section B (2)(h), (i) and (j) above apply to community, non-transient non-community and transient non-community water systems.

(2) Analytical methods used to comply with Section B above, shall be made using EPA-approved methods listed in 40 CFR 141. Analyses for the purpose of determining compliance with Section B above are required as follows:

(a) Analyses for all community water systems utilizing surface water sources, in whole or in part, shall be completed within one year following the effective date of this regulation. These analyses shall be repeated at yearly intervals.

(b) Analyses for all community water systems utilizing only groundwater sources shall be completed within two years following the effective date of this regulation. These analyses shall be repeated at three-year intervals.

(c) For non-community water systems, whether supplied by surface or groundwater sources, analyses for nitrate shall be completed within two years following the effective date of this regulation. These analyses shall be repeated at intervals determined by the Department.

(d) The Department shall have the authority to determine compliance or to initiate enforcement action based upon analytical results and other information compiled by the Department.

(3) If the result of an analysis made pursuant to subsection (2) above indicates that the level of any contaminant listed in Section B above exceeds the maximum contaminant level, the supplier of water shall report to the Department within seven days.

(4) When the maximum contaminant level for any contaminant listed in Section B above is exceeded as determined in accordance with subsection (15) below, the supplier of water shall notify the Department and give notice to the public pursuant to R. 61-58.6, Reports, Record Retention, and Public Notification, Sections B and E. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption, or enforcement action shall become effective.

(5) The provisions of subsections (3) and (4) above notwithstanding, compliance with the maximum contaminant level for nitrate and nitrite shall be determined in accordance with subsection (12)(b) below.

(6) For the initial analyses required by items (2)(a), (b), or (c) above, data for surface waters acquired within one year prior to the effective date and data for groundwater acquired within three years prior to the effective date of this regulation may be substituted at the discretion of the Department. Analyses conducted to determine compliance with Section B above shall be made in accordance with the analytical methods adopted by the Department.

(7) Monitoring for the purpose of determining compliance with the maximum contaminant levels specified in Section B (2) above, shall be conducted as follows:

(a) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point) beginning in the 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.

(b) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point) beginning in the 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 purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.]

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

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

(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 and inorganic contaminant shall be in accordance with those listed in 40 CFR 141

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

(e) The frequency of monitoring for asbestos shall be in accordance with paragraph (8) of this section; the frequency of monitoring for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be in accordance with paragraph (9) of this section; the frequency of monitoring for nitrate shall be in accordance with paragraph (10) of this section; and the frequency of monitoring for nitrite shall be in accordance

with paragraph (11) of this section.

(8) The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos specified in Section B(2) above shall be conducted as follows:

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

(b) If the system believes it is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply to the Department for a waiver of the monitoring requirement in paragraph (8)(a) of this section. If the Department grants the waiver, the system is not required to monitor.

(c) The Department 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.

(d) 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 paragraph (8)(a) of this section.

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

(f) A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of paragraph (7) of this section.

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

(h) A system which exceeds the maximum contaminant levels as determined in paragraph (15) of this section shall monitor quarterly beginning in the next quarter after the violation occurred.

(i) The Department may decrease the quarterly monitoring requirement to the frequency specified in paragraph (8)(a) of this section provided the Department has determined that the system is reliably and consistently below the maximum contaminant level. In no case can the Department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface (or combined surface/ground) water system takes a minimum of four quarterly samples.

(j) If monitoring data collected after January 1, 1990 are generally consistent with the requirements of paragraph (8) of this section, then the Department may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(9) The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in Section B(2) above for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium shall be as follows:

(a) Groundwater systems shall take one sample at each sampling point during each compliance period. Surface water systems (or combined surface/ground) shall take one sample annually at each sampling point.

(b) The system may apply to the Department for a waiver from the monitoring frequencies specified in paragraph (9)(a) of this section. The Department may grant a public water system a waiver for monitoring of cyanide, provided that the Department determines that the system is not vulnerable due to lack of any industrial source of cyanide.

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

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

(e) In determining the appropriate reduced monitoring frequency, the Department 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 concentrations such as changes in groundwater pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.

(f) A decision by the Department to grant a waiver shall be made in writing and shall set forth the basis for the determination. The determination may be initiated by the Department or upon an application by the public water system. The public water system shall specify the basis for its request. The Department shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.

(g) Systems which exceed the maximum contaminant levels as calculated in paragraph (15) of this section shall monitor quarterly beginning in the next quarter after the violation occurred.

(h) The Department may decrease the quarterly monitoring requirement to the frequencies specified in paragraphs (9)(a) and (9)(c) of this section provided it has

determined that the system is reliably and consistently below the maximum contaminant level. In no case can the Department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

(i) 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 within a period of time specified by the Department. The system must also comply with the initial sampling frequencies specified by the Department to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.

(10) All public water systems (community; non-transient, non-community; and transient, non-community) shall monitor to determine compliance with the maximum contaminant level for nitrate in Section B above.

(a) Community and non-transient, non-community water systems served by groundwater systems shall monitor annually beginning January 1, 1993; systems served by surface water shall monitor quarterly beginning January 1, 1993.

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

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

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

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

(11) All public water systems (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrite in Section B above.

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

(b) After the initial sample, systems where an analytical result for nitrite is less than 50 percent of the MCL shall monitor at the frequency specified by the Department.

(c) For community, non-transient, non-community, and transient non-community water systems, the repeat monitoring frequency for any water system shall be quarterly for

at least one year following any one sample in which the concentration is 50 percent or more of the MCL. The Department may allow a system to reduce the sampling frequency to annually after determining the system is reliably and consistently less than the MCL.

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

(12) Confirmation samples:

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

(b) Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within 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 (24) hour sampling requirement must immediately notify the consumers served by the area served by the public water system in accordance with R.61-58.6.B and E and meet other Tier 1 public notification requirements under this regulation. Systems exercising this option must take and analyze a confirmation sample within two weeks of notification of the analytical results of the first sample.

(c) If a Department-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 paragraph (15) of this section. The Department has the discretion to delete results of obvious sampling errors.

(13) The Department may require more frequent monitoring than specified in paragraphs (8), (9), (10) and (11) of this section or may require confirmation samples for positive and negative results at its discretion.

(14) Systems may apply to the Department to conduct more frequent monitoring than the minimum monitoring frequencies specified in this section.

(15) Compliance with Section B(2) above (as appropriate) shall be determined based on the analytical result(s) obtained at each sampling point.

(a) For systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, 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 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. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(b) For systems which are monitoring annually, or less frequently, the system is out of

compliance with the maximum contaminant levels for arsenic, asbestos, antimony, 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 Department, the determination of compliance will be based on the average of the two samples. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(c) Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one sample if the levels of these contaminants is 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 paragraph (12)(b) of this section, and compliance shall be determined based on the average of the initial and confirmation samples

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

(16) Each public water system shall monitor at the time designated by the Department during each compliance period

(17) Inorganic Analysis

(a) Analysis for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium shall be conducted using EPA-approved methods listed in 40 CFR 141.

(b) 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 EPA-approved methods listed in 40 CFR 141.

(c) Analysis under this section shall only be conducted by laboratories that have been certified by the Department.

D. Maximum Contaminant Levels for Organic Chemicals.

(1) The following are the maximum contaminant levels for organic chemicals. The MCLs specified in R.61-58.5(D)(2) below, apply to all public water systems. The maximum contaminant level for total trihalomethanes is pursuant to Section P below.

(2) The maximum contaminant levels for organic chemicals are as follows:

| **Contaminant** | | | **Level, mg/L** |
|---|---|---|---|
| (a) | Reserved | | |
| (b) | (i) | Alachlor | 0.002 |
| | (ii) | Atrazine | 0.003 |
| | (iii) | Carbofuran | 0.04 |
| | (iv) | Chlordane | 0.002 |
| | (v) | Dibromochloropropane | 0.0002 |
| | (vi) | 2,4-D | 0.07 |
| | (vii) | Ethylene dibromide (EDB) | 0.00005 |
| | (viii) | Heptachlor | 0.0004 |
| | (ix) | Heptachlor epoxide | 0.0002 |
| | (x) | Lindane | 0.0002 |

| | | |
|---|---|---|
| (xi) | Methoxychlor | 0.04 |
| (xii) | Polychlorinated biphenyls(PCBs) | 0.0005 |
| (xiii) | Pentachlorophenol | 0.001 |
| (xiv) | Toxaphene | 0.003 |
| (xv) | 2,4,5-TP | 0.05 |
| (xvi) | Benzo[a]pyrene | 0.0002 |
| (xvii) | Dalapon | 0.2 |
| (xviii) | Di(2-ethylhexyl)adipate | 0.4 |
| (xvix) | Di(2-ethylhexyl)phthalate | 0.006 |
| (xx) | Dinoseb | 0.007 |
| (xxi) | Diquat | 0.02 |
| (xxii) | Endothall | 0.1 |
| (xxiii) | Endrin | 0.002 |
| (xxiv) | Glyphosate | 0.7 |
| (xxv) | Hexachlorobenzene | 0.001 |
| (xxvi) | Hexachlorocyclopentadiene | 0.05 |
| (xxvii) | Oxamyl (vydate) | 0.2 |
| (xxviii) | Picloram | 0.5 |
| (xxvix) | Simazine | 0.004 |
| (xxx) | 2,3,7,8-TCDD (Dioxin) | $3 \times 10^{-8}$ |

E. Organic Chemicals Other Than Total Trihalomethanes, Sampling and Analytical Requirements.

(1) The monitoring requirements for organic contaminants specified in R.61-58.5(D)(2)(a) shall apply to all community water systems. The monitoring requirements for organic contaminants specified in 61-58.5(D)(2)(b) shall apply to community water systems and non-transient non-community water systems.

(2) Reserved.

(3) Reserved.

(4) Reserved.

(5) Reserved.

(6) Reserved.

(7) Analytical methods used to comply with Section D(2)(b) above, shall be made using EPA-approved methods listed in 40 CFR 141. Analysis of the contaminants listed in Section D(2)(b) above, for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows:

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

(b) Surface water systems shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point). Each sample must

be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. [Note: For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.]

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

(d) Monitoring frequency:

(i) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in Section D(2)(b) above, 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 quarterly samples in one year during each repeat compliance period.

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

(e) Each community and non-transient water system may apply to the Department for a waiver from the requirement of paragraph (7)(d) of this section. A system must reapply for a waiver for each compliance period.

(f) The Department may grant a waiver after evaluating the following factor(s): Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the Department reveals no previous use of the contaminant within the watershed or zone 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.).

(g) If an organic contaminant listed in Section D(2)(b) above, is detected (as defined by paragraph (7)(r) of this section) in any sample, then:

(i) Each system must monitor quarterly at each sampling point which resulted in a detection.

(ii) The Department may decrease the quarterly monitoring requirement specified in paragraph (7)(g)(i) of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the Department make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.

(iii) After the Department determines the system is reliably and consistently below the maximum contaminant level the Department may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.

(iv) Systems which have 3 consecutive annual samples with no detection of a contaminant may apply to the Department for a waiver as specified in paragraph (7)(f) of this section.

(v) Groundwater systems which have detected one 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 or more of the two-carbon organic compounds was detected. If the results of the first analysis do not detect vinyl chloride, the Department may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one sample during each compliance period. Surface water systems are required to monitor for vinyl chloride as specified by the Department.

(h) Systems which violate the requirements of Section D(2)(b) above, as determined by paragraph (7)(k) of this section must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the Department determines the system is reliably and consistently below the MCL, as specified in paragraph (7)(k) of this section, the system shall monitor at the frequency specified in paragraph (7)(g)(iii) of this section.

(i) The Department may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Department, the result must be averaged with the first sampling result and the average used for the compliance determination as specified by paragraph (7)(k) of this section. The Department has the discretion to delete results of obvious sampling errors from this calculation.

(j) The Department may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for

analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.

(i) If the concentration in the composite sample detects one or more contaminants listed in Section D(2)(b) above, then a follow-up sample must be taken 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 Department within 14 days of collection.

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

(k) Compliance with Section D(2)(b) above, shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

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

(ii) Systems monitoring annually or less frequently whose sample result exceeds the regulatory detection level as defined by paragraph (7)(r) of this section must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one 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.

(l) [Reserved]

(m) Analysis for PCBs shall be conducted using EPA-approved methods listed in 40 CFR 141.

(i) [Reserved]

(ii) [Reserved]

(iii) Compliance with the PCB MCL shall be determined based upon the quantitative results of analyses using EPA-approved methods listed in 40 CFR 141.

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

(o) The Department may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctuations in concentration due to seasonal use, changes in water source).

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

(q) Each public water system shall monitor at the time designated by the Department within each compliance period.

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

| **Contaminant** | **Detection Limit** |
|---|---|
| Alachlor | 0.0002 mg/L |
| Atrazine | 0.0001 mg/L |
| Benzo[a]pyrene | 0.00002 mg/L |
| Carbofuran | 0.0009 mg/L |
| Chlordane | 0.0002 mg/L |
| Dalapon | 0.001 mg/L |
| Dibromochloropropane (DBCP) | 0.00002 mg/L |
| Di (2-ethylhexly) adipate | 0.0006 mg/L |
| Di (2-ethylhexly) phthalate | 0.0006 mg/L |
| Dinoseb | 0.0002 mg/L |
| Diquat | 0.0004 mg/L |
| 2,4-D | 0.0001 mg/L |
| Endothall | 0.009 mg/L |
| Endrin | 0.00001 mg/L |
| Ethylene dibromide (EDB) | 0.00001 mg/L |
| Glyphosate | 0.006 mg/L |
| Heptachlor | 0.00004 mg/L |
| Heptachlor epoxide | 0.00002 mg/L |
| Hexachlorobenzene | 0.0001 mg/L |
| Hexachlorocyclopentadiene | 0.0001 mg/L |
| Lindane | 0.00002 mg/L |
| Methoxychlor | 0.0001 mg/L |
| Oxamyl | 0.002 mg/L |
| Picloram | 0.0001 mg/L |
| Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl) | 0.0001 mg/L |
| Pentachlorophenol | 0.00004 mg/L |
| Simazine | 0.00007 mg/L |
| Toxaphene | 0.001 mg/L |
| 2,3,7,8-TCDD (Dioxin) | 0.000000005 mg/L |
| 2,4,5-TP (Silvex) | 0.0002 mg/L |

(s) All new systems or systems that used a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the Department. The system must also comply with the initial sampling frequencies specified by the Department to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.

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

These maximum contaminant levels shall apply to all public water systems.

(1) The MCL is based on the presence or absence of total coliforms in a sample, rather than coliform density.

(a) For a system which collects at least forty (40) samples per month, if no more than five (5.0) percent of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms.

(b) For a system which collects fewer than forty (40) samples per month, if no more than one (1) sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

(2) Any fecal coliform-positive repeat sample or E. coli-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or E. coli-positive routine sample constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in R.61-58.6.E, this is a violation that may pose an acute risk to health.

(3) A water system shall determine compliance with the MCL for total coliforms in paragraphs (1) and (2) of this section for each month in which it is required to monitor for total coliforms.

G. Microbiological Contaminant Sampling and Analytical Requirements.

These sampling and analytical requirements shall apply to community and non-community water systems. Analytical methods used to comply with Section F above, shall be made using EPA-approved methods listed in 40 CFR 141.

(1) Routine Monitoring.

(a) Community and non-community water systems shall 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 Department review and revision.

(b) The monitoring frequency for total coliforms for community water systems is based on the population served by the system, as follows:

| **Population Served** | | | **Minimum # 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 |
| 41,001 | to | 50,000 | 50 |
| 50,001 | to | 59,000 | 60 |
| 59,001 | to | 70,000 | 70 |
| 70,001 | to | 83,000 | 80 |
| 83,001 | to | 96,000 | 90 |
| 96,001 | to | 130,000 | 100 |
| 130,001 | to | 220,000 | 120 |
| 220,001 | to | 320,000 | 150 |
| 320,001 | to | 450,000 | 180 |
| 450,001 | to | 600,000 | 210 |
| 600,001 | to | 780,000 | 240 |
| 780,001 | to | 970,000 | 270 |
| 970,001 | to | 1,230,000 | 300 |
| 1,230,001 | to | 1,520,000 | 330 |
| 1,520,001 | to | 1,850,000 | 360 |
| 1,850,001 | to | 2,270,000 | 390 |
| 2,270,001 | to | 3,020,000 | 420 |
| 3,020,001 | to | 3,960,000 | 450 |
| 3,960,001 | or more | | 480 |

[1]Includes public water systems which have at least fifteen (15) service connections, but serve fewer than twenty-five (25) persons.

If a community water system serving twenty-five (25) to one-thousand (1,000) persons has no history of total coliform contamination in its current configuration and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and is free of sanitary defects, the Department may reduce the monitoring frequency specified above, except that in no case may the Department reduce the monitoring frequency to less than one sample per quarter. The Department must approve the reduced monitoring frequency in writing.

(i) [Reserved]

(ii) Community water systems shall make at a minimum one fecal or total coliform density measurement each day from the raw water source, and one coliform density or presence/absence measurement from the finished water, if treating surface water. This requirement may be waived by the Department on a case-by-case basis if a public water supply can demonstrate that such monitoring is unnecessary.

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

(i) A non-community water system using only ground water (except ground

water under the direct influence of surface water) and serving one-thousand (1,000) persons or fewer shall monitor each calendar quarter that the system provides water to the public, except that the Department may reduce this monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. Beginning June 29, 1994, the Department cannot reduce the monitoring frequency for a non-community water system using only ground water (except ground water under the direct influence of surface water) and serving one-thousand (1,000) persons or fewer to less than once per year.

(ii) A non-community water system using only ground water (except ground water under the direct influence of surface water) and serving more than one-thousand (1,000) persons during any month shall monitor at the same frequency as a like-sized community water system, as specified in paragraph (1)(b) of this section, except that the Department may reduce this monitoring frequency, in writing, for any month the system serves one-thousand (1,000) persons or fewer. The Department cannot reduce the monitoring frequency to less than once per year. For systems using ground water under the direct influence of surface water, paragraph (1)(c)(iv) of this section applies.

(iii) A non-community water system using surface water, in total or in part, shall monitor at the same frequency as a like-sized community water system, as specified in paragraph (1)(b) of this section, regardless of the number of persons it serves.

(iv) A non-community water system using ground water under the direct influence of surface water shall monitor at the same frequency as a like-sized community water system, as specified in paragraph (1)(b) of this section. The system shall begin monitoring at this frequency beginning six (6) months after the Department determines that the ground water is under the direct influence of surface water.

(d) The community or non-community water system shall collect samples at regular time intervals throughout the month, except that a system which uses ground water (except ground water under the direct influence of surface water), and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

(e) A community or non-community water systems that uses surface water or ground water under the direct influence of surface water and does not practice filtration in compliance with R.61-58.10 shall collect at least one sample near the first service connection each day the turbidity level of the source water, measured as specified in R.61-58.10.F(2)(b), exceeds 1 NTU. This sample shall be analyzed for the presence of total coliforms. When one or more turbidity measurements in any day exceed 1 NTU, the system shall collect this coliform sample within 24 hours of the first exceedance, unless the Department determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within thirty (30) hours of collection. Sample results from this coliform monitoring shall be included in determining compliance with the MCL for total coliforms in Section F above.

(f) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the MCL for total coliforms in Section F above. Repeat samples taken pursuant to paragraph (2) of this section are not considered special purpose

samples, and shall be used to determine compliance with the MCL for total coliforms in Section F above.

(2) Repeat Monitoring.

(a) If a routine sample is total coliform-positive, the community or non-community water system shall collect a set of repeat samples within twenty-four (24) hours of being notified of the positive result. A system which collects more than one routine sample per month shall collect no fewer than three repeat samples for each total coliform-positive sample found. A system which collects one routine sample per month or fewer shall collect no fewer than four repeat samples for each total coliform-positive sample found. The Department 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 Department shall specify how much time the system has to collect the repeat samples.

(b) The system shall collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five (5) service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the Department may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

(c) The system shall collect all repeat samples on the same day, except that the Department may allow a system with a single service connection to collect the required set of repeat samples over a four-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one routine sample per month).

(d) If one or more repeat samples in the set is total coliform-positive, the water system shall collect an additional set of repeat samples in the manner specified in paragraphs (2)(a) through (c) of this section. The additional samples shall be collected within twenty-four (24) hours of being notified of the positive result, unless the Department extends the limit as provided in paragraph (2)(a) of this section. The system shall repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in Section F above, has been exceeded and notifies the Department.

(e) If a system collecting fewer than five routine samples per month has one or more total coliform-positive samples and the Department does not invalidate the sample(s) under paragraph (3) of this section, it shall collect at least five routine samples during the next month the system provides water to the public, except that the Department may waive this requirement if the conditions of paragraph (2)(e)(i) or (ii) of this section are met. The Department cannot waive the requirement for a system to collect repeat samples in paragraphs (2)(a) through (d) of this section.

(i) The Department may waive the requirement to collect five routine samples the next month the system provides water to the public if the Department, or an agent approved by the Department, performs a site visit before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit shall be sufficiently detailed to allow the Department to determine whether additional monitoring and/or any corrective

action is needed. The Department cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the Department to perform sanitary surveys.

(ii) The Department may waive the requirement to collect five routine samples the next month the system provides water to the public if the Department has determined 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. In this case, the Department shall document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the Department official who recommends such a decision, and make this document available to the EPA and public. The written documentation shall 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 Department cannot waive the requirement to collect five 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 this paragraph, a system shall still take at least one 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 R.61-58.5.F, unless the Department has determined that the system has corrected the contamination problem before the system took the set of repeat samples required in paragraphs (2)(a) through (d) of this section, and all repeat samples were total coliform-negative.

(f) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(g) Results of all routine and repeat samples not invalidated by the Department shall be included in determining compliance with the MCL for total coliforms in Section F above.

(3) Invalidation of total coliform samples.

A total coliform-positive sample invalidated under this paragraph does not count towards meeting the minimum monitoring requirements of this section.

(a) The Department may invalidate a total coliform-positive sample only if the conditions of paragraph (3)(a)(i), (ii) or (iii) of this section are met.

(i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.

(ii) The Department, on the basis of the results of repeat samples collected as required by paragraphs (2)(a) through (d) of this section, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The Department cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform- positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are

total coliform-negative (e.g., the Department cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform- negative, or if the public water system has only one service connection).

(iii) The Department has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system shall still collect all repeat samples required under paragraphs (2)(a) through (d) of this section, and use them to determine compliance with the MCL for total coliforms in Section F above. To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision shall be documented in writing, and approved and signed by the supervisor of the Department official who recommended the decision. The Department shall make this document available to the EPA and the public. The written documentation shall state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The Department may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(b) A laboratory shall invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the Multiple-Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence (P-A) Coliform Test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the Department shall be notified, and the system shall collect another sample from the same location as the original sample within twenty-four (24) hours of being notified of the interference problem, and shall have it analyzed for the presence of total coliforms. The system shall continue to re-sample within twenty-four (24) hours and have the samples analyzed until it obtains a valid result. The Department may waive the twenty-four (24) hour time limit on a case-by-case basis.

(4) Sanitary Surveys.

(a) (i) Public water systems which do not collect five (5) or more routine samples per month shall undergo an initial sanitary survey by June 29, 1994, for community water systems and June 29, 1999, for non-community water systems. hereafter, systems shall 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 Department, shall undergo subsequent sanitary surveys at least every ten (10) years after the initial sanitary survey. The Department shall review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the system needs to undertake to improve drinking water quality.

(ii) In conducting a sanitary survey of a system using ground water in a State having an EPA-approved wellhead protection program under the Federal Safe Drinking Water Act, information on sources of contamination within the delineated wellhead protection area that was collected in the course of developing and implementing the program should be considered instead of collecting new information, if the information was collected since the last time the system was subject to a sanitary survey.

(b) Sanitary surveys shall be performed by the Department or an agent approved by the Department. The system is responsible for ensuring the survey takes place.

(c) Sanitary surveys conducted by the Department under the provisions of 40 CFR 142.16(o)(2) may be used to meet the sanitary survey requirements of R.61-58.5.G(4).

(5) Fecal coliforms/Escherichia coli (E. coli) testing.

(a) If any routine or repeat sample is total coliform positive, the system shall analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for E. coli in lieu of fecal coliforms. If fecal coliforms or E. coli are present, the system shall notify the Department by the end of the day when the system is notified of the test result, unless the system is notified of the result after the Department is closed, in which case the system shall notify the Department before the end of the next business day.

(b) The Department has the discretion to allow a public water system, on a case-by-case basis, to forego 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 shall notify the Department as specified in paragraph (5)(a) of this section and the provisions of Section F(2) above, apply.

(6) Analytical methodology.

(a) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

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

(c) Analytical methods used to comply with R.61-58.5.G shall be in accordance with EPA-approved methods listed in 40 CFR 141 (11-8-06 edition).

(d) Water systems must conduct fecal coliform analysis in accordance with the procedure outlined in 40 CFR 141.21(f)(5) (11-8-06 edition).

(e) Water systems must conduct Escherichia coli analysis in accordance with the analytical methods outlined in 40 CFR 141.21(f)(6) (11-8-06 edition).

(7) Response to violation.

(a) A water system which has exceeded the MCL for total coliforms in Section F above, shall report the violation to the Department no later than the end of the next business day after it learns of the violation, and shall notify the public in accordance with R.61-58.6.E.

(b) A water system which has failed to comply with a coliform monitoring requirement, including the sanitary survey requirement, shall report the monitoring violation to the Department within ten days after the system discovers the violation, and shall notify the public in accordance with R.61-58.6.E.

H. Maximum Contaminant Levels for Radionuclides.

(1) The maximum contaminant level for radionuclides are applicable to all public water systems. Compliance with the maximum contaminant levels for radionuclides is calculated pursuant to Section I below.

(2) MCL for combined radium-226 and -228. The maximum contaminant level for combined radium-226 and radium-228 is 5 pCi/L. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

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

(4) MCL for beta particle and photon radioactivity.

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

(b) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of two (2) liters 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. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

**TABLE A: AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR**

| Radionuclide | Critical organ | pCi per liter |
|---|---|---|
| 1. Tritium | Total body | 20,000 |
| 2. Strontium-90 | Bone Marrow | 8 |

(5) MCL for uranium. The maximum contaminant level for uranium is 30 μg/L.

(6) Compliance dates. 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 paragraphs (2), (3), (4), and (5) of this section beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of Sections I and K below. Compliance with reporting requirements for the radionuclides under Appendix D to R.61-58.12 and Appendices A , B and C to R.61-58.6 is required on December 8, 2003.

(7) Best available technologies (BATs) for radionuclides. The Administrator, pursuant to section 1412 of the Federal Safe Drinking Water Act, 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. |

(8) Small systems compliance technologies list for radionuclides.

**TABLE C: LIST OF SMALL SYSTEMS COMPLIANCE TECHNOLOGIES FOR RADIONUCLIDES AND LIMITATIONS TO USE**

| Unit technologies | Limitations (see foot-notes) | Operator skill level required. [1] | Raw water quality range and considerations.[1] |
|---|---|---|---|
| 1. Ion exchange (IE) | ( a ) | Intermediate | All ground waters. |
| 2. Point of use (POU 2 ) IE | ( b ) | Basic | All ground waters. |
| 3. Reverse osmosis (RO) | ( c ) | Advanced | Surface waters usually require pre-filtration. |
| 4. POU[2] RO | ( b ) | Basic | Surface waters usually require pre-filtration. |
| 5. Lime softening | ( d ) | Advanced | All waters. |
| 6. Green sand filtration | ( e ) | Basic. | |
| 7. Co-precipitation with Barium sulfate | ( f ) | Intermediate to Advanced | Ground waters with suitable water quality. |
| 8. Electrodialysis/ electrodialysis reversal | ..... | Basic to 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 con-centrations may affect regeneration frequency. |
| 11. Enhanced coagulation/ filtration | ( i ) | Advanced | Can treat a wide range of water qualities. |

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

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

Limitations Footnotes: Technologies for Radionuclides:

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

[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 RADIONUCLIDES**

| Contaminant | Compliance technologies [1] for system size categories (population served) | | |
|---|---|---|---|
| | 25B500 | 501B3,300 | 3,300B10,000 |
| 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 the Table C above.

I. Monitoring Frequency and Compliance Requirements for Radionuclides in Community Water Systems.

(1) This section shall apply only to community water systems which serve at least fifteen (15) service connections used by year-round residents or systems which regularly serve at least twenty-five (25) year -round residents. Suppliers of water for applicable community water systems shall analyze for radionuclides to determine compliance with Section H above.

(2) The monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium.

(a) Community water systems (CWSs) must conduct initial monitoring to determine compliance with Section H(2), (3) and (5) above by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, "detection limit" is defined as in Section K(3) below.

(i) Applicability and sampling location for existing community water systems or sources. All existing CWSs using ground water, surface water or systems using both ground and surface water (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 Department has designated a distribution system location, in accordance with paragraph (2)(b)(ii)(C) of this

section.

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

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

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

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

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

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

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

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

(c) Reduced monitoring: The Department 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 Section K(3)(a) below, 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 one-half (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 one-half (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 one-half (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 one-half (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 one-half (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 Department.

(d) 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 Department will treat analytical results from the composited 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 one-half (1/2) MCL, the Department may direct the system to take additional quarterly samples before allowing the system to sample under a reduced monitoring schedule.

(e) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not

exceed 5 pCi/l. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/l.

The gross alpha measurement shall have a confidence interval of 95 percent (1.65 sigma, where sigma is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, one-half (1/2) the detection limit will be used to determine compliance and the future monitoring frequency.

(3) Monitoring and compliance requirements for beta particle and photon radioactivity.

To determine compliance with the maximum contaminant levels in paragraph (4) of this section for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

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

(i) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the Department may reduce the frequency of monitoring at that sampling point to once every three (3) years. Systems must collect all samples required in paragraph (2)(a) of this section during the reduced monitoring period.

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

(b) Community water systems (both surface and ground water) designated by the Department as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. 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 quarter after being notified by the Department. Systems already designated by the Department as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the Department reviews and either reaffirms or removes the designation.

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

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

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

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

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

(c) Community water systems designated by the Department to monitor for beta particle and photon radioactivity can not apply to the Department for a waiver from the monitoring frequencies specified in paragraph (2)(a) or (2)(b) of this section.

(d) Community water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for the gross beta particle activity analysis. 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.

(e) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and summed to determine compliance with Section H(4)(a) above , using the formula in Section H(4)(b) above. Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(f) Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in R.61-58.5.H(4)(a), beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of three (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 paragraphs (3)(a)(i) or (3)(b)(iv) of this section.

(4) General monitoring and compliance requirements for radionuclides.

(a) The Department may require more frequent monitoring than specified R.61-58.5.I(1) or (2), or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

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

(c) Compliance: Compliance with Section H(2) through (5) above, 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, one-half (1/2) the detection limit will be used to calculate the annual average.

(d) The Department has the discretion to delete results of obvious sampling or analytic errors.

(e) If the MCL for radioactivity set forth in Section H(2) through (5) above, is exceeded, the operator of a community water system must give notice to the Department pursuant to R.61-58.6.

J. Maximum Contaminant Level Goals for Radionuclides.

MCLGs for radionuclides are as indicated in the following table:

| Contaminant | MCLG |
|---|---|
| 1. Combined radium-226 and radium-228 | Zero. |
| 2. Gross alpha particle activity (excluding radon and uranium) | Zero. |
| 3. Beta particle and photon radioactivity | Zero. |
| 4. Uranium | Zero. |

K. Analytical Methods for Radionuclides.

(1) Analysis for the following contaminants shall be conducted to determine compliance with Section H above, (radioactivity) in accordance with the methods adopted by the Department.

(2) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radio-analysis is defined in terms of detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus one hundred percent at the ninety-five percent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample). To determine compliance with Sections H and J above, the detection limits shall not exceed those set form by the Administrator.

(3) To judge compliance with the maximum contaminant levels listed in Sections H and J above, averages of data shall be used and shall be round to the same number of significant figures as the maximum contaminant level for the substance in question.

(a) To determine compliance with Section H(2), (3), and (5), above the detection limit shall not exceed the concentrations in Table B to this paragraph.

**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 | I microgram/L |

(b) To determine compliance with Section H(4) above, the detection limits shall not exceed the concentrations listed in Table C to this paragraph.

**TABLE C: DETECTION LIMITS FOR MAN-MADE BETA PARTICLES AND PHOTON EMITTERS**

| Contaminant | 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 |

(4) To judge compliance with the maximum contaminant levels listed in Section H above, 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.

L. [Reserved]

M. [Reserved]

N. Maximum Contaminant Levels for Volatile Synthetic Organic Chemicals (VOCs).

(1) The maximum contaminant levels for volatile synthetic organic chemicals (VOCs) apply to all public water systems.

(2) The maximum contaminant levels for volatile synthetic organic chemicals (VOCs) are as follows:

| | Contaminant | MCL (mg/L) |
|---|---|---|
| (a) | Vinyl chloride | 0.002 |
| (b) | Benzene | 0.005 |
| (c) | Carbon tetrachloride | 0.005 |
| (d) | 1,2-Dichloroethane | 0.005 |
| (e) | Trichloroethylene | 0.005 |
| (f) | para-Dichlorobenzene | 0.075 |
| (g) | 1,1,-Dichloroethylene | 0.007 |
| (h) | 1,1,1-Trichloroethane | 0.2 |
| (i) | cis-1,2-Dichloroethylene | 0.07 |
| (j) | 1,2-Dichloropropane | 0.005 |
| (k) | Ethylbenzene | 0.7 |
| (l) | Monochlorobenzene | 0.1 |
| (m) | o-Dichlorobenzene | 0.6 |
| (n) | Styrene | 0.1 |
| (o) | Tetrachloroethylene | 0.005 |
| (p) | Toluene | 1 |
| (q) | trans-1,2-Dichloroethylene | 0.1 |
| (r) | Xylenes (total) | 10 |
| (s) | Dichloromethane | 0.005 |
| (t) | 1,2,4-Trichlorobenzene | 0.07 |
| (u) | 1,1,2-Trichloroethane | 0.005 |

O. VOC Monitoring, Sampling and Analytical Requirements.

(1) This section shall apply to community and non-transient non-community water systems.

(2) Beginning with the initial compliance period analysis of the contaminants listed in Section N(2) above, for the purpose of determining compliance with the maximum contaminant level shall be conducted as follows:

(a) Groundwater systems shall take a minimum of one (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.

(b) 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.

(c) 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 is being used).

(d) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in Section N(2)(b) through (u) above, during each compliance period beginning in the initial compliance period.

(e) If the initial monitoring for contaminants listed in Section N(2)(a) through (h) and the monitoring for the contaminants listed in Section N(2)(i) through (u) as allowed in paragraph (2)(r) of this section, has been completed by December 31, 1992, and the system did not detect any contaminant listed in Section N(2) above, then each ground and surface water system shall take one (1) sample annually beginning with the initial compliance period.

(f) After a minimum of three (3) years of annual sampling, the Department may allow groundwater systems with no previous detection of any contaminant listed in Section N(2) above, to take one (1) sample during each compliance period.

(g) Each community and non-transient non-community ground water system which does not detect a contaminant listed in Section N(2) above, may apply to the Department for a waiver from the requirement of paragraphs (4)(e) and (4)(f) of this section after completing the initial monitoring. (For the purposes of this section, detection is defined as 0.0005 mg/L.) A waiver shall be effective for no more than six (6) years (two compliance periods). The Department may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene.

(h) The Department 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 of influence of the system. If a

determination by the Department reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted.

(ii) If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.

(A) Previous analytical results.

(B) The proximity of the system to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities.

(C) The environmental persistence and transport of the contaminants.

(D) The number of persons served by the public water system and the proximity of a smaller system to a larger system.

(E) How well the water source is protected against contamination such as whether it is a surface or groundwater system. 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.

(i) 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 sample during two compliance periods or six years) and update its vulnerability assessment considering the factors listed in paragraph (2)(h) of this section. Based on this vulnerability assessment the Department must reconfirm that the system is non-vulnerable. If the Department does not make this reconfirmation within three (3) years of the initial determination, then the waiver is invalidated and the system is required to sample annually as specified in paragraph (e) of this section.

(j) Each community and non-transient non-community surface water system which does not detect a contaminant listed in Section N(2) above may apply to the Department for a waiver from the requirements of paragraph (4)(e) of this section after completing the initial monitoring. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Systems meeting this criteria must be determined by the Department to be non-vulnerable based upon a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the Department (if any).

(k) If a contaminant listed in Section N (2)(b) through (u) above, is detected at a level exceeding 0.0005 mg/L in any sample, then:

(l) Systems which violate the requirements of Section N(2) above, as determined by paragraph (2)(o) of this section must monitor quarterly. After a minimum of four (4) consecutive quarterly samples which shows the system is in compliance as specified in paragraph (2)(o) of this section, the system and the Department determines that the system

is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and time specified in paragraph (4)(k)(iii) of this section.

(m) The Department may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Department, the result must be averaged with the first sampling result and the average is used for the compliance determination as specified by paragraph (2)(o) of this section. The Department has the discretion to delete results of obvious sampling errors from this calculation.

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

(i) If the concentration in the composite sample is 0.0005 mg/L for any contaminant listed in Section N(2) above, 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 instead of resampling. The duplicate must be analyzed and the results reported to the Department within fourteen (14) days of collection.

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

(iv) Compositing samples prior to GC analysis.

(A) 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.

(B) The samples must be cooled at $4^{o}C$ during this step to minimize volatilization losses.

(C) Mix well and draw out a 5-ml aliquot for analysis.

(D) Follow sample introduction, purging, and desorption steps described in the method.

(E) If less than five samples are used for compositing, a proportionately small syringe may be used.

(v) Compositing samples prior to GC/MS analysis.

(A) 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.

(B) The total volume of the sample in the purging device must be 25 ml.

(C) Purge and desorb as described in the method.

(o) Compliance with Section N(2) above, shall be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

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

(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 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.

(p) Analysis for the contaminants listed in Section N(2) above, shall be conducted using EPA-approved methods listed in 40 CFR 141.

(q) Analysis under this section shall only be conducted by laboratories that are certified by the Department.

(r) The Department may allow the use of monitoring data collected after January 1, 1988, for purposes of initial monitoring compliance. If the data are generally consistent with the other requirements in this section, the Department may use those data (i.e., a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement of paragraph (2)(d) of this section. Systems which use grandfathered samples and did not detect any contaminant listed in Section N(2)(b) through (u) above shall begin monitoring annually in accordance with paragraph (2)(e) of this section beginning with the initial compliance period.

(s) The Department may increase required monitoring where necessary to detect variations within the system.

(t) Each public water system shall monitor at the time designated by the Department within each compliance period.

(u) 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 within a period of time specified by the Department. The system must also comply with the initial sampling frequencies specified by the Department to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in

accordance with the requirements in this section.

(3) If a community or a non-transient non-community water system fails to comply with an applicable VOC MCL, that system shall give notice to the customers served by the system in accordance with the requirements of R.61-58.6.E.

P. Maximum Contaminant Levels for Disinfection Byproducts.

(1) Bromate and Chlorite

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

| Disinfection Byproduct | MCL (mg/L) |
|---|---|
| Bromate | 0.010 |
| Chlorite | 1.0 |

(a) Compliance Dates. Community water systems and non-transient non-community water systems that use a surface water source or a ground water source under the influence of surface water serving 10,000 or more persons must comply with this section beginning January 1, 2002. Community water systems and non-community non-transient water systems that use a surface water source or a ground water source under the influence of surface water serving fewer than 10,000 persons and community water systems and non-community non-transient water systems using only ground water not under the direct influence of surface water must comply with this section beginning January 1, 2004.

(b) Best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for bromate and chlorite identified in this section are specified in 40 CFR 141.64 (a)(2) (1-04-06 edition).

(2) TTHM and HAA5.

(a) Stage 1 DBP Rule Running Annual Average (RAA) compliance.

The maximum contaminant levels (MCLs) for TTHM and HAA5 are as follows:

| Disinfection Byproduct | MCL (mg/L) |
|---|---|
| Total Trihalomethanes (TTHM) | 0.080 |
| Haloacetic Acids (five) (HAA5) | 0.060 |

(i) Compliance dates. Subpart H systems serving 10,000 or more persons must comply with this paragraph (2)(a) beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this paragraph (2)(a) beginning January 1, 2004. All systems must comply with these MCLs until the date specified for Stage 2 DBP Rule compliance in R.61-58.15.B(2).

(ii) Best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this section are specified in 40 CFR 141.64 (b)(1)(ii) (1-04-06 edition).

(b) Stage 2 DBP Rule Locational Running Annual Average (LRAA) compliance.

The maximum contaminant levels (MCLs) for TTHM and HAA5 are as follows:

| Disinfection Byproduct | MCL (mg/L) |
|---|---|
| Total Trihalomethanes (TTHM) | 0.080 |
| Haloacetic Acids (five) (HAA5) | 0.060 |

(i) Compliance dates. The MCLs for TTHM and HAA5 must be complied with as a locational running annual average at each monitoring location beginning the date specified in R.61-58.15.B(2).

(ii) Best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this section are specified in 40 CFR 141.64 (b)(2)(ii), and 40 CFR 141.64 (b)(2)(iii) (1-04-06 edition).

Q. Maximum Residual Disinfectant Levels (MRDLs) for Disinfectants.

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

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

(2) Compliance dates.

(a) Community water systems and non-transient non-community water systems that use a surface water source or a ground water source under the influence of surface water serving 10,000 or more persons must comply with this section beginning January 1, 2002. Community water systems and non-community non-transient water systems that use a surface water source or a ground water source under the influence of surface water serving fewer than 10,000 persons and community water systems and non-community non-transient water systems using only ground water not under the direct influence of surface water must comply with this section beginning January 1, 2004.

(b) Transient non-community water systems that use a surface water source or a ground water source under the influence of surface water 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. Transient non-community water systems that use a surface water source or a ground water source under the influence of surface water systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and transient non-community water 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.

R. Secondary Maximum Contaminant Levels.

(1) The secondary maximum contaminant levels are applicable to all public water systems.

(2) The secondary maximum contaminant levels are as follows:

| Contaminant | Level |
|---|---|
| Aluminum | 0.05 to 0.2 mg/L |
| Chloride | 250 mg/L |
| Color | 15 color units |
| Copper | 1 mg/L |
| Corrosivity | Noncorrosive |
| Fluoride | 2.0 mg/L |
| Foaming agents | 0.5 mg/L |
| Iron | 0.3 mg/L |
| Manganese | 0.05 mg/L |
| Odor | 3 threshold odor number |
| pH | 6.5 to 8.5 s.u. |
| Silver | 0.1 mg/L |
| Sulfate | 250 mg/L |
| Total Dissolved Solids (TDS) | 500 mg/L |
| Zinc | 5 mg/L |

(3) The Department may establish higher or lower levels which may be appropriate depending upon local conditions provided the supplier of water is able to demonstrate that use of the water will not adversely affect the public health and welfare. In evaluating the affect to the public health and welfare, the supplier of water may evaluate the unavailability of alternate water sources; the economic evaluation of necessary treatment or other compelling factors that may prevent compliance.

(4) Community water systems that exceed the secondary MCL for fluoride, as determined by the last single sample taken in accordance with the requirements of these regulations, shall send the notice described in paragraph (5) of this section, to: (1) all existing billing units, (2) all new billing units at the time service begins, and (3) the Department.

(5) The public notice that shall be used by systems which exceed the secondary MCL for fluoride shall contain the specific language outlined in R.61-58.6.E(8), and no additional language except as necessary to complete the notice.

S. Secondary Maximum Contaminant Levels Sampling and Analytical Requirements.

(1) This section shall apply only to community and non-community water systems which serve at least fifteen service connections or regularly serve an average of at least twenty-five individuals daily at least sixty (60) days out of the year.

(2) At the discretion of the Department any community or non-community water system may be required to monitor, in whole or in part, for secondary maximum contaminant levels listed in Section R(2) or for any other secondary standard designated by the Department.

(3) For the initial analyses required by paragraph (2) of this section, data for surface waters acquired within one (1) year prior to the effective date and data for groundwaters acquired within three (3) years prior to the effective date of this regulation may be substituted at the discretion of the Department. Analyses conducted to determine compliance with Section R above shall be made using EPA-approved methods listed in 40 CFR 141.

T. Special Monitoring for Inorganic and Organic Contaminants.

(1) All community and non-transient non-community water supply systems shall conduct special monitoring for the following contaminants. Systems serving 10,000 or fewer persons are not required to monitor for the contaminants in the section after December 31, 1998.

| | |
|---|---|
| Chloroform | 1,3-Dichloropropane |
| Bromodichloromethane | Chloromethane |
| Chlorodibromomethane | Bromomethane |
| Bromoform | 1,2,3-Trichloropropane |
| Chlorobenzene | 1,1,1,2-Tetrachloroethane |
| m-Dichlorobenzene | Chloroethane |
| 2,2-Dichloropropane | 1,1-Dichloropropene |
| o-Chlorotoluene | 1,1-Dichloroethane |
| Bromobenzene | 1,1,2,2-Tetrachloroethane |
| 1,3-Dichloropropene | p-Chlorotoluene |

(2) Monitoring for the organic compounds listed in paragraph (1) of this section, shall begin no later than the date specified below:

| Population Served | Initial Monitoring Date |
|---|---|
| >10,000 | No later than January 1, 1988 |
| 3,300 - 10,000 | No later than January 1, 1989 |
| <3,300 | No later than January 1, 1991 |

(3) Surface water systems shall sample at points in the distribution system representative of each water source or at entry points to the distribution system after any application of treatment. The minimum number of samples is one year of quarterly samples per water source.

(4) Ground water systems shall sample at points of entry to the distribution system representative of each well after any application of treatment. The minimum number of samples is one (1) sample per entry point to the distribution system.

(5) The Department may require confirmation samples for positive or negative results.

(6) (Reserved)

(7) Analysis under this section shall be conducted using EPA-approved methods listed in 40 CFR 141.

(8) Analysis under this section shall only be performed by laboratories which are certified by the Department.

(9) Public water systems may use monitoring data collected any time after January 1, 1983, to meet the requirements of paragraph (1) of this section, provided that the monitoring program was consistent with the requirements of this section. In addition, the results of EPA's Ground Water Supply Survey may be used in a similar manner for systems supplied by a single well.

(10) At the Department's discretion, community water systems and non-transient non-community water systems may be required to conduct special monitoring for the following contaminants:

| | |
|---|---|
| 1,2,4-Trimethylbenzene | p-Isopropyltoluene |
| 1,2,4-Trichlorobenzene | Isopropylbenzene |
| 1,2,3-Trichlorobenzene | Tert-butylbenzene |
| n-Propylbenzene | Sec-butylbenzene |
| n-Butylbenzene | Fluorotrichloromethane |
| Naphthalene | Dichlorodifluoromethane |
| Hexachlorobutadiene | Bromochloromethane |
| 1,3,5-Trimethylbenzene | |

(11) All community and non-transient non-community water systems shall repeat the monitoring required by this Section no less frequently than every five (5) years from the dates specified in paragraph (2) of this section.

(12) The Department or public water systems may composite up to five samples when monitoring for the organic contaminants in paragraphs (1) and (10) of this section.

(13) Monitoring of the contaminants listed in paragraphs (13)(k) and (l) of this section, shall be conducted as follows:

(a) Each community and non-transient, non-community water system shall take four consecutive quarterly samples at each sampling point for each contaminant listed in paragraph (13)(k) of this section and report the results to the Department. Monitoring must be completed by December 31, 1995.

(b) Each community and non-transient non-community water system shall take one sample at each sampling point for each contaminant listed in paragraph (13)(l) of this section and report the results to the Department. Monitoring must be completed by December 31, 1995.

(c) Each community and non-transient non-community water system may apply to the Department for a waiver from the requirements of paragraph (13)(a) and (b) of this section.

(d) The Department may grant a waiver for the requirement of paragraph (13)(a) of this section based on the criteria specified in Section E(7)(f) above. The Department may grant a waiver from the requirement of paragraph (13)(b) of this section if previous analytical results indicate contamination would not occur, provided this data was collected after January 1, 1990.

(e) 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.

(f) 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.]

(g) 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 is being used).

(h) The Department may require a confirmation sample for positive or negative results.

(i) The Department 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. Compositing of samples must be done in the laboratory and the composite sample must be analyzed within fourteen (14) days of collection. If the population served by the system is greater than3,300 persons, then compositing may only be permitted by the Department at sampling points within a single system. In systems serving 3,300 persons or less, the Department may permit compositing among different systems provided the 5-sample limit is maintained.

(j) Instead of performing the monitoring required by this section, a community water system or non-transient non-community water system serving fewer than 150 service connections may send a letter to the Department stating that the system is available for sampling. This letter must be sent to the Department by January 1, 1994. The system shall not send such samples to the Department, unless requested to do so by the Department.

(k) List of Unregulated Organic Contaminants:

| Organic Contaminants | EPA Analytical Method |
|---|---|
| Aldicarb | 531.1 |
| Aldicarb sulfone | 531.1 |
| Aldicarb sulfoxide | 531.1 |
| Aldrin | 505, 508, 525.1 |
| Butachlor | 507, 525.1 |
| Carbaryl | 531.1 |
| Dicamba | 515.1 |
| Dieldrin | 505, 508, 525.1 |
| 3-Hydroxycarbofuran | 531.1 |
| Methomyl | 531.1 |
| Metolachlor | 507, 525.1 |
| Metribuzin | 507, 525.1 |
| Propachlor | 508, 525.1 |

(l) List of Unregulated Inorganic Contaminants:

| Inorganic Contaminant | EPA Analytical Method |
|---|---|
| Sulfate | Colorimetric |

(14) The owner or operator of a community or non-transient non-community water system that is required to monitor in accordance with this section shall send a copy of the results of such monitoring within thirty (30) days of receipt, and a copy of any public notice under paragraph (15) of this section, to the Department.

(15) The owner or operator shall notify the persons served by the system of the availability of the results of sampling conducted in accordance with this section by including a notice in the first set of water bills issued by the system after the receipt of the results or written notice within three (3) months. The notice shall identify a person and supply the telephone number to contact for information on the monitoring results. For surface water systems, public notification is required only after the first quarter's monitoring and must include a statement that additional monitoring will be conducted for three (3) more quarters with the results available upon request.

U. Special Monitoring for Sodium.

(1) Suppliers of water for community public water systems shall collect and analyze one (1) sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three (3) years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the Department's approval, be considered one (1) treatment plant for determining the minimum number of samples. The supplier of water may be required by the Department to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(2) The supplier of water shall report to the Department the results of the analyses for sodium within the first ten (10) days of the month following the month in which the sample results were received or within the first ten (10) days following the end of the required monitoring period as stipulated by the Department, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within ten (10) days of the month following the month in which the analytical results of the last sample used for the annual average was received.

(3) The supplier of water shall notify the appropriate local public health officials of the sodium levels in the water by written notice by direct mail within three (3) months after receiving the results of analyses. Within ten (10) days after notifying the local public health officials, the supplier of water shall forward a copy of such written notice to the Department. The supplier of water is not required to notify local public health officials where the Department provides such notices.

(4) Analysis for sodium shall be conducted using EPA-approved methods listed in 40 CFR 141.

V. Special Monitoring for Corrosivity Characteristics.

(1)-(3)[Reserved]

(4) The supplier of water for applicable community water systems shall identify and report to the Department whether the following construction materials are present in their distribution system:

(a) Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing.

(b) Copper from piping and alloys, service lines and home plumbing.

(c) Galvanized piping, service lines and home plumbing.

(d) Ferrous piping materials such as cast iron and steel.

(e) Vinyl lined asbestos cement pipe.

(f) Coal tar lined pipes and tanks.

(g) Asbestos cement pipe.

W. Special Monitoring and Notification Requirements.

The Department shall perform such monitoring as is necessary to insure the quality and integrity of results of tests, measurements, or analyses reported by the supplier of water. Should such monitoring by the Department indicate a violation of the maximum contaminant levels, or the presence of any contaminant at levels considered to be a real or potential threat to the public's health, the Department at its discretion may notify the public or require the supplier of water to notify the public pursuant to R.61-58.6.E, or other method deemed appropriate by the Department and initiate the necessary action to eliminate the violation or contaminant.

X. Monitoring of Consecutive Public Water Systems.

When a public water system supplies water to one or more other public water systems, the Department may modify the monitoring requirements imposed by this regulation to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the Department and concurred in by the Administrator.

Y. Criteria and Procedures for Public Water Systems using Point-of-Entry Devices.

(1) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this section.

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

(3) The public water system must develop and obtain Department approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the Department, point-of-entry devices must provide health protection equivalent to central water treatment. "Equivalent" means that the water would meet all State primary drinking water regulations 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) The public water system must properly apply effective technology under a plan approved by the Department and must maintain the microbiological safety of the water.

(a) The public water system must provide adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-entry devices.

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

(5) The public water system must protect all consumers. Every building connected to the

system must have a point-of-entry device installed, maintained, and adequately monitored. The public water system must assure that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

Z. Use of Other Non-Centralized Treatment Devices.

Public water systems shall not use bottled water or point-of-use devices to achieve compliance with an established maximum contaminant level. Bottled water or point-of-use devices may be used on a temporary basis to avoid an unreasonable risk to health.

AA. Treatment Techniques.

(1) This section establishes criteria and requirements for treatment techniques in lieu of maximum contaminant levels for specified contaminants. This section applies to all public water systems.

(2) Treatment techniques for acrylamide and epichlorohydrin. Each public water system must certify annually in writing to the Department (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 Department.

BB. Approved Laboratories.

For the purpose of determining compliance with R.61-58.5.B through R.61-58.5.V, R.61-58.5.CC, R.61-58.10.F, R.61-58.11.D, and R.61-58.16.E, samples may be considered only if they have been analyzed by a laboratory approved by the Department, except that measurements for turbidity may be performed by a properly certified water treatment plant operator.

CC. Alternative Analytical Techniques.

With express written permission of the Department, concurred in by the Administrator, an alternative analytical technique may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by this regulation.

## R.61-58.6 REPORTS, RECORD RETENTION AND PUBLIC NOTIFICATION OF DRINKING WATER VIOLATIONS

A. Applicability.

This regulation specifies the information public water supplies are required to report to the Department; the information they are required to retain; and the conditions and procedure for making public notification of a violation. This regulation shall apply to each public water system, unless the public water system meets all of the following conditions:

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

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

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

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

B. Reporting Requirements.

(1) Except where a shorter reporting period is specified in this regulation, the supplier of water shall report to the Department the results of any test, measurement or analysis required to be made by the primary drinking water regulation within ten calendar days following the end of the month in which the result is received or within ten calendar days following the end of the monitoring period specified by the Department, whichever of these is shortest. Such report shall be in form established by the Department.

(2) If the result of an analysis made pursuant to the requirements of R.61-58.5, Maximum Contaminant Levels in Drinking Water, indicates that the level of any contaminant listed in said regulation exceeds the maximum contaminant level, the supplier of water shall report these findings to the Department within seven days of receiving the results.

(3) Except where a different reporting period is specified in these regulations, the supplier of water shall report to the Department within 48 hours the failure to comply with any national primary drinking water regulations (including failure to comply with monitoring requirements) as set forth in these regulations.

(4) The supplier of water is not required to report analytical results to the Department in cases where a State Laboratory performs the analysis and reports the results to the Department.

(5) The public water system, within ten (10) days of completing the public notification requirements under Section E below for the initial public notice and any repeat notices, must submit to the Department a certification that it has fully complied with the public notification regulations. The public water system must include with this certification a representative copy of each type of notice distributed, published, posted, and made available to the persons served by the system and to the media.

(6) The public water system shall submit to the Department, when requested, within the time stated in the request, copies of any records required to be maintained under R.61-58.6.D or copies of any documents then in existence which the Department or the EPA Administrator is entitled to inspect pursuant to the authority of section 1445 of the Safe Drinking Water Act or the equivalent provisions of State law.

C. Reports To Be Submitted.

All reports listed below are to be on a form or in a format (written or electronic) approved by the Department.

(1) By the tenth calendar day of each month, the supplier of water for each surface water treatment plant shall complete and submit to the Department, as a minimum, the following reports for the previous month:

(a) Surface Water Supply Monthly Operation Report

(b) Bacteriological Summary Analysis Report

(c) Turbidity Summary Analysis Report

(2) By the tenth calendar day of each month, the supplier of water, who operates a groundwater treatment plant that provides water to a community water system serving at least fifteen service connections or twenty-five individuals on a continuous basis, shall complete and submit to the Department, as a minimum, the following reports for the previous month:

(a) Ground Water Supply Monthly Operation Report

(b) Bacteriological Summary Analysis Report (if eight or more bacteriological samples are collected each month)

(3) By the tenth calendar day of each month, the supplier of water, who uses wells as a sole source of supply for a community water system serving at least fifteen service connections or twenty-five individuals on a continuous basis, and does not treat the water, shall complete and submit to the Department, as a minimum, the following reports for the previous month:

(a) Bacteriological Summary Analysis Report (if eight or more bacteriological samples are collected each month)

(b) Bacteriological Analysis Report (if seven or less bacteriological samples are collected each month)

(c) The total amount of water pumped from the wells each month and the total volume of water delivered to the customers each month, if the information is available

(4) By the tenth calendar day of each month, the supplier of water, who obtains water from another public water supply and provides it to a community water system serving at least fifteen service connections or twenty-five individuals on a continuous basis, shall complete and submit to the Department, as a minimum, the following reports for the previous month:

(a) Bacteriological Summary Analysis Report (if eight or more bacteriological samples are collected each month)

(b) Bacteriological Analysis Report (if seven or less bacteriological samples are collected each month)

(c) The total amount of water purchased each month and the total amount of water delivered to the customers each month, where required by the Department

(5) By the tenth calendar day of each month, the supplier of water, who operates a groundwater treatment plant using treatment processes other than the addition of chlorine or corrosion inhibitor or the adjustment of pH, and which provides water to a non-community water system serving at least fifteen service connections or an average of at least twenty-five individuals daily at least sixty days out of the year, shall complete and submit to the Department, as a minimum, the following reports for the previous month:

(a) Ground Water Supply Monthly Operation Report

(b) Bacteriological Summary Analysis Report (if eight or more bacteriological samples are collected each month)

(c) Bacteriological Analysis Report (if seven or less bacteriological samples are collected each month)

(6) Based on complaints received, the results of chemical, or bacteriological testing or the findings of sanitary surveys, the Department may require the supplier of water for any community or non-community water system not described in subsections (1) through (5) above to submit any necessary reports or monitoring data at a frequency established by the Department.

(7) If a water level measuring device has been installed in a well serving a public water supply, the supplier of water shall measure and record the static and pumping water levels on a quarterly basis. The results shall be forwarded to the Department by the tenth calendar day of the following month.

(8) The supplier of water for a community water system that serves more than one hundred service connections shall monitor the operating pressure in the distribution system annually and shall record the date and location where each pressure test was made and the pressure in pounds per square inch. A copy of the results shall be made available to the Department upon request. Records of these results shall be maintained for a period not less than three years.

(9) In the event the Department finds it necessary to require a supplier of water to monitor for chemical parameters on a schedule more stringent than required for routine monitoring, the supplier of water shall submit the monitoring data by the tenth calendar day of the month following the month in which the data was received.

D. Record Keeping.

(1) Any supplier of water subject to the provisions of this regulation and R.61-58.5, Maximum Contaminant Levels in Drinking Water, shall retain on the premises at a convenient location near the premises all appropriate records, and make them available for inspection by the Department and the public upon request.

(2) These records shall include the following:

(a) Records of microbiological analyses and turbidity analyses made pursuant to the State Primary Drinking Water Regulation: R.61-58 shall be kept for not less than five (5) years. Records of chemical analyses made pursuant to the State Primary Drinking Water Regulation: R.61-58 shall be kept for not less than ten years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

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

(ii) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample.

(iii) Date of analysis.

(iv) Laboratory and person responsible for performing analysis.

(v) The analytical technique or method used.

(vi) The results of the analysis.

(b) Records of action taken by the supplier of water to correct violation of regulations, shall be kept for a period not less than three years after the last action with respect to the particular violation involved.

(c) Copies of any written reports, summaries, or communications relating to sanitary surveys or operational inspections of the public water supply conducted by the supplier of water, by a private consultant, or by any local, state, or federal agency, shall be kept for a period not less than ten years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the public water supply shall be kept for a period ending not less than five years following the expiration of such variance or exemption.

(e) Copies of public notices issued pursuant to Section E below and certifications made to the Department pursuant to the provisions of this regulation must be kept for three (3) years after issuance.

(f) Copies of monitoring plans developed pursuant to the State Primary Drinking Water Regulation: R.61-58 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 this regulation.

E. Public Notification of Drinking Water Violations.

(1) General public notification requirements:

(a) ***Who must give public notice?*** Each owner or operator of a public water system (community water systems, non-transient non-community water systems, and transient non community water systems) must give notice for all violations of State Primary Drinking Water Regulations (SPDWR) and for other situations, as listed in Table 1. The term "SPDWR violations" is used in this regulation to include violations of the maximum contaminant level (MCL), maximum residual disinfection level (MRDL), treatment technique (TT), monitoring requirements, and testing procedures in this regulation. Appendix A to this regulation identifies the tier assignment for each specific violation or situation requiring a public notice.

**TABLE 1: VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A PUBLIC NOTICE**

(1) SPDWR 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 R.61-58.9:
- (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 Department under R.61-58.5.B(3).
- (iii) Exceedance of the secondary maximum contaminant level (SMCL) for fluoride.
- (iv) Availability of unregulated contaminant monitoring data.
- (v) Other violations and situations determined by the Department to require a public notice under this regulation, not already listed in Appendix A to this regulation.

(b) ***What type of public notice is required for each violation or situation?*** 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 to this regulation identifies the tier assignment for each specific violation or situation.

**TABLE 2: DEFINITION OF PUBLIC NOTICE TIERS**

(1) Tier 1 public notice -- required for SPDWR 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 SPDWR violations and situations with potential to have serious adverse effects on human health.

(3) Tier 3 public notice -- required for all other SPDWR violations and situations not included in Tier 1 and Tier 2.

(c) ***Who must be notified****?*

(i) Each public water system must provide public notice to persons served by the water system, in accordance with this regulation. Public water systems that sell or otherwise provide drinking water to other public water systems (i.e., to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice to the persons it serves.

(ii) If a public water system has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system, the Department may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission by the Department for limiting distribution of the notice must be granted in writing.

(iii) A copy of the notice must also be sent to the Department, in accordance with the requirements of R.61-58.6.B(5).

(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 regulation identifies the tier assignment for each specific violation or situation.

**TABLE 1: 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 R.61-58.5.F(2)), 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 R.61-58.5.G(5)); |
| (2) Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, as defined in R.61-58.5.B, 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 R.61-58.5.C(12)b); |
| (3) Exceedance of the nitrate MCL by non-community water systems, where permitted to exceed the MCL by the Department under R.61-58.5.B(3), as required under paragraph (9) of this section; |
| (4) Violation of the MRDL for chlorine dioxide, as defined in R.61-58.5.Q(1), when one or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system, as specified in R.61-58.13.D(3)(b)(i); |
| (5) Violation of the turbidity MCL under R.61-58.10(C), (E), (H), or (I), where the Department determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the |

system learns of the violation;

(6) Violation of the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR) or Long Term 1 Enhanced Surface Water Treatment Rule (LT1EWSTR) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit (as identified in Appendix A to this regulation), where the Department determines after consultation that a Tier 1 notice is required or where consultation does not take place within twenty-four (24) hours after the system learns of the violation;

(7) Occurrence of a waterborne disease outbreak, as defined in R.61-58(B)(174), 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 R.61-58.16.E(1) or R.61-58.16.E(2).

(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 Department 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****?* Public water systems must:

(i) Provide a public notice as soon as practical but no later than twenty-four (24) hours after the system learns of the violation;

(ii) Initiate consultation with the Department as soon as practical, but no later than twenty-four (24) hours after the public water system learns of the violation or situation, to determine additional public notice requirements; and

(iii) Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the Department. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.

(c) ***What is the form and manner of the public notice****?* Public water systems must provide the notice within twenty-four (24) hours in a form and manner reasonably calculated to reach all persons served. The form and manner used by the public water system are to fit the specific situation, but must be designed to reach residential, transient, and non-transient users of the water system. In order to reach all persons served, water systems are to use, at a minimum, one or more of the following forms of delivery:

(i) Appropriate broadcast media (such as radio and television);

(ii) Posting of the notice in conspicuous locations throughout the area served by the water system;

(iii) Hand delivery of the notice to persons served by the water system; or

(iv) Another delivery method approved in writing by the Department.

(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 regulation identifies the tier assignment for each specific violation or situation.

**TABLE 1: 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 paragraph (2)(a) of this section or where the Department determines that a Tier 1 notice is required; |
| (2) Violations of the monitoring and testing procedure requirements, where the Department determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation; and |
| (3) Failure to comply with the terms and conditions of any variance or exemption in place. |
| (4) Failure to take corrective action or failure to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department approved combination of 4-log virus inactivation and removal) before or at the first customer under R.61-58.16.F(1). |

(b) ***When is the Tier 2 public notice to be provided****?*

(i) Public water systems must provide the public notice as soon as practical, but no later than thirty (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 Department 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 Department to grant an extension to the thirty (30) day deadline for any unresolved violation or to allow across-the-board extensions by rule or policy for other violations or situations requiring a Tier 2 public notice. Extensions granted by the Department must be in writing.

(ii) The public water system must repeat the notice every three (3) months as long as the violation or situation persists, unless the Department 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 Department 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. It is also not appropriate for the Department 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. Department determinations allowing repeat notices to be given less frequently than once every three (3) months must be in writing.

(iii) For the turbidity violations specified in this paragraph, public water systems must consult with the Department as soon as practical but no later than twenty-four (24) hours after the public water system learns of the violation, to determine whether a Tier 1 public notice under paragraph (2)(a) of this section is required to protect public health. When consultation does not take place within the twenty-four (24) hour period, the water system must distribute a Tier 1 notice of the violation within the next twenty-four (24) hours (i.e., no later than forty-eight (48) hours after the system learns of the violation), following the requirements under paragraphs (b) and (c) of this section. Consultation with the Department is required for:

(A) Violation of the turbidity MCL under R.61-58.10(C), (E), (H), or (I ); or

(B) Violation of the SWTR, IESWTR or LT1ESWTR 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?*** Public water systems must provide the initial public notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

(i) Unless directed otherwise by the Department in writing, community water systems must provide notice by:

(A) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

(B) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in R.61-58.6.E(3)(c)(i)(A). Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public

places served by the system or on the Internet; or delivery to community organizations.

(ii) Unless directed otherwise by the Department in writing, non-community water systems must provide notice by:

(A) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(B) Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in R.61-58.6.E(3)(c)(ii)(A). Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

(4) Tier 3 Public Notice: 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 regulation identifies the tier assignment for each specific violation or situation.

**TABLE 1: VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 3 PUBLIC NOTICE**

| |
|---|
| (1) Monitoring violations under R.61-58.5, except where a Tier 1 notice is required under paragraph (2)(a) of this section or where the Department determines that a Tier 2 notice is required; |
| (2) Failure to comply with a testing procedure established in R.61-58.5, except where a Tier 1 notice is required under paragraph (2)(a) of this section or where the Department determines that a Tier 2 notice is required; |
| (3) Operation under a variance or an exemption granted under R.61-58.9; |
| (4) Availability of unregulated contaminant monitoring results, as required under paragraph (7) of this section; and |
| (5) Exceedance of the fluoride secondary maximum contaminant level (SMCL), as required under paragraph (8) of this section. |

(b) ***When is the Tier 3 public notice to be provided?***

(i) Public water systems must provide the public notice not later than one (1) year after the public water system learns of the violation or situation or begins

operating under a variance or exemption. Following the initial notice, the public water system must repeat the notice annually for as long as the violation, variance, exemption, or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, exemption, or other situation persists, but in no case less than seven (7) days (even if the violation or situation is resolved).

(ii) Instead of individual Tier 3 public notices, a public water system may use an annual report detailing all violations and situations that occurred during the previous twelve months, as long as the timing requirements of paragraph (b)(i) of this section are met.

(c) ***What is the form and manner of the Tier 3 public notice****?* Public water systems must provide the initial notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

(i) Unless directed otherwise by the Department in writing, community water systems must provide notice by:

(A) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

(B) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (c)(i)(A) of this section. 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.

(ii) Unless directed otherwise by the Department in writing, non-community water systems must provide notice by:

(A) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(B) Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in paragraph (c)(ii)(A) of this section. 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 R.61-58.12 of this regulation may be used as a vehicle for the initial Tier 3 public notice and all required repeat notices, as long as:

(i) The CCR is provided to persons served no later than twelve (12) months after the system learns of the violation or situation as required under paragraph (4)(b) of this section;

(ii) The Tier 3 notice contained in the CCR follows the content requirements under paragraph (5) of this section; and

(iii) The CCR is distributed following the delivery requirements under paragraph (4)(c) of this section.

(5) Content of the Public Notice.

(a) ***What elements must be included in the public notice for violations of State Primary Drinking Water Regulations (SPDWR) or other situations requiring a public notice?*** When a public water system violates a SPDWR or has a situation requiring public notification, each public notice must include the following elements:

(i) A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);

(ii) When the violation or situation occurred;

(iii) Any potential adverse health effects from the violation or situation, including the standard language under paragraphs (d)(i) or (d)(ii) of this section, whichever is applicable;

(iv) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;

(v) Whether alternative water supplies should be used;

(vi) What actions consumers should take, including when they should seek medical help, if known;

(vii) What the system is doing to correct the violation or situation;

(viii)When the water system expects to return to compliance or resolve the situation;

(ix) The name, business address, and phone number of the water system owner, operator, or designee of the public water system as a source of additional information concerning the notice; and

(x) A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under paragraph (d)(iii) of this section, where applicable.

(b) ***What elements must be included in the public notice for public water systems operating under a variance or exemption****?*

(i) If a public water system has been granted a variance or an exemption, the public notice must contain:

(A) An explanation of the reasons for the variance or exemption;

(B) The date on which the variance or exemption was issued;

(C) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(D) A notice of any opportunity for public input in the review of the variance or exemption.

(ii) If a public water system violates the conditions of a variance or exemption, the public notice must contain the ten elements listed in paragraph (a) of this section.

(c) ***How is the public notice to be presented?***

(i) Each public notice required by this section:

(A) Must be displayed in a conspicuous way when printed or posted;

(B) Must not contain overly technical language or very small print;

(C) Must not be formatted in a way that defeats the purpose of the notice;

(D) Must not contain language which nullifies the purpose of the notice.

(ii) Each public notice required by this section must comply with multilingual requirements, as follows:

(A) For public water systems serving a large proportion of non-English speaking consumers, as determined by the Department, 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.

(B) In cases where the Department has not determined what constitutes a large proportion of non-English speaking consumers, the public water system must include in the public notice the same information as in paragraph (c)(ii)(A) of this section, where appropriate to reach a large proportion of non-English speaking persons served by the water system.

(d) ***What standard language must public water systems include in their public notice?*** Public water systems are required to include the following standard language in their public notice:

(i) Standard health effects language for MCL or MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption. Public water systems must include in each public notice the health effects language specified in Appendix B to this regulation corresponding to each MCL, MRDL, and treatment technique violation listed in Appendix A to this regulation, and for each violation of a condition of a variance or exemption.

(ii) Standard language for monitoring and testing procedure violations. Public water systems must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in Appendix A to this regulation:

"We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During [compliance period], we "did not monitor or test" or "did not complete all monitoring or testing" for [contaminant(s)], and therefore cannot be sure of the quality of your drinking water during that time."

(iii) Standard language to encourage the distribution of the public notice to all persons served. Public water systems must include in their notice the following language (where applicable): Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

(6) Notice to New Billing Units or New Customers.

(a) ***What is the requirement for community water systems?*** Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

(b) What is the requirement for non-community water systems? Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

(7) Special Notice of the Availability of Unregulated Contaminant Monitoring Results.

(a) ***When is the special notice to be given?*** The owner or operator of a community water system or non-transient, non-community water system required to monitor under R.61-58.5.T 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

paragraphs (4)(c), (d)(i), and (d)(iii) of this section. The notice must also identify a person and provide the telephone number to contact for information on the monitoring results.

(8) Special Notice for Exceedance of the SMCL for Fluoride.

(a) ***When is the special notice to be given*?** Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of 2 mg/L as specified in R.61-58.5.R (determined by the last single sample taken in accordance with R.61-58.5.C, but do not exceed the maximum contaminant level (MCL) of 4 mg/L for fluoride (as specified in R.61-58.5.B), must provide the public notice in paragraph (c) of this section to persons served. Public notice must be provided as soon as practical but no later than twelve (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 State public health officer. The public water system must repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice must remain in place for as long as the SMCL is exceeded, but in no case less than seven (7) days (even if the exceedance is eliminated). On a case-by-case basis, the Department may require an initial notice sooner than twelve (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 paragraphs (4)(c) and (d)(i) and (d)(iii) of this section.

(c) ***What mandatory language must be contained in the special notice?*** The notice must contain the following language, including the language necessary to fill in the blanks:

"This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/L) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your community water system [name] has a fluoride concentration of [insert value] mg/L.

Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water.

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."

(9) Special notice for Nitrate Exceedances Above MCL by Non-Community Water Systems (NCWS), Where Granted Permission by the Department under R.61-58.5.B(3).

(a) ***When is the special notice to be given?*** The owner or operator of a non-community water system granted permission by the Department under R.61-58.5.B(3) to exceed the nitrate MCL must provide notice to persons served according to the requirements for a Tier 1 notice under paragraphs (2)(a) and (b) of this section.

(b) ***What is the form and manner of the special notice?*** Non-community water systems granted permission by the Department to exceed the nitrate MCL under R.61-58.5.B(3) 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 paragraph (2)(c) of this section and the content requirements under paragraph (5) of this section.

(10) Notice by Department on Behalf of the Public Water System.

(a) ***May the Department give the notice on behalf of the public water system****?* The Department may give the notice required by this regulation on behalf of the owner and operator of the public water system if the Department complies with the requirements of this regulation.

(b) ***What is the responsibility of the public water system when notice is given by the primacy agency****?* The owner or operator of the public water system remains responsible for ensuring that the requirements of this regulation are met.

(11) Special notice for repeated failure to conduct monitoring of the source water for Cryptosporidium and for failure to determine bin classification or mean Cryptosporidium level

(a) Special notice for repeated failure to monitor.

The owner or operator of a community or non-community water system that is required to monitor source water under R.61-58.10.K(2) must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any 3 months of monitoring as specified in R.61-58.10.K(2)(c). The notice must be repeated as specified in R.61-58.6.E(3)(b).

(b) Special notice for failure to determine bin classification or mean Cryptosporidium level.

The owner or operator of a community or non-community water system that is required to determine a bin classification under R.61-58.10.K(11), or to determine mean Cryptosporidium level under R.61-58.10.K(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 to report the determination as specified in R.61-58.10.K(11)(e) or R.61-58.10.K(13)(a), respectively. The notice must be repeated as specified in R.61-58.6.E(3)(b). The notice is not required if the system is complying with a Department-approved schedule to address the violation.

(c) 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 R.61-58.6.E(3)(c). The public notice must be presented as required in R.61-58.6.E(5)(c).

(d) Mandatory language that must be contained in the special notice.

The notice must contain the following language, including the language necessary to fill in the blanks.

(i) 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)".

(ii) 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.

## R.61-58.7 OPERATION AND MAINTENANCE

A. Applicability.

This regulation applies to all public water systems, no matter when constructed, and establishes minimum requirements for the operation and maintenance of the system in order to ensure the delivery of safe, potable water to the public. Existing systems may be required to upgrade to comply with regulations 61-58.2, 58.3, or 58.4:

(1) when no construction permit exists, or;

(2) when required by the Department as the result of a sanitary survey.

B. General Requirements for Operation and Maintenance of Public Water Systems.

(1) All water systems must be operated and maintained in accordance with their construction and operating permit(s) and any approved modifications.

(2) Each system shall have and maintain up-to-date written Standard Operating Procedures for the operation and maintenance of its system. These procedures shall include but not be limited to:

(a) detailed instructions for the operation of all major components of the water system, including wells and/or intakes, pumps, chemical feed equipment, etc.

(b) detailed instructions on starting and stopping any treatment plant;

(c) preventive maintenance schedules on equipment;

(d) reporting and public notification requirements;

(e) water quality monitoring, including frequency of monitoring and sampling and analytical procedures for any monitoring conducted by the water system;

(f) sample siting plans;

(g) disinfection requirements for the new construction of, or the repair of, wells, tanks and water lines;

(h) valve and fire hydrant maintenance;

(i) distribution system flushing program;

(j) leak detection and repair program;

(k) cross connection control program; and,

(l) safety procedures.

(3) All chemical feed systems that are in operation shall be monitored as often as necessary to ensure proper operation. Documentation must be maintained.

(4) The water from each treatment process shall be sampled and analyzed as often as necessary to ensure that the treatment process is functioning properly, but in no case less than once a day.

The operator shall maintain a written record of all analyses conducted. These records shall be kept for a minimum of three (3) years. Except where otherwise noted, any analyses conducted for compliance with the monitoring requirements of R.61-58.5, R.61-58.10, R.61-58.11 and R.61-58.13, shall be performed by a laboratory certified by the Department and the records of these analyses kept on file in accordance with the retention schedules outlined in the regulations. All other monitoring conducted for the purpose of process control shall be performed using equipment and methodology acceptable to the Department.

(5) If a combined phosphate or poly-phosphate chemical is used, total phosphate residual monitoring may be conducted once every two weeks in lieu of the daily monitoring as required in R.61-58.7(B)(4).

(6) The operator shall measure the amounts of chemicals used each day and calculate the dosages. The operator shall maintain a written record of all measurements and dosage calculations. These records shall be kept for a minimum of 3 years.

(7) The system shall have immediate access to parts for routine repairs and shall repair any malfunctioning equipment as soon as possible.

(8) Chemical spills shall be cleaned up promptly and disposed of properly. Any chemical spills which are not contained and reach the environment shall be reported to the Department immediately.

(9) Where chlorine gas is used, the following shall apply:

(a) Chlorine gas feed and storage rooms shall be maintained in a reasonably air tight condition. The louvers on the air inlet and on the discharge side of the ventilating fan shall be maintained to ensure proper closure when the fan is not in use. Weather striping on the door shall be maintained in good condition and no opening shall be allowed to exist between the rooms and other parts of the treatment plant. If a floor drain is provided, a water seal or removable plug must be maintained to prevent escaped gases from exiting through the building sewer.

(b) The doors to the chlorine gas feed and storage rooms shall be kept closed except while being occupied by authorized personnel.

(c) The chlorine gas feed and storage rooms shall be well lighted.

(d) Ammonia shall not be stored in the same room with chlorine gas cylinders or feed equipment.

(e) The ventilating fans for the chlorine gas feed and storage rooms shall work properly at all times, and be manually controlled only. If the fans should ever malfunction, they shall be repaired or replaced promptly.

(f) The vents from the feeders and storage shall be maintained free of any debris.

(g) All cylinders (full and empty) shall be restrained.

(h) The chlorinator room shall be heated to maintain proper temperature for operation.

(i) There shall be no equipment housed in the chlorine feed room except chlorinators, chlorine cylinders, weighing scales, heater, ventilation fan, light(s), chlorine gas leak detector(s), and chlorinator appurtenances.

(j) Scales for weighing cylinders shall be calibrated yearly and properly maintained.

(k) The chlorine feed system shall be operated to ensure continuous feed of chlorine when the plant is operating.

(l) A chlorine leak detection and alarm system shall be in service at all times.

(m) The public water system shall have an emergency action plan for addressing chlorine leaks.

(10) Where ammonia gas is used, the following shall apply:

(a) Ammonia gas feed and storage rooms shall be maintained in a reasonably air tight condition. The louvers on the air inlet and on the discharge side of the ventilating fan shall be maintained to ensure proper closure when the fan is not in use. Weather striping on the door shall be maintained in good condition and no opening shall be allowed to exist between the rooms and other parts of the treatment plant.

(b) The doors to the ammonia gas feed and storage rooms shall be kept closed except while occupied by authorized personnel.

(c) The ammonia gas feed and storage rooms shall be well lighted.

(d) The ventilating fans for the ammonia gas feed and storage rooms shall work properly at all times, and be manually controlled only. If the fans should ever malfunction, they shall be repaired or replaced promptly.

(e) Chlorine shall not be stored in the same room with ammonia gas cylinders or feed equipment.

(f) The vents from the feeders and storage shall be maintained free of any debris.

(g) All cylinders (full and empty) shall be restrained.

(h) The ammoniator room shall be heated to maintain proper temperature for operation.

(i) There shall be no equipment housed in the ammonia feed room except ammoniators, ammonia cylinders, weighing scales, heater, ventilation fan, light(s), ammonia gas leak detector(s), and ammoniator appurtenances.

(j) Scales for weighing cylinders shall be calibrated yearly and properly maintained. Where bulk storage tanks are installed a pressure gauge shall be maintained.

(k) The ammonia feed system shall be maintained and operated to ensure continuous feed of ammonia when the plant is operating.

(l) An ammonia leak detection and alarm system shall be in service at all times.

(m) The public water system shall have an emergency action plan for addressing ammonia leaks.

(11) Where fluoride is added to the water the following shall apply:

(a) The fluoride content of the water shall be maintained between eight-tenths (.80) and one and two-tenths (1.20) milligrams per liter.

(b) Finished water shall be analyzed daily for fluoride content in accordance with methodology specified in Section C(17) of R.61-58.5.

(c) Should a public water system cease fluoridating for any reason the Department shall be notified immediately.

(d) A public water system which fluoridates must notify their service population and all local dental and public health practices prior to ceasing fluoridation.

(12) Adequate safety equipment for handling of chemicals used in treatment shall be provided.

(13) Chemical dosages shall not exceed the maximum dosage specified by the Department.

(14) All emergency power equipment shall be operated at least once per month under load and records of this operation kept on file with the water system.

(15) All chemicals and products added to a public water supply as part of the treatment process shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 60, Drinking Water Treatment Chemicals - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

(16) All materials and products installed in a public water system after December 31, 1995, which comes into contact with drinking water during the treatment, storage, transmission or distribution of the water, shall be certified as meeting the specifications of the American National Standard Institute/National Sanitation Foundation Standard 61, Drinking Water System Components - Health Effects. The certifying party shall be accredited by the American National Standards Institute.

(17) All storage and de-watering facilities for water treatment plant residuals shall be maintained in good operating condition. Equipment shall be cleaned and lubricated according to manufacturer's recommendations and the operation and maintenance manual for the plant. Records shall be kept of maintenance performed. There shall be no bypassing of any treatment process to the environment. The facilities shall be monitored in accordance with any operating permit(s) issued by the Department.

(18) Security shall be provided and maintained for all intake, treatment, storage and pumping facilities so as to prevent the entrance of unauthorized persons.

(19) Sampling taps shall be maintained so that representative water samples can be obtained from:

(a) each raw water source;

(b) appropriate locations throughout the treatment process so that the operator can maintain proper control of the treatment process;

(c) effluent from each filter and the combined filter effluent prior to any post chemical addition;

(d) the entry point(s) to the distribution system

(20) All required flow meters shall be maintained and operated in accordance with design criteria.

(21) Secondary containment systems shall be maintained for all liquid chemical storage tanks and solution tanks, capable of receiving and containing accidental spills or overflows. Incompatible chemicals shall not be stored in the same secondary containment area.

C. Surface Water Treatment Plants.

(1) All surface water treatment plants shall have an operator of the appropriate grade present at the plant and responsible for its operation, when the plant is producing water for public consumption.

(2) All enclosed filters shall be opened and inspected per manufacturer's recommendation or as required to ensure proper operation.

(3) All water, chemical and waste lines shall be labeled and color coded to identify line contents and direction of flow (if applicable).

(4) The treatment facility shall be operated such that the Department approved filtration rate is not exceeded at any time, and the pretreatment retention times are not reduced below those times approved by the Department. The treatment facility shall be operated such that hydraulic surges through the filters are minimized during flow rate changes and when filters are removed from service for backwashing.

(5) The use of chemicals for the control of aquatic weeds, algae and water borne organisms in rivers, lakes and reservoirs which are used as a source of water by a public water supply, shall be approved by the Department prior to their use.

(6) Intake screens shall be cleaned as often as is necessary for the proper functioning of the intake station.

(7) All plants shall have an on-site laboratory with the necessary equipment and methodology acceptable to the Department for process control monitoring. If the on-site laboratory is to conduct any analyses for compliance with the monitoring requirements of R.61-58.5, R.61-58.10 , R.61-58.11 and R.61-58.13, it must be certified by the Department.

(8) The following analyses shall be conducted as often as necessary, but no less than once a day, to ensure the treatment plant is functioning properly.

(a) Raw water shall be analyzed for pH, alkalinity, temperature, turbidity and total or fecal coliform bacteria.

(b) The coagulated water shall be analyzed for pH and alkalinity. If a pre-disinfectant and/or oxidant is added, the coagulated water shall be analyzed for the disinfectant and/or oxidant.

(c) The settled water shall be analyzed for turbidity and for disinfectant residual if a pre-disinfectant is used. If the pretreatment unit is used as a disinfectant sequence, the disinfectant concentration, pH and water temperature shall be measured in accordance with the requirements of R.61-58.10 for calculating CT values.

(d) The filtered water shall be analyzed for turbidity. If a pre-filter disinfectant is

used, the filtered water disinfectant residual shall be measured.

(e) The finished water (water entering distribution system) shall be analyzed for pH, alkalinity, temperature, disinfectant residual, calcium hardness and turbidity.

(f) The system shall analyze for any additional parameter that the Department may require for a specific plant for special concerns.

(9) The effluent weirs of the sedimentation basins shall be maintained so there is a uniform flow of water over the entire length of the weir.

(10) Flocculation and sedimentation basins and clarifiers shall be cleaned as often as necessary to keep the settled material and algae growths to a minimum.

(11) The reliable capacity of a surface water treatment plant shall be based on the lowest capacity in the treatment train. This shall include, but not be limited to, the capacity of the source, capacity of the raw water pump station with the largest pump out of service, capacity of the rapid mix chamber(s), flocculator(s), sedimentation basin(s), clarifier(s) and filters(s) and the capacity of the high service pump station with the largest pump out of service. If the reliable capacity of a plant is exceeded on a consistent basis during the peak water use months, the Department may elect not to issue any construction permits for new water line construction until the reliable capacity of the plant is increased.

(12) When the average daily demand during any month exceeds eighty (80) percent of the public water system's reliable capacity, as specified in R.61-58.7.C(11), the system shall submit a preliminary engineering report to the Department within one hundred eighty (180) days addressing in detail any upgrade necessary to keep up with any growth in demand on the system. When the average daily demand during any month exceeds ninety (90) percent of the public water system's reliable capacity as specified in R.61-58.7.C(11), the system shall submit to the Department plans and specifications along with an application for a permit to construct the upgrade within one hundred eighty (180) days, unless a longer time period is specified by the Department .

D. Groundwater Sources and Treatment Plants.

(1) All well heads and associated piping shall be inspected at a minimum of once a week. Stand-by wells shall be inspected and exercised at least quarterly. Documentation of these inspections must be maintained.

(2) All groundwater treatment plants shall be monitored by an operator of the appropriate grade, at a frequency to ensure proper operation, but in no case less than once a day. Such monitoring may be accomplished through site visits and/or remote monitoring equipment approved by the Department.

(3) All pressure filters and enclosed aeration devices shall be opened and inspected per manufacturer's recommendation or as required to ensure proper operation.

(4) Valves provided for the isolation of each well shall be maintained to ensure proper operation.

(5) The check valve and blow-off on the well head piping shall be maintained.

(6) Adequate freeze protection for the well head piping shall be maintained.

(7) A flow meter shall be maintained for each well serving a community water system and each well which is equipped with chemical treatment. The meter shall be periodically calibrated to ensure

accuracy in accordance with the manufacturer's recommendations. Calibration records shall be kept on file for a minimum of three (3) years.

(8) Drainage systems shall be maintained so that surface water flows away from the well head.

(9) All wells shall be maintained so the sanitary seal, the casing, the screened vent and the concrete pad are in good repair and can prevent the entrance of contamination into the well.

(10) If a well is no longer used, does not meet the requirements of a stand-by or emergency well, and is not converted to another active use (e.g. irrigation), it shall be properly abandoned in accordance with R.61-58.2.B(15).

(11) Public water systems using ground water as its drinking water source shall maintain compliance with R.61-58.2B(1).

(12) The capacity of a public water system which uses groundwater as its only drinking water source, shall be based on all operable wells pumping 16 hours a day or all operable wells minus the largest well pumping 24 hours a day, which ever is less. If the system has an additional source (surface water plant or metered connection from another public water system), the additional capacity from that source shall be used in determining the total capacity of the system. If the capacity of the system is exceeded on a consistent basis during the peak water use months, the system shall submit a preliminary engineering report to the Department within ninety (90) days addressing in detail any upgrade necessary to keep up with any growth in demand on the system. Construction plans and specifications for a new well may be submitted in lieu of the preliminary engineering report. In addition, the Department may elect not to issue any construction permits for new water line construction until the capacity of the system is increased.

(13) The public water system shall conduct monitoring as specified in R.61-58.2(B)(14)(c) when required by the Department to determine if the ground water source is under the direct influence of surface water.

(14) Stand-by wells must be exercised and sampled for total coliform on at least a quarterly basis. In addition, stand-by wells must be sampled annually for nitrate and nitrite. This monitoring is conducted by the water system and records must be maintained for Department inspection. Whenever a stand-by well is put in service, the system must notify the Department as soon as possible, but in no case later than the end of the next business day.

(15) Emergency wells must be exercised on an annual basis to ensure that they are operable. Whenever an emergency well is placed into service, the system must notify the Department as soon as possible, but in no case later than the end of the next business day. In addition, the system must immediately issue a Boil Water Advisory for all portions of the system being served by the emergency well.

E. Distribution Systems and Storage Tanks.

(1) Operator Certification

(a) All distribution treatment plants (e.g. booster chlorination stations) shall be monitored by an operator of appropriate grade, at a frequency to ensure proper operation, but in no case less than once a day. Such monitoring may be accomplished through site visits and/or remote monitoring equipment approved by the Department

(b) All community and non-transient non-community water systems must designate an operator(s) of appropriate grade as the operator responsible for the operation and maintenance of their distribution system.

(c) All community and non-transient non-community water systems must be operated such that all personnel making decisions which could affect water quality, water quantity, or distribution system integrity be certified distribution system operators. Certified water treatment plant operators that make such decisions as a part of their routine treatment plant operation duties (e.g. starting and stopping distribution pumps) are not required to have dual certification.

2) All elevated, hydropneumatic and ground storage tanks shall be inspected at a minimum of once a week for the purpose of checking on the security of the tank(s) and insuring that proper air/water ratios are being maintained in hydropneumatic storage tanks. Vent screens, hatches and other openings on atmospheric tanks must be inspected annually to ensure sanitary protection.

(3) The drainage system on any storage tank lot shall be maintained to channel water away from the tank foundations.

(4) Valves provided for the isolation of each tank shall be maintained to ensure proper operation.

(5) Screens shall be maintained on all storage tank vents.

(6) Screens or flap valves shall be maintained on all storage tank overflows.

(7) The minimum pressure in the distribution system under normal operating conditions shall be twenty-five (25) pounds per square inch at a customer's service connection. A minimum pressure of twenty (20) pounds per square inch shall be maintained at all service connections during unusually heavy flows (i.e., fire or flushing).

(8) Each public water system shall maintain a map of the distribution system which shows the location of water lines and their sizes as well as the location of all valves, hydrants and blow-offs. The location of all water sources and all pumping, treatment and storage facilities shall also be included on this map.

(9) Valves and hydrants shall be exercised and maintained in accordance with the system's valve and hydrant maintenance program to ensure operability. Any valves or hydrants that malfunction shall be repaired promptly. Records shall be kept on this maintenance program.

(10) A flow test shall be conducted on all fire hydrants at a minimum of once every three years. The flow from the hydrant shall be measured and recorded along with the static and residual pressure and time of day the test was conducted. The system shall keep a record of the latest test of each hydrant on file.

(11) All community water systems shall initiate and carry out a program aimed at detecting leaks in the distribution system. At a minimum, a leak detection program shall include a comparison of water produced to water sold or used for other purposes. Any leaks found through this program or any leaks discovered through other means shall be repaired promptly. Records shall be kept of the leaks detected and the repairs made.

(12) When a break occurs in a system's distribution line, the repairs to that line must be made promptly and in accordance with good sanitary practices. Precautions shall be taken throughout the repair process to make sure that customers affected by the break will be assured of safe water after the line is

placed back into service.

(13) All public water systems shall develop and maintain a flushing program in order to prevent customer complaints caused by stagnant, discolored, and sediment laden water and maintain adequate disinfectant residuals throughout the distribution system. Detailed instructions of this program shall be included in the system's manual of standard operating procedures. Records of all flushing activities shall be maintained by the system.

(14) The Department shall be notified in writing at least ten (10) days prior to the repainting of the interior or exterior of any storage tank. All interior paint coatings shall be certified as meeting ANSI/NSF Standard 61.

(15) A storage tank that is drained for any reason must be properly disinfected and satisfactory bacteriological samples must be obtained prior to placing it back into service.

(16) The Department shall be notified in writing at least thirty (30) days prior to the entry of an underwater diver into a finished water storage tank for the purpose of inspecting or cleaning of the tank.

F. Cross Connection Control.

(1) General

(a) All public water systems shall initiate and maintain a viable cross connection control program. Such a program shall consist of:

(i) Locating and eliminating unprotected cross connections.

(ii) Maintaining records pertaining to the location of existing backflow prevention assemblies, type and size of each assembly and test results.

(b) No person shall install, permit to be installed or maintain any cross connection between a public water system and any other non-public water system, sewer or a line from any container of liquids or other substances, unless an approved backflow prevention device or assembly is installed between the public water system and the source of contamination.

(2) Low Hazard Cross Connections

A connection between an approved public water system and another water source not hazardous to health but not meeting the standards of the approved public water system and not cross-connected within its system with a potentially dangerous substance shall be considered a low hazard category cross connection. At a minimum, an approved Double Check Valve Assembly or Pressure Vacuum Breaker must be installed on a low hazard cross connection except as provided for in section 3 below.

(3) Residential Lawn Irrigation Systems

(a) Low hazard residential lawn irrigation systems - Each public water system which has low hazard residential irrigation systems directly or indirectly connected to their public water system must have a written low hazard residential lawn irrigation system cross connection control policy. This policy must be documented in writing and must be approved by the governing body of the public water system. The policy must specify the minimum acceptable device for low hazard residential lawn sprinkler systems. The

minimum acceptable device for low hazard residential lawn sprinkler systems is a residential dual check. If a water system specifies another backflow prevention assembly as the minimum acceptable protection for these cross connections, the policy must be approved by the governing body of the public water system with due opportunity being provided for public comment and participation. The written policy must:

(i) Identify the type of backflow prevention device or assembly that is required to be installed on low hazard residential lawn irrigation system connections.

(ii) Establish a schedule for the required testing of double check valve assemblies, or other testable assembly, if testable assemblies are designated by the policy as minimum acceptable protection for low hazard residential lawn irrigation systems. The minimum testing frequency must be specified in the policy and appropriate records must be maintained to verify compliance with the established testing requirements.

(iii) establish a schedule for the required change out of residential dual checks if these are the devices designated by the policy as minimum acceptable protection for low hazard residential lawn irrigation systems. The minimum change out frequency must be specified in the policy and appropriate records must be maintained to verify compliance with the established change out requirements.

(b) High hazard residential lawn irrigation systems - Any residential lawn irrigation system that includes chemical addition, or is also connected to another water source which is not an approved public water system, shall be considered a high hazard cross connection and must meet the requirements of paragraph (4) below.

(4) High Hazard Cross Connections

(a) A connection between an approved public water system and a service or other water system which has or may have any material in the water dangerous to health, or connected to any material dangerous to health, that is or may be handled under pressure, or subject to negative pressure, shall be considered a high hazard category cross connection. Protection shall be by air gap separation or an approved reduced pressure principle backflow prevention assembly.

(b) Reduced pressure principal backflow prevention assemblies shall not be installed in any location subject to possible flooding. This includes pits or vaults which are not provided with a gravity drain to the ground's surface that is capable of exceeding the discharge rate of the relief valve.

(5) Fire Sprinkler Systems

Fire line sprinkler systems, except those in the high hazard category shall be protected by an approved double check valve assembly. High hazard category fire sprinkler systems shall include, but not be limited to: antifreeze systems, foam systems, systems charged from or tied into ponds, lakes, streams, or any water source other than the approved public water supply. High hazard category fire sprinkler systems shall comply with the requirements of Paragraph (4) above.

(6) Approved Devices and Assemblies

The Department shall prepare and publish a list of backflow prevention assemblies approved by the Department for use in South Carolina, and this list shall be updated at least once

annually.

(7) Testing Requirements

When double check valve assemblies, pressure vacuum breakers, and/or reduced pressure principal backflow prevention assemblies are installed to protect a public water system against the possibility of backflow from a customer's water service, routine testing of the assemblies shall be performed by a certified tester.

(a) Each assembly shall be tested by a certified tester after installation and before use by the customer. Except as specified in paragraph 3(a)(ii) above, each assembly shall be tested at least once annually by a certified tester.

(b) The public water system is to receive a written report of the inspection and testing results for all assemblies tested within its distribution system. The report shall be submitted by the certified tester making the inspection and test.

(c) All backflow prevention assemblies shall be tested immediately after repairs of any kind are made to the assembly.

(8) Backflow Prevention Tester Certification

There are four (4) types of certified testers of backflow prevention assemblies: General Tester, Limited Tester, Inspector Tester and Manufacturer's Agent. The definition of each type of certified tester is specified in R.61-58(A).

(a) Each certified tester's license shall expire three (3) years from the date of issue. In order to renew this certification for three (3) more years, the tester shall come before a designated person approved by the Department and shall successfully complete a written examination with a passing score of 70%, and perform the prescribed test on an approved reduced pressure principal backflow prevention assembly, double check valve assembly, and a pressure vacuum breaker using the tester's own differential pressure gauge. The gauge must be accurate within 2% of full scale or plus or minus 0.3 pounds per square inch differential (PSID). Any gauge found to be inaccurate or malfunctioning will be required to be calibrated or repaired as needed to bring it into compliance before certification will be renewed.

(b) Any applicant for certification who fails to properly perform the above prescribed tests will have his certification revoked immediately and will have to successfully complete the state sponsored backflow prevention training and certification course in order to become re-certified as a tester of backflow prevention assemblies in South Carolina.

(c) A certified tester may have his tester's certification revoked due to incompetence or falsification of test results, as determined by the Department.

(d) The Department shall reserve the right to charge or allow for the charge of a nominal fee for the administration of the recertification of testers. This fee shall not exceed fifty dollars ($50.00).

(9) Installation of Pressure Vacuum Breakers

Where used, pressure vacuum breakers shall be installed at a minimum of twelve (12) inches above the highest downstream piping and shall not be subject to backpressure.

G. Operation and Maintenance Requirements for Drinking Water Vending Machines and Dispensing Stations.

(1) All drinking water vending machines and dispensing stations shall be monitored by an operator who holds a valid Bottle Water Class Operator's Certificate issued by the Department of Labor, Licensing and Regulation, at a frequency to ensure proper operation. Dispensing stations shall be inspected by the operator no less than once a week.

(2) Records shall be kept of each visit by the operator and any other maintenance personnel under the direct supervision of the operator. The records shall show the date and time of the visit, any tests performed, any maintenance performed, and the signature of the operator or maintenance personnel. These reports must be kept by the owner of the vending machine or dispensing station for minimum of two (2) years. These records shall be made available to the Department upon request.

(3) A twenty-four (24) hour telephone number shall be clearly posted on the front of each machine or dispensing station for use in emergencies or for consumer complaints. A record of any consumer complaints shall be kept on file with the owner of the machine for a minimum of three years, and shall be made available to the Department upon request.

(4) Each machine will be considered a transient non-community water system and shall comply with the monitoring requirements of R.61.58.5.

(5) Vending machines shall be operated and maintained in accordance with the manufacturer's recommendations.

H. Operating and Monitoring Requirements for Bottled Water Plants.

(1) All bottled water treatment plants shall be monitored on a daily basis by an operator of the appropriate grade to insure proper operation. This monitoring must be by site visitation. No remote monitoring shall be allowed.

(2) All sources used by bottled water plants in the State shall be approved by Department prior to their use. These sources shall be monitored on an annual basis for all contaminants specified in R.61-58.5, R.61-58.10, and R.61-58.11. The results of this monitoring shall be submitted to the Department by the January 10th following the year for which the monitoring is conducted. If the source is from the distribution system of existing public water system in the State, this monitoring is not required. However, the operator of such a bottled water plant shall hold a valid Bottle Water Class Operator's Certificate issued by the Department of Labor, Licensing and Regulation.

(3) No surface water sources or groundwater sources under the direct influence of surface water shall be used for bottled water unless the requirements of R.61-58.10 are met.

I. Operation and Maintenance of Aquifer Storage and Recovery (ASR) Wells.

(1) All ASR wells must be operated and maintained in accordance with their construction and operating permits(s) and any approved modifications.

(2) The Department may require routine testing of specific water quality parameters. Results of such testing must be submitted to the Department upon request or at a frequency established by the Department.

(3) Records must be kept of total flow volume into and out of an ASR well. Such records must be submitted to the Department upon request or at a frequency established by the Department.

(4) For the purposes of determining compliance with R.61-58.7.C(12) and R.61-58.7.D(12), the Department may consider up to ninety (90) percent of the water stored in an ASR well(s) as an additional source of water in lieu of requiring the expansion of existing sources or treatment facilities or the development of new sources or treatment facilities on a case-by-case basis.

**R.61-58.8 EMERGENCY PROCEDURES**

A. Applicability.

This regulation establishes the minimum requirements that must be met by all public water systems prior to, during and after an emergency.

B. Emergency Preparedness Plan.

(1) Each public water system shall maintain an up-to-date copy of the Emergency Preparedness Plan at a location that is readily accessible in the event of an emergency.

(2) Each public water system shall conduct an assessment outlining the critical parts of the water system, i.e., raw water, treatment, storage, power sources.

(3) Each community water system shall develop an Emergency Preparedness Plan which shall, as a minimum, contain the following:

(a) the telephone number of the Department's District Office, the Department's drinking water program office and the Department's twenty-four (24) hour telephone number;

(b) the name and telephone number of:

(i) the County Emergency Preparedness Representative;

(ii) the local law enforcement and highway patrol offices; and,

(iii) the local fire department(s) and Emergency Medical Service (EMS);

(c) the telephone number of the State Emergency Preparedness Office;

(d) the names and telephone numbers of the water system's personnel who should be notified in the event of an emergency;

(e) the locations and telephone numbers of primary and secondary command posts that may be utilized in the event of emergency;

(f) the names and telephone numbers of current chemical suppliers;

(g) the names and telephone numbers of the electric power, natural gas, telephone and cable companies, and if available, the locator service in the area;

(h) the names and telephone numbers of critical users and the priority of service to each one, i.e., dialysis patients, hospitals, etc.;

(i) the names and telephone numbers of potential sources of spare parts, pipe sections, repair clamps;

(j) the names, addresses and telephone numbers of equipment suppliers and contacts for equipment repair, i.e. rewinding of motors, pump shaft repairs;

(k) a list of any mutual aid agreements among water systems, such as emergency

connections, personnel, equipment and chemical supplies;

(l) the names, addresses and telephone numbers of contractors to call for making any repairs beyond the capability of the systems personnel;

(m) the names and telephone numbers of well drillers (if applicable);

(n) the names and telephone numbers of other sources of assistance such as engineers, laboratories;

(o) arrangements for obtaining emergency power;

(p) arrangements for obtaining potable water;

(q) an up-to-date distribution map showing line sizes and the location of all valves, fire hydrants, blow-offs and pumping, storage and treatment facilities. If the map is too large to include in the plan, the plan must reference its location;

(r) notification procedures to the public and media and example notices to be issued, such as notices instructing customers to boil their water prior to consumption; and,

(s) emergency disinfection procedures for wells (if applicable), water lines and storage tanks;

(4) Each non-community water system shall develop an Emergency Preparedness Plan which shall, as a minimum, contain the following:

(a) the telephone number of the Department's District Office, the Department's drinking water program office and the Department's twenty-four (24) hour telephone number;

(b) the names and telephone numbers of current chemical suppliers;

(c) the names and telephone numbers of the electric power, natural gas and telephone companies;

(d) the names and telephone numbers of potential sources of spare parts, pipe sections, repair clamps;

(e) the names, addresses and telephone numbers of equipment suppliers and contacts for equipment repair, i.e., rewinding of motors, pump shaft repairs;

(f) the names, addresses and telephone numbers of plumbing contractors to call for making necessary repairs;

(g) the names and telephone numbers of well drillers (if applicable);

(h) the names and telephone numbers of other sources of assistance such as engineers, laboratories;

(i) arrangements for obtaining emergency power;

(j) arrangements for obtaining potable water;

(k) an up-to-date distribution map showing line sizes and the location of all valves, fire hydrants, blow-offs and pumping, storage and treatment facilities;

(l) notification procedures to employees and the public and example notices to be issued; and,

(m) emergency disinfection procedures for wells (if applicable), water lines and storage tanks;

C. Operation Under Emergency Conditions.

(1) If the pressure in a distribution system or any significant portion of a distribution system should drop to ten (10) pounds per square inch or less the owner or operator of the system shall notify the Department immediately. Any immediate corrective action necessary to protect public health shall take priority over any notification requirement to the Department.

(2) If a boil water notice or advisory is issued by the public water system, the Department shall be notified immediately. A copy of the boil water notice or advisory and repeal of such shall be forwarded to the Department as soon as possible after each is issued.

(3) If potable drinking water is transported into an area where normal water service has been disrupted, the water shall be transported in a sanitized container or tank truck or trailer which is designed for the transportation of potable water. The disinfectant residual of the transported water at the loading point shall be a minimum of one (1) milligram per liter. The source of water shall be approved by the Department before any water is loaded into a container, tank truck or trailer and transported to the affected area.

(4) If a contaminant is injected or syphoned into the distribution system, the owner or operator of the system shall take necessary actions to remove the contamination from the distribution system as soon as possible. The Department shall be notified as soon as possible of the event and actions taken.

(5) If a contaminant is injected, dumped, discharged, or flushed into surface water or groundwater which serves a public water system, the owner or operator of the system shall take necessary precautions to prevent the contaminant from entering the distribution system.

D. Withdrawals of Surface Water and Groundwater During Drought and Other Emergency Conditions

(1) Whenever drought or low rainfall conditions reduce the amount of surface and groundwater available for domestic, industrial, agricultural and commercial use, the Department may regulate surface water and groundwater withdrawals in an equitable manner to reduce the adverse impact to the public well being and health.

(2) No person shall withdraw or cause to withdraw water from a surface or groundwater source at such a rate and daily volume as to infringe on the use of said water source by a public water supply.

**R.61-58.9 VARIANCES AND EXEMPTIONS**

A. Applicability.

The Department may issue variances and exemptions from the requirements of these primary drinking water regulations under conditions and in a manner which are not less stringent than the conditions under which, and the manner in which, variances and exemptions may be granted under the Federal Safe Drinking Water Act. This regulation shall apply to each public water system, unless the public water system meets all of the following conditions:

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

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

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

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

B. Variances.

(1) Requirements for a variance.

(a) The Department may grant one or more variances to any public water system within the State from any requirement respecting a maximum contaminant level of an applicable State primary drinking water regulation upon a finding that:

(i) Because of characteristics of the raw water sources which are reasonably available to the system, the system cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulations despite application of the best technology, treatment techniques, or other means, which the Department finds are generally available (taking costs into consideration); and,

(ii) The granting of a variance will not result in an unreasonable risk to the health of persons served by the system.

(b) The Department may grant one or more variances to any public water system within the State from any requirement of a specific treatment technique or an applicable State primary drinking water regulation upon a finding that the public water system applying for the variance has demonstrated 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.

(2) Requests for a variance.

A supplier of water may request the granting of a variance by submitting a request for a variance in writing to the Department. Suppliers of water may submit a joint request for variances when they seek similar variances under similar circumstances. Any written request for a variance or variances shall include the following information:

(a) The nature and duration of the variance requested.

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of these regulations.

(c) For any request made under paragraph (1)(a) above:

(i) Explanation in full and evidence of the best available treatment technology and techniques.

(ii) Economic and legal factors relevant to ability to comply.

(iii) Analytical results of raw water quality relevant to the variance request.

(iv) A proposed compliance schedule, including the date each step toward compliance will be achieved. Such schedule shall include as a minimum the following dates:

(A) Date by which arrangement for alternative raw water source or improvement of existing raw water source will be completed.

(B) Date of initiation of the connection of the alternative raw water source or improvement of existing raw water source.

(C) Date by which final compliance is to be achieved.

(v) A plan for the provision of safe drinking water in the case of an excessive rise in the contaminant level for which the variance is requested.

(vi) A plan for additional interim control measures during the effective period of variance.

(d) For any request made under paragraph (1)(b) above, a statement that the system will perform monitoring and other reasonable requirements prescribed by the Department as a condition to the variance.

(e) Other information, if any, believed to be pertinent by the applicant.

(f) Such other information as the Department may require.

(3) Consideration of a variance request.

(a) The Department will act on any variance request submitted pursuant to paragraph (2) above within 90 days of receipt of the request.

(b) In its consideration of whether the public water system is unable to comply with a contaminant level required by these regulations because of the nature of the raw water source, the Department will consider such factors as the following:

(i) The availability and effectiveness of treatment methods for the contaminant for which the variance is requested.

(ii) Cost and other economic considerations such as implementing treatment, improving the quality of the source water or using an alternate source.

(c) A variance may be issued to a system only after the system's application of the best technology, treatment techniques, or other means, which the Department finds are available (taking costs into consideration).

(d) In its consideration of whether a public water system should be granted a variance to a required treatment technique because such treatment is unnecessary to protect the public health, the Department will consider such factors as the following:

(i) Quality of the water source including water quality data and pertinent sources of pollution.

(ii) Source protection measures employed by the public water system.

(4) Disposition of a variance request.

(a) If the Department decides to deny the application for a variance, it will notify the applicant of its intention to issue a denial. Such notice will include a statement of reasons for the proposed denial, and will offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument to the Department. The Department will make a final determination on the request within 30 days after receiving any such additional information or argument. If no additional information or argument is submitted by the applicant, the application will be denied.

(b) If the Department proposes to grant a variance request submitted pursuant to paragraph (2) above, it shall notify the applicant of its decision in writing. Such notice will identify the variance, the facility covered, and will specify the period of time for which the variance will be effective.

(i) For the type of variance specified in paragraph (1)(a) above, such notice will provide that the variance will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Department that the system has failed to comply with any requirements of a final schedule issued pursuant to paragraph (5) below.

(ii) For the type of variance specified in paragraph (1)(b) above, such notice will provide that the variance may be terminated at any time upon a finding that the nature of the raw water source is such that the specified treatment technique for which the variance was granted is necessary to protect the health of persons, or upon a finding that the public water system has failed to comply with monitoring and other requirements prescribed by the Department as a condition to the granting of the variance.

(c) For a variance specified in paragraph (1)(a)(i) above, the Department will propose a schedule for:

(i) Compliance (including increments of progress) by the public water system with each contaminant level requirement covered by the variance; and,

(ii) Implementation by the public water system of such additional control measures as the Department may require for each contaminant covered by the variance.

(d) The proposed schedule for compliance will specify dates by which steps toward

compliance are to be taken, including at the minimum, where applicable:

(i) The date by which arrangement for an alternative raw water source or improvement of existing raw water source will be completed.

(ii) The date of initiation of the connection for the alternative raw water source or improvement of the existing raw water source.

(iii) The date by which final compliance is to be achieved.

(e) The proposed schedule may, if the public water system has no access to an alternative raw water source and can effect or anticipate no adequate improvement of the existing raw water source, specify an indefinite time period for compliance until a new and effective treatment technology is developed at which time a new compliance schedule will be prescribed by the Department.

(f) The proposed schedule for implementation of additional interim control measures during the period of variance will specify interim treatment techniques, methods and equipment, and dates by which steps toward meeting the additional interim control measures are to be met.

(g) The schedule will be prescribed by the Department at the time of the granting of the variance, subsequent to provision of opportunity for hearing pursuant to paragraph (5) below.

(5) Public notice and opportunity for hearing.

(a) Before a variance and schedule proposed by the Department pursuant to paragraph (4) above may take effect, the Department will provide notice and opportunity for public hearing on the variance and schedule. A notice given pursuant to the preceding section may cover the granting of more that one variance and a hearing held pursuant to such notice will include each of the variances covered by the notice.

(b) Public notice of an opportunity for hearing on a variance and schedule will be circulated in a manner designed to inform interested and potentially interested persons of the proposed variance and schedule, and will include at least the following:

(i) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system; and,

(ii) Such notice will include a summary of the proposed variance and schedule and shall inform interested persons that they may request a public hearing on the proposed variance and schedule.

(c) Requests for hearing may be submitted by any interested person. Frivolous or insubstantial requests for hearing may be denied by the Department. Requests must be submitted to the Department within 30 days after issuance of the public notice provided for in paragraph (b) of this section. Such requests shall include the following information:

(i) The name, address and telephone number of the individual, organization or other entity requesting a hearing.

(ii) A brief statement of the interest of the person making the request in the proposed variance and schedule, and of information that the requester intends to submit at such hearing.

(iii) The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Department will give notice of any hearing to be held pursuant to a request submitted by an interested person or on its own motion. Notice will be given and such hearing conducted in accordance with the Department's administrative procedures.

(e) The variance and schedule will become effective 30 days after notice of opportunity for hearing is given pursuant to paragraph (b) of this section if no timely request for a hearing is submitted and the Department does not determine to hold a public hearing on its own motion.

(6) Action after hearing.

If a public hearing is held pursuant to paragraph (5) above, the Department will take into consideration information obtained during such hearing and confirm, revise or rescind the proposed variance and schedule.

(7) Variance for alternative treatment techniques.

The Department may grant a variance from any treatment technique requirement of a state primary drinking water regulation to a supplier of water upon a showing from the supplier that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirement was prescribed. A variance under this paragraph shall be conditioned on the use of the alternative treatment technique which is the basis of the variance.

C. Exemptions.

(1) The Department may exempt any public water system within the State from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable state primary drinking water regulation upon a finding that:

(a) Due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement;

(b) The public water system was in operation on the effective date of such contaminant level or treatment technique requirement; and,

(c) The granting of the exemption will not result in an unreasonable risk to health.

(2) Requests for an exemption.

A supplier of water may request the granting of an exemption by submitting a request for exemption in writing to the Department. Suppliers of water may submit a joint request for exemptions when they seek similar exemptions under similar circumstances. Any written request for an exemption shall include the following information:

(a) The nature and duration of exemption requested.

(b) Relevant analytical results of water quality sampling of the system, including results of relevant tests conducted pursuant to the requirements of these regulations.

(c) Explanation of the compelling factors such as time or economic factors which prevent such system from achieving compliance.

(d) Other information, if any, believed by the applicant to be pertinent to the application.

(e) A proposed compliance schedule, including the date when each step toward compliance will be achieved.

(f) Such other information as the Department may require.

(3) Consideration of an exemption request.

(a) The Department will act on any exemption request submitted pursuant to paragraph (2) above within 90 days of receipt of the request.

(b) In its consideration of whether the public water system is unable to comply due to compelling factors, the Department will consider such factors as the following:

(i) Construction, installation, or modification of the treatment equipment or systems.

(ii) The time needed to put into operation a new treatment facility to replace an existing system which is not in compliance.

(iii) Economic feasibility of compliance.

(4) Disposition of an exemption request.

(a) If the Department decides to deny the application for an exemption, it will notify the applicant of its intention to issue a denial. Such notice will include a statement of reasons for the proposed denial, and will offer the applicant an opportunity to present, within 30 days of receipt of the notice, additional information or argument to the Department. The Department will make a final determination on the request within 30 days after receiving any such additional information or argument. If no additional information or argument is submitted by the applicant, the application will be denied.

(b) If the Department proposes to grant an exemption request submitted pursuant to paragraph (2) above, it will notify the applicant of its decision in writing. Such notice will identify the facility covered, and will specify the termination date of the exemption. Such notice will provide that the exemption will be terminated when the system comes into compliance with the applicable regulation, and may be terminated upon a finding by the Department that the system has failed to comply with any requirements of a final schedule issued pursuant to paragraph (6) below.

(c) The Department will propose a schedule for:

(i) Compliance (including increments of progress) by the public water system with each contaminant level requirement and treatment technique requirement covered by the exemption; and,

(ii) Implementation by the public water system of such control measures as the Department may require for each contaminant covered by the exemption.

(d) The schedule will be prescribed by the Department at the time the exemption is granted, subsequent to provision of opportunity for hearing pursuant to paragraph (5) below.

(5) Public notice and opportunity for hearing.

(a) Before a schedule proposed by the Department pursuant to paragraph (4) above may take effect, the Department will provide notice and opportunity for public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the proposal of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(b) Public notice of an opportunity for hearing on an exemption schedule will be circulated in a manner designed to inform interested and potentially interested persons of the proposed schedule, and will include at least the following:

(i) Posting of a notice in the principal post office of each municipality or area served by the public water system, and publishing of a notice in a newspaper or newspapers of general circulation in the area served by the public water system.

(ii) Such notice will include a summary of the proposed schedule and shall inform interested persons that they may request a public hearing on the proposed schedule.

(c) Requests for hearing may be submitted by any interested person. Frivolous or insubstantial requests for hearing may be denied by the Department. Requests must be submitted to the Department within 30 days after issuance of the public notices provided for in paragraph (b) of this section. Such request shall include the following information:

(i) The name, address and telephone number of the individual, organization or other entity requesting a hearing.

(ii) A brief statement of the interest of the person making the request in the proposed schedule and of information that the requesting person intends to submit at such hearing.

(iii) The signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

(d) The Department will give notice of any hearing to be held pursuant to a request submitted by an interested person or on its own motion. Notice will be given and such hearing conducted in accordance with the Department's administrative procedures.

(e) The exemption and schedule will become effective 30 days after notice of opportunity for hearing is given pursuant to paragraph (a) of this section if no timely

request for hearing is submitted and the Department does not determine to hold a hearing on its own motion.

(6) Final schedule.

(a) If a public hearing is held pursuant to paragraph (5) above, the Department will take into consideration information obtained during such hearing, and revise the proposed schedule as necessary and prescribe the final schedule.

(b) Such schedule must require compliance 12 months after the issuance of the exemption.

(7) Extension for date of compliance.

(a) The final date for compliance provided in any schedule in the case of any exemption may be extended by the Department for a period not to exceed 3 years after the date of the issuance of the exemption if the public water system establishes that:

(i) The system cannot meet the standard without capital improvements which cannot be completed within the period of such exemption;

(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,

(iii) The system has entered into an enforceable agreement to become a part of a regional public water system; and the system is taking all practicable steps to meet the standard.

(b) In the case of a system which does not serve more than 500 service connections and which needs financial assistance for the necessary improvements, an exemption granted under paragraph (a)(i) or (ii) may be renewed for one or more additional 2-year periods if the system establishes that it is taking all practicable steps to meet the requirements of paragraph (a) of this section.

(8) Bottled water, point-of-use and point-of-entry devices.

(a) The Department may require a public water system to use bottled water, point-of-use, or point-of-entry devices as a condition for granting an exemption from the requirements of R.61-58.5.B(2), D(2)(b) and N.

(b) Public water systems that use bottled water as a condition of obtaining an exemption from the requirements of R.61-58.5.B(2), D(2)(b) and N must meet the requirements set out in R.61-58.9.F(8).

(c) Public water systems that use point-of-use or point-of-entry devices as a condition for receiving an exemption must meet the requirements of R.61-58.9.F(9).

D. Variances from the Maximum Contaminant Level for Total Trihalomethanes.

(1) The following are identified as the best technology, treatment techniques or other means generally available for achieving compliance with the maximum contaminant level for total trihalomethanes (TTHM):

(a) Use of chloramines as an alternate or supplemental disinfectant or oxidant.

(b) Use of chlorine dioxide as an alternate or supplemental disinfectant or oxidant.

(c) Improved existing clarification for THM precursor reduction.

(d) Moving the point of chlorination to reduce TTHM formation and, where necessary, substituting for the use of chlorine as a pre-oxidant chloramines, chlorine dioxide or potassium permanganate.

(e) Use of powdered activated carbon for THM precursor or TTHM reduction seasonally or intermittently at dosages not to exceed 10 mg/L on an annual average basis.

(2) The Department will consider a request for a variance from the maximum contaminant level for total trihalomethanes only from a community system which has installed the best available technology or treatment method specified in paragraph (1) above unless the Department determines that such treatment method is not available and effective for TTHM control for the system. A treatment method will not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system or would only result in a marginal reduction in TTHM for the system. The Department's determination as to the availability and effectiveness of such treatment methods will be based upon studies by the system and other relevant information. If a system submits information intending to demonstrate that a treatment method is not available and effective for TTHM control for that system, the Department will make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and/or use of such treatment method.

(3) Pursuant to R.61-58.9(B)(4)(c) - (g), the Department will issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods to determine the probability that any of these methods will significantly reduce the level of TTHM for that system and, if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable, and that the TTHM reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

(a) Introduction of off-line water storage for THM precursor reduction.

(b) Aeration for TTHM reduction, where geographically and environmentally appropriate.

(c) Introduction of clarification where not currently practiced.

(d) Consideration of alternative sources of raw water.

(e) Use of ozone as an alternate or supplemental disinfectant or oxidant.

(4) If the Department determines that a treatment method identified in paragraph (3) above is technically feasible, economically reasonable and will achieve TTHM reductions commensurate with the costs incurred with the installation and/or use of such treatment method for the system, the Department will require the system to install and/or use that treatment method in connection with its compliance schedule. The Department's determination will be based upon studies by the system and other relevant information. In no event will the Department require a system to install and/or use a treatment method not described in paragraph (1) or (3) above to obtain or maintain a variance from the TTHM maximum contaminant level or in connection with any variance compliance schedule.

E. Variances from the Maximum Contaminant Level for Fluoride.

(1) The following are identified as the best technology, treatment techniques or other means generally available for achieving compliance with the maximum contaminant level for fluoride:

(a) Activated alumina absorption, centrally applied; and,

(b) Reverse osmosis, centrally applied.

(2) The Department will consider a request for a variance from the maximum contaminant level for fluoride only from a community water system which has installed the best available technology or treatment method specified in paragraph (1) above unless the Department determines that such treatment method is not available and effective for fluoride control for the system. A treatment method will not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system. The Department's determination as to the availability and effectiveness of such treatment methods will be based upon studies by the system and other relevant information. If a system submits information to demonstrate that a treatment method is not available and effective for fluoride control for that system, the Department will make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and/or use of such treatment method.

(3) Pursuant to R.61-58.9(B)(4)(c)-(g), the Department will issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods to determine the probability that any of these methods will significantly reduce the level of fluoride for that system and, if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable and that the fluoride reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

(a) Modification of lime softening

(b) Alum coagulation

(c) Electrodialysis

(d) Anion exchange resins

(e) Well field management

(f) Alternate source

(g) Regionalization

(4) If the Department determines that a treatment method identified in paragraph (3) above or other treatment method is technically feasible, economically reasonable, and will achieve fluoride

reductions commensurate with the costs incurred with the installation and/or use of such treatment method for the system, the Department will require the system to install and/or use that treatment method in connection with its compliance schedule. The Department's determination will be based upon studies by the system and other relevant information.

F. Variances and Exemptions from the Maximum Contaminant Levels for Organic and Inorganic Chemicals and Exemptions from the Treatment Technique for Lead and Copper.

(1) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for volatile organic chemicals as listed in R.61-58.5.N and the organic chemicals listed in R.61-58.5.D(2):

**BEST AVAILABLE TECHNOLOGIES FOR ORGANIC CONTAMINANTS**

| CAS Number | Contaminant | Granular Activated Carbon | Packed Tower Aeration | Oxidation |
|---|---|---|---|---|
| 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 | | |
| 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 | |
| 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 |

(2) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the inorganic contaminants listed in R.61-58.5(B)(2), except fluoride:

| **CHEMICAL NAME** | **BAT(S)** |
|---|---|
| Antimony | 2,7 |
| Arsenic[4] | 1, 2, 5, 6, 7, 9, 12[5] |
| Asbestos | 2,3,8 |
| Barium | 5,6,7,9 |
| Beryllium | 1,2,5,6,7 |
| Cadmium | 2,5,6,7 |
| Chromium | 2,5,6[2],7 |
| Cyanide | 5,7,10 |
| Mercury | 2[1],4,6[1],7[1] |
| Nickel | 5,6,7 |
| Nitrate | 5,7,9 |
| Nitrite | 5,7 |
| Selenium | 1,2[3],6,7,9 |
| Thallium | 1,5 |

[1] BAT only if influent Hg concentrations <10 µg/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] 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 less than 500 service connections
3 = Direct and Diatomite Filtration
4 = Granular Activated Carbon
5 = Ion Exchange

6 = Lime (not less than 500 service connections) BAT for systems softening
7 = Reverse Osmosis
8 = Corrosion Control
9 = Electrodialysis
10 = Chlorine
11 = Ultraviolet
12 = Oxidation/Filtration

(3) The Department 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:

**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 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.

(4) The Department shall require community water systems and non-transient, non-community water systems to install and/or use any treatment method identified in paragraphs 1 and 2 of the section as a condition for granting a variance except as provided in paragraph (4) of this section. If, after the system's installation of the treatment method, the system cannot meet the MCL, that system shall be eligible for a variance under the provisions of section B above.

(5) If a system can demonstrate through comprehensive engineering assessments, which may

include pilot plant studies, that the treatment methods identified in paragraphs 1 and 2 of the section would only achieve a de minimis reduction in contaminants, the Department may issue a schedule of compliance that requires the system being granted the variance to examine other treatment methods as a condition of obtaining the variance.

(6) If the Department determines that a treatment method identified in paragraph (4) of this section is technically feasible, the Department may require the system to install and/or use that treatment method in connection with a compliance schedule issued under the provisions of R.61-58.9.B(4)(c) through (g). The Department's determination shall be based upon studies by the system and other relevant information.

(7) The Department may require a public water system 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 from the requirements of R.61-58.5.B(2), D(2)(b) and N, to avoid an unreasonable risk to health. The Department may require a public water system to use bottled water and point-of-use devices or other means, but not point-of-entry devices, as a condition for granting an exemption from corrosion control treatment requirements for lead and copper in R.61-58.11.C and D to avoid an unreasonable risk to health. The Department may require a public water system to use point-of-entry devices as a condition for granting an exemption from the source water and lead service line replacement requirements for lead and copper under R.61-58.11.E or F to avoid an unreasonable risk to health.

(8) Public water systems that use bottled water as a condition for receiving a variance or exemption from the requirements of R.61-58.5.B(2), D(2)(b) and N, or an exemption from the requirements of R.61-58.11.C through F, must meet the requirements in either paragraph (a) or (b) of this section in addition to the requirements in paragraph (c) of this section:

(a) The public water system must develop and put in place a monitoring program approved by the Department that provides reasonable assurances that the bottled water meets all maximum contaminant levels. The public water system must monitor a representative sample of the bottled water for all contaminants regulated under R.61-58.5.B(2), D(2)(b) and N the first quarter that it supplies the bottled water to the public, and annually thereafter. Results of the monitoring program shall be provided to the Department annually.

(b) The public water system must obtain the bottled water from a bottled water company that has been permitted by the Department. The public water system must certify such to the Department the first quarter after it supplies bottled water and annually thereafter.

(c) The public water system is fully responsible for the provision of sufficient quantities of bottled water to every person supplied by the public water system, via door-to-door bottled water delivery.

(9) Public water systems that use point-of-use or point-of-entry devices as a condition for obtaining a variance or exemption from the maximum contaminant levels listed in R.61-58.5.B(2), D(2)(b) and N must meet the following requirements:

(a) It is the responsibility of the public water system to operate and maintain the point-of-use and/or point-of-entry treatment system.

(b) The public water system must develop a monitoring plan and obtain Department approval for the plan before point-of-use or point-of-entry devices are installed for compliance. This monitoring plan must provide health protection equivalent to a

monitoring plan for central water treatment.

(c) Effective technology must be properly applied under a plan approved by the Department and the microbiological safety of the water must be maintained at all times.

(d) The public water system must provide adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-use and/or point-of-entry devices.

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

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

(g) 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 R.61-58.11.E or F, the Department 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.

G. Variances and Exemptions from the Maximum Contaminant Level for Total Coliforms.

(1) The following are identified as the best technology, treatment techniques, or other means available for achieving compliance with the MCL for total coliforms:

(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 including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, and continual maintenance of positive water pressure in all parts of the distribution system;

(d) Filtration and/or disinfection of surface water, as described in R.61-58.10, or disinfection of ground water using strong oxidants such as chlorine, chlorine dioxide, or ozone; or

(e) The development and implementation of an EPA-approved State Wellhead Protection Program under section 1428 of the Federal Safe Drinking Water Act.

(2) No variances or exemptions from the maximum contaminant level in R.61-58.5.F are permitted.

H. Variances and Exemptions from the Filtration and Disinfection Requirements.

(1) No variances from the filtration and disinfection requirements are permitted.

(2) No exemptions from the disinfection requirements of R.61-58.10.D(1)(c) and (2)(b) are permitted.

I. Variances and Exemptions from the Maximum Contaminant Levels for Radionuclides.

(1) The following are identified as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for radionuclides listed in R.61-58.5.H(2), (3), (4), and (5), for the purposes of issuing variances and exemptions, as shown in Table A to this paragraph.

**TABLE A: BAT FOR RADIONUCLIDES LISTED IN R.61-58.5.H**

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

(2) In addition, the following are identified as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the radionuclides listed in R.61-58.5.H(2), (3), (4), and (5), for the purposes of issuing variances and exemptions to small drinking water systems, defined here as those serving 10,000 persons or fewer, as shown in Table C to this paragraph.

**TABLE B: 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 & 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 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 C: BAT FOR SMALL COMMUNITY WATER SYSTEMS FOR THE RADIONUCLIDES LISTED IN R.61-58.5.H**

| Contaminant | Compliance technologies[1] for system size categories (population served) | | |
|---|---|---|---|
| | 25-500 | 501-3,300 | 3,300-10,000 |
| 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 |
| Gross alpha particle activity | 3, 4 | 3, 4 | 3, 4 |
| Beta particle activity and photon activity | 1, 2, 3, 4 | 1, 2, 3, 4 | 1, 2, 3, 4 |
| Uranium | 1, 2, 4, 10, 11 | 1, 2, 3, 4, 5, 10, 11 | 1, 2, 3, 4, 5, 10, 11 |

[1] Note: Numbers correspond to those technologies found listed in the Table B to this paragraph.

(3) The Department shall require community water systems to install and/or use any treatment technology identified in Table A to this section, or in the case of small water systems (those serving 10,000 persons or fewer), Table B and Table C of this section, as a condition for granting a variance except as provided in paragraph (4) of this section. If, after the system's installation of the treatment technology, the system cannot meet the MCL, that system shall be eligible for a variance under the provisions of this section.

(4) If a community water system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment technologies identified in this section would only achieve a de minimus reduction in the contaminant level, the Department may issue a schedule of compliance that requires the system being granted the variance to examine other treatment technologies as a condition of obtaining the variance.

(5) If the Department determines that a treatment technology identified under paragraph (4) of this section is technically feasible, the Administrator or the Department may require the system to install and/or use that treatment technology in connection with a compliance schedule issued under the provisions of this section. The Department's determination shall be based upon studies by the system and other relevant information.

(6) The Department may require a community water system 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 from the requirements of R.61-58.5.H of this regulation, to avoid an unreasonable risk to health.

(7) Community water systems that use bottled water as a condition for receiving a variance or an exemption from the requirements of R.61-58.5.H of this regulation must meet the requirements

specified in Section F(7)(a) through (c) above.

(8) Community water systems that use point-of-use or point-of-entry devices as a condition for obtaining a variance or an exemption from the radionuclides SPDWRs must meet the conditions in Section F(8) above.

**R.61-58.10 FILTRATION AND DISINFECTION**

A. Applicability.

(1) This regulation establishes criteria and requirements for the filtration and disinfection of drinking water served to the public. This regulation shall apply to each community and non-community water system, unless the water system meets all of the following conditions:

(a) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

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

(c) Does not sell water to any person; and

(d) Is not a carrier which conveys passengers in interstate commerce.

(2) The requirements of R.61-58.10.B through R61-58.10.G apply to all public water systems supplied by a surface water source and all public water systems supplied by a ground water source under the direct influence of surface water. In addition to these requirements, all public water systems supplied by a surface water source or a ground water source under the direct influence of surface water which serve at least 10,000 people must also comply with R.61-58.10.H and for all public water systems supplied by a surface water source or a groundwater source under the direct influence of surface water which serve fewer than 10,000 people must also comply with R.61-58.10.I.

B. General Requirements.

(1) The requirements of this regulation constitute national primary drinking water regulations. These regulations establish criteria under which filtration is required as a treatment technique for public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water. In addition, these regulations establish treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, and turbidity. Each public water system with a surface water source or a ground water source under the direct influence of surface water shall provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

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

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

(2) A public water system using a surface water source or a ground water source under the direct influence of surface water is considered to be in compliance with the requirements of paragraph (1) of this section if:

(a) It meets the requirements for avoiding filtration in R.61-58.10.C and the disinfection requirements in R.61-58.10.D(1); or,

(b) It meets the filtration requirements in R.61-58.10.E and the disinfection requirements in R.61-58.10.D(2).

(3) Each public water system using a surface water source or a ground water source under the direct influence of surface water shall be operated by qualified personnel who meet the requirements specified by the Department.

C. Criteria for Avoiding Filtration.

A public water system that uses a surface water source shall meet all of the conditions of paragraphs (1) and (2) of this section, and is subject to paragraph (3) of this section, beginning December 30, 1991, unless the Department has determined, in writing, that filtration is required. A public water system that uses a ground water source under the direct influence of surface water shall meet all of the conditions of paragraphs (1) and (2) of this section and is subject to paragraph (3) of this section, beginning 18 months after the Department determines that it is under the direct influence of surface water, or December 30, 1991, whichever is later, unless the Department has determined, in writing, that filtration is required. If the Department determines, in writing, before December 30, 1991, that filtration is required, the system shall have installed filtration and meet the criteria for filtered systems specified in R.61-58.10.D(2) and R.61-58.10.E by June 29, 1993. 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 of the requirements of paragraphs (1) and (2) of this section or after June 29, 1993, whichever is later, the system shall have installed filtration and meet the criteria for filtered systems specified in R.61-58.10.D(2) and R.61-58.10.E.

(1) Source water quality conditions.

(a) The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than 100/100 ml [measured as specified in R.61-58.10.F(1)(a) and (b) and (2)(a)], in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph must be met.

(b) The turbidity level cannot exceed 5 NTU [measured as specified in R.61-58.10.F(1)(d) and (2)(b)] in representative samples of the source water immediately prior to the first or only point of disinfectant application unless:

(i) The Department determines that any such event was caused by circumstances that were unusual and unpredictable; and

(ii) As a result of any such event, there have not been more than two events in the past 12 months the system served water to the public, or more than five events in the past 120 months the system served water to the public, in which the turbidity level exceeded 5 NTU. An "event" is a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

(2) Site-specific conditions.

(a) (i) The public water system shall meet the requirements of R.61-58.10.D(1)(a) at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the

requirements during 2 of the 12 previous months that the system served water to the public, and the Department determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.

(ii) The public water system shall meet the requirements of R.61-58.10.D(1)(b) at all times the system serves water to the public.

(iii) The public water system shall meet the requirements of R.61-58.10.D(1)(c) at all times the system serves water to the public unless the Department determines that any such failure was caused by circumstances that were unusual and unpredictable.

(iv) The public water system shall meet the requirements of R.61-58.10.D(1)(d) on an ongoing basis unless the Department determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

(b) The public water system shall maintain a watershed control program which minimizes the potential for contamination by *Giardia lamblia* cysts and viruses in the source water. The Department shall determine whether the watershed control program is adequate to meet this goal. The adequacy of a program to limit potential contamination by *Giardia lamblia* cysts and viruses shall be based on: the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and 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 shall;

(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 public water system shall 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 public water system shall submit an annual report to the Department 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 public water system expects to address them. For systems using a ground water source under the direct influence of surface water, an approved wellhead protection program developed under section 1428 of the Federal Safe Drinking Water Act may be used, if the Department deems it appropriate, to meet these requirements.

(c) The public water system shall be subject to an annual on-site inspection to assess the watershed control program and disinfection treatment process. Either the Department or a party approved by the Department shall conduct the on-site inspection. The inspection shall be conducted by competent individuals such as sanitary and civil engineers, sanitarians, or technicians who have experience and knowledge about the operation and maintenance of a public water system, and who have a sound understanding

of public health principles and waterborne diseases. A report of the on-site inspection summarizing all findings shall be prepared every year. The on-site inspection shall indicate to the Department's satisfaction that the watershed control program and disinfection treatment process are adequately designed and maintained. The on-site inspection shall include:

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

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

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

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

(v) A review of operating procedures;

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

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

(d) The public water system shall not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system shall have been modified sufficiently to prevent another such occurrence, as determined by the Department.

(e) The public water system shall comply with the maximum contaminant level (MCL) for total coliforms in R.61-58.5.F at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the Department determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(f) The public water system must comply with the requirements for trihalomethanes in R.61-58.13.

(3) Treatment technique violations.

(a) A system is in violation of a treatment technique requirement if:

(i) it fails to meet any one of the criteria in paragraphs (1) and (2) of this section and/or the Department has determined, in writing, that filtration is required; and

(ii) it fails to install filtration by the date specified in the introductory paragraph of this section.

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

(i) The turbidity level [measured as specified in R.61-58.10.F(1)(d) and (2)(b)] in a representative sample of the source water immediately prior to the first

or only point of disinfection application exceeds 5 NTU; or

(ii) The system is identified as a source of a waterborne disease outbreak.

D. Disinfection.

A public water system that uses a surface water source and does not provide filtration treatment shall provide the disinfection treatment specified in paragraph (1) of this section beginning December 30, 1991, unless the Department determines, in writing, that filtration is required. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall provide disinfection treatment specified in paragraph (1) of this section beginning December 30, 1991, or 18 months after the Department determines that the ground water source is under the influence of surface water, whichever is later, unless the Department has determined, in writing, that filtration is required. If the Department has determined that filtration is required, the system shall comply with any interim disinfection requirements the Department deems necessary before filtration is installed. A system that uses a surface water source that provides filtration treatment shall provide the disinfection treatment specified in paragraph (2) of this section beginning June 29, 1993, or beginning when filtration is installed, whichever is later. A system that uses a ground water source under the direct influence of surface water and provides filtration treatment shall provide disinfection treatment as specified in paragraph (2) of this section by June 29, 1993, or beginning when filtration is installed, whichever is later. Failure to meet any requirement of this section after the applicable date specified in this introductory paragraph is a treatment technique violation.

(1) Disinfection requirements for public water systems that do not provide filtration.

Each public water system that does not provide filtration treatment shall provide disinfection treatment as follows:

(a) The disinfection treatment shall 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 day each month. Each day a system serves water to the public, the public water system shall calculate the CT value(s) from the system's treatment parameters, using the procedure specified in R.61-58.10.F(2)(c), and determine whether this value(s) is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. If a system uses a disinfectant other than chlorine, the system may demonstrate to the Department, through the use of a Department-approved protocol for on-site disinfection challenge studies or other information satisfactory to the Department, that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in R.61-58.10.F(2)(c) or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by paragraph (1)(a) of this section.

(b) The disinfection system shall have either:

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

(ii) automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/L of residual disinfectant concentration in the water. If the Department determines that automatic shut-off would cause unreasonable risk to health or interfere with fire protection, the system shall comply with paragraph (1)(b)(i) of this section.

(c) The residual disinfectant concentration in the water entering the distribution system, measured as specified in R.61-58.10.F(1)(e) and (2)(e), cannot be less than 0.2 mg/L for more than 4 hours.

(d) (i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in R.61-58.10.F(1) (e) and (2)(f), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in R.61-58.10.F(1)(c), 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 month, for any two 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 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.

(ii) If the Department determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by R.61-58.10.F(1)(c) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (1)(d)(i) of this section do not apply to that system.

(2) Disinfection requirements for public water systems which provide filtration.

Each public water system that provides filtration treatment shall provide disinfection treatment as follows:

(a) The disinfection treatment shall 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 Department.

(b) The residual disinfectant concentration in the water entering the distribution system, measured as specified in R.61-58.10.F(1)(e) and (3)(b), cannot be less than 0.2 mg/L for more than four (4) hours.

(c) (i) The residual disinfectant concentration in the distribution system,

measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in R.61-58.10.F(1) (e) and (3)(c), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in R.61-58.10(F)(1)(c), 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 month, for any two 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 heterotrophic bacteria plate count (HPC) is measured;
c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;
d = number of instances where no residual disinfectant concentration is 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.

(ii) If the Department determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in R.61-58.10.F(1)(c) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (2)(c)(i) of this section do not apply.

E. Filtration.

A public water system that uses a surface water source or a ground water source under the direct influence of surface water, and does not meet all of the criteria in R.61-58.10.C(1) and (2) for avoiding filtration, shall provide treatment consisting of both disinfection, as specified in R.61-58.10.D(2), and filtration treatment which complies with the requirements of paragraphs (1), (2), (3), or (4) of this section by June 29, 1993, or within 18 months of the failure to meet any one of the criteria for avoiding filtration in R.61-58.10.C(1) and (2), whichever is later. Failure to meet any requirement of this section after the date specified in this introductory paragraph is a treatment technique violation.

(1) Conventional filtration treatment or direct filtration.

(a) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 NTU in at least 95 percent of the measurements taken each month, measured as specified in R.61-58.10.F(1)(d) and (3)(a), except that if the Department determines that the system is capable of achieving at least 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts at some turbidity level higher than 0.5 NTU in at least 95 percent of the measurements taken each month, the Department may substitute this higher turbidity limit for that system. However, in no case may the Department approve a turbidity limit that allows more than 1 NTU in more than 5 percent of the samples taken each month,

measured as specified in R.61-58.10.F(1)(d) and (3)(a).

(b) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in R.61-58.10.F(1)(d) and (3)(a).

(c) Beginning January 1, 2002, systems serving at least 10,000 people must meet the requirements of R.61-58.10.H(4)(a)

(d) Beginning January 1, 2005, systems serving fewer than 10,000 people must meet the turbidity requirements in Section I(6) below.

(2) Slow sand filtration.

(a) 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 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in R.61-58.10.F(1)(d) and (3)(a), except that if the Department determines there is no significant interference with disinfection at a higher turbidity level, the Department may substitute this higher turbidity limit for that system.

(b) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in R.61-58.10.F(1)(d) and (3)(a).

(3) Diatomaceous earth filtration.

(a) 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 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in R.61-58.10.F(1) (d) and (3)(a).

(b) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in R.61-58.10.F(1)(d) and (3)(a).

(4) Other filtration technologies.

A public water system may use a filtration technology not listed in paragraphs (1) through (3) of this section if it demonstrates to the Department, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of Section D(2), above, consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses. For a system that makes this demonstration, the requirements of paragraph (2) of this section apply. Beginning January 1, 2002, systems serving at least 10,000 people must meet the requirements for other filtration technologies in R.61-58.10.H(4)(b). Beginning January 1, 2005, systems serving fewer than 10,000 people must meet the requirements for other filtration technologies in Section I(6) below.

F. Analytical and Monitoring Requirements.

(1) Analytical requirements.

Only the analytical method(s) specified in this paragraph, or otherwise approved by EPA, may be used to demonstrate compliance with the requirements of R.61-58.10.C, R.61-58.10.D, and R.61-58.10.E. Measurements for pH, temperature, turbidity and residual disinfectant concentrations shall be conducted by a party approved by the Department. Measurements for total coliforms, fecal coliforms, and HPC shall

be conducted by a laboratory certified by the Department or EPA to do such analysis. Until laboratory certification criteria are developed for the analysis of HPC and fecal coliforms, any laboratory certified for total coliform analysis by EPA is deemed certified for HPC and fecal coliform analysis. All procedures shall be performed in accordance with EPA-approved methods outlined in 40 CFR 141 (11-8-06 edition).

(2) Monitoring requirements for systems that do not provide filtration.

A public water system that uses a surface water source and does not provide filtration treatment shall begin monitoring, as specified in this paragraph, beginning December 31, 1990, unless the Department has determined in writing that filtration is required, in which case the Department may specify alternative monitoring requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall begin monitoring as specified in this paragraph beginning December 31, 1990, or 6 months after the Department determines that the ground water source is under the direct influence of surface water, whichever is later, unless the Department has determined in writing that filtration is required, in which case the Department may specify alternative monitoring requirements, as appropriate, until filtration is in place.

(a) Fecal coliform or total coliform density measurements as required by R.61-58.10.C(1)(a) shall be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system shall 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[1] |
|---|---|
| <=500 | 1 |
| 501 to 3,300 | 2 |
| 3,301 to 10,000 | 3 |
| 10,001 to 25,000 | 4 |
| >25,000 | 5 |

[1] Must be taken on separate days.

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

(b) Turbidity measurements as required by R.61-58.10.C(1)(b) shall be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the Department.

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

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

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

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

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

(v) If a system uses a disinfectant other than chlorine, the system may demonstrate to the Department, through the use of a Department-approved protocol for on-site disinfection challenge studies or other information satisfactory to the Department, that $CT_{99.9}$ values other than those specified in Tables 2.1 and 3.1 in this section or other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by R.61-58.10.D(1)(a).

**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]**

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

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT99.9 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 5.0°C[1]**

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

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT99.9 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]**

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

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT99.9 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]**

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

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the CT99.9 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 20.0oC[1]**

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

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

**TABLE 1.6 - CT VALUES ($CT9_{9.9}$) FOR 99.9 PERCENT INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 25.0°C[1] AND HIGHER.**

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

[1]These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT9_{9.9}$ 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]**

| | Temperature | | | | | |
|---|---|---|---|---|---|---|
| | ≤1°C | 5°C | 10°C | 15°C | 20°C | ≥25°C |
| Chlorine dioxide | 63 | 26 | 23 | 19 | 15 | 11 |
| Ozone | 2.9 | 1.9 | 1.4 | 0.95 | 0.72 | 0.48 |

[1]These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ 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 |
| 3,800 | 2,200 | 1,850 | 1,500 | 1,100 | 750 |

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

(d) The total inactivation ratio shall be calculated at follows:

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

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

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

Step 1: Determine $\frac{CTcalc \text{ for each sequence}}{CT_{99.9}}$

Step 2: Add the $\frac{CTcalc}{CT_{99.9}}$ values together $\sum \frac{(CTcalc)}{CT_{99.9}}$

Step 3: If $\sum \frac{CTcalc}{CT_{99.9}} \geq 1.0$,

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

(ii) If the system uses more than one point of disinfectant application before or at the first customer, the system shall determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The $CTcalc/CT_{99.9}$ value of each sequence and

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

shall be calculated using the method in paragraph (2)(d)(i)(B) of this section to determine if the system is in compliance with R.61-58.10.D(1).

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

$$\text{Percent inactivation} = 100 - \frac{100}{10^z}$$

where $z = 3 \times \sum \frac{CTcalc}{CT_{99.9}}$

(e) The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

| System size by population | Samples/day[1] |
|---|---|
| ≤ 500 | 1 |
| 501 to 1,000 | 2 |
| 1,001 to 2,500 | 3 |
| 2,501 to 3,300 | 4 |

[1]The day's samples cannot be taken at the same time. The sampling intervals are subject to Department review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/L in a system using grab

sampling in lieu of continuous monitoring, the system shall take a grab sample every 4 hours until the residual concentration is equal to or greater than 0.2 mg/L.

(f) (i) The residual disinfectant concentration shall 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 R.61-58.5.G, except that the Department may allow a public water system which uses both a surface water source or a ground water source under the direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the Department determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (1)(c) of this section, may be measured in lieu of residual disinfectant concentration.

(ii) If the Department determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (1)(c) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (2)(f)(i) of this section do not apply to that system.

(3) Monitoring requirements for systems using filtration treatment.

A public water system that uses a surface water source or a ground water source under the influence of surface water and provides filtration treatment shall monitor in accordance with this paragraph beginning June 29, 1993, or when filtration is installed, whichever is later.

(a) Turbidity measurements as required by R.61-58.10.E shall be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the Department. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the Department may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the Department may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used if the Department determines that less frequent monitoring is sufficient to indicate effective filtration performance.

(b) The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies each day prescribed below:

| System size by population | Samples/day[1] |
|---|---|
| ≤500 | 1 |
| 501 to 1,000 | 2 |
| 1,001 to 2,500 | 3 |
| 2,501 to 3,300 | 4 |

[1]The day's samples cannot be taken at the same time. The sampling intervals are subject to Department review and approval.

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

(c) (i) The residual disinfectant concentration shall 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 R.61-58.5.I, except that the Department may allow a public water system which uses both a surface water source or a ground water source under the direct influence of surface water, and a ground water source to take disinfectant residual samples at points other than the total coliform sampling points if the Department determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (1)(c) of this section, may be measured in lieu of residual disinfectant concentration.

(ii) If the Department determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (1)(c) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (3)(c)(i) of this section do not apply to that system.

G. Reporting and Recordkeeping Requirements.

(1) A public water system that uses a surface water source and does not provide filtration treatment shall report monthly to the Department the information specified in this paragraph beginning December 31, 1990, unless the Department has determined in writing that filtration is required, in which case the Department may specify alternative reporting requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall report monthly to the Department the information specified in this paragraph beginning December 31, 1990, or 6 months after the Department determines that the ground water source is under the direct influence of surface water, whichever is later, unless the Department has determined, in writing, that filtration is required, in which case the Department may specify alternative reporting requirements, as appropriate, until filtration is in place.

(a) Source water quality information shall be reported to the Department within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

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

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

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

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

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

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

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

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

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

(b) Disinfection information specified in R.61-58.10.F(2) shall be reported to the Department within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

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

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

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

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

(v) The daily measurement(s) of water temperature in $^{o}C$ following each point of disinfection.

(vi) The daily CTcalc and CTcalc/$CT_{99.9}$ values for each disinfectant measurement or sequence and the sum of all CTcalc/$CT_{99.9}$ values [$\sum$(CTcalc/$CT_{99.9}$)] before or at the first customer.

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

(viii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to R.61-58.10.D:

(A) Number of instances where the residual disinfectant concentration is measured;

(B) Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

(C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(D) Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;

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

(F) For the current and previous month the system served water to the public, the value of "V" in the following formula:

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

where:

a = the value in paragraph (1)(b)(viii)(A) of this section;
b = the value in paragraph (1)(b)(viii)(B) of this section;
c = the value in paragraph (1)(b)(viii)(C) of this section;
d = the value in paragraph (1)(b)(viii)(D) of this section; and
e = the value in paragraph (1)(b)(viii)(E) of this section.

(G) If the Department determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by R.61-58.10.F(1)(c) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (1)(b)(viii)(A) - (F) of this section

do not apply to that system.

(ix) A system need not report the data listed in paragraphs (1)(b)(i), and (iii) - (vi) of this section if all data listed in paragraphs (1)(b)(i) - (viii) of this section remain on file at the system, and the Department determines that:

(A) The system has submitted to the Department all the information required by paragraphs (1)(b)(i) -(viii) of this section for at least 12 months; and

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

(c) No later than October 10 of each year, each system shall provide to the Department a report which summarizes its compliance with all watershed control program requirements specified in R.61-58.10.C(2)(b).

(d) No later than October 10 of each year, each system shall provide to the Department a report on the on-site inspection conducted during that year pursuant to R.61-58.10.C(2)(c), unless the on-site inspection was conducted by the Department. If the inspection was conducted by the Department, the Department shall provide a copy of its report to the public water system.

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

(ii) If at any time the turbidity exceeds 5 NTU, the system shall inform the Department as soon as possible, but no later than the end of the next business day.

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

(iv) If at any time the turbidity exceeds 5 NTU, the system must consult with the primacy agency as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under R.61-58.6.E(3)(b)(iii).

(2) A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment shall report monthly to the Department the information specified in this paragraph beginning June 29, 1993, or when filtration is installed, whichever is later.

(a) Turbidity measurements as required by R.61-58.10.F(3)(a) shall be reported within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

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

(ii) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in R.61-58.10.E for the filtration technology being used.

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

(b) Disinfection information specified in R.61-58.10.F(3) shall be reported to the Department within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

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

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

(iii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to R.61-58.10.D:

(A) Number of instances where the residual disinfectant concentration is measured;

(B) Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

(C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(D) Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;

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

(F) For the current and previous month the system serves water to the public, the value of "V" in the following formula:

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

where:

a = the value in paragraph (2)(b)(iii)(A) of this section;
b = the value in paragraph (2)(b)(iii)(B) of this section;
c = the value in paragraph (2)(b)(iii)(C) of this section;
d = the value in paragraph (2)(b)(iii)(D) of this section; and
e = the value in paragraph (2)(b)(iii)(E) of this section.

(G) If the Department determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory within the

requisite time and temperature conditions specified by R.61-58.10.F(1)(c) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (2)(b)(iii)(A) - (F) of this section do not apply.

(iv) A system need not report the data listed in paragraph (2)(b)(i) of this section if all data listed in paragraphs (2)(b)(i) - (iii) of this section remain on file at the system and the Department determines that the system has submitted all the information required by paragraphs (2)(b)(i) - (iii) of this section for at least 12 months.

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

(ii) If at any time the turbidity exceeds 5 NTU, the system shall inform the Department as soon as possible, but no later than the end of the next business day.

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

(iv) If at any time the turbidity exceeds 5 NTU, the system must consult with the primacy agency as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under R.61-58.6.E(3)(b)(iii).

H. Enhanced Filtration and Disinfection - Systems Serving 10,000 or More People (Interim Enhanced Surface Water Treatment Rule).

(1) General requirements.

(a) The requirements of this regulation constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under Sections B through G above. The requirements of this section are applicable to 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 serving at least 10,000 people, beginning January 1, 2002 unless otherwise specified. These regulations establish or extend 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 public water system supplied by a surface water source or a ground water source under the direct influence of surface water system serving at least 10,000 people must provide treatment of its source water that complies with these treatment technique requirements and are in addition to those identified in Sections B through G above. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(i) 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.

(ii) Compliance with the profiling and benchmark requirements under the provisions of paragraph (3) of this section.

(b) A public water system subject to the requirements of these regulations is considered to be in compliance with the requirements of paragraph (1) of this section if:

(i) It meets the requirements for avoiding filtration in R.61-58.10.C and R.61-58.10.H(2) and the disinfection requirements in R.61-58.10.D and R.61-58.10.H(3); or

(ii) It meets the applicable filtration requirements in either R.61-58.10.E or R.61-58.10.H(4) and the disinfection requirements in R.61-58.10.D and R.61-58.10.H(3).

(c) Systems are not permitted to begin construction of uncovered finished water storage facilities beginning February, 16, 1999.

(d) Systems with a surface water source or a ground water source under the direct influence of surface water that did not conduct optional monitoring under Section H(3) because they served fewer than 10,000 persons when such monitoring was required, but served at least 10,000 persons prior to January 1, 2005 must comply with Section H. These systems must also consult with the Department to establish a disinfection benchmark. A system that decides to make a significant change to its disinfection practice, as described in Section H(3)(c)(i) must consult with the Department prior to making such change.

(2) Criteria for avoiding filtration.

In addition to the requirements of R.61-58.10.C, a public water system subject to the requirements of this section that does not provide filtration must meet all of the conditions of paragraphs (2)(a) and (2)(b) of this section.

(a) Site-specific conditions. In addition to site-specific conditions in R.61-58.10.C(2), systems must maintain the watershed control program under R.61-58.10.C(2)(b) to minimize the potential for contamination by *Cryptosporidium* oocysts in the source water. The watershed control program must, for *Cryptosporidium*:

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

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

(b) During the onsite inspection conducted under the provisions of R.61-58.10.C(2)(c), the Department must determine whether the watershed control program established under 58.10.C(2)(b) is adequate to limit potential contamination by *Cryptosporidium* oocysts. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within

the watershed.

(3) (a) Using data gathered from monitoring conducted by the Department during the time period of January 1, 1999 through March 1, 2000, any system having either a TTHM annual average greater than or equal to 0.064 mg/L or an HAA5 annual average greater than or equal to 0.048 mg/L during this period must comply with paragraph (3)(b) of this section.

(b) Disinfection profiling.

(i) Any system that meets the criteria in paragraph (3)(a) of this section must develop a disinfection profile of its disinfection practice for a period of up to three years.

(ii) The system must monitor daily for a period of 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 R.61-58.10.F(2), as appropriate, through the entire treatment plant. This system must begin this monitoring not later than March 16, 2000. As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring in paragraphs (3)(b)(ii) (A) through (D) of this section. A system with more than one point of disinfectant application must conduct the monitoring in paragraphs (3)(b)(i) through (iv) of this section for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using EPA approved analytical methods specified in 40 CFR 141, as follows:

(iii) In lieu of the monitoring conducted under the provisions of paragraph (b)(ii) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (b)(iii)(A) of this section. In addition to the monitoring conducted under the provisions of paragraph (b)(ii) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (b)(iii)(B) of this section.

(A) A PWS that has three years of existing operational data may submit those data, a profile generated using those data, and a request that the State approve use of those data in lieu of monitoring under the provisions of paragraph (b)(2) of this section not later than March 16, 2000. The State must determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (b)(ii) of this section. These data must also be representative of *Giardia lamblia* inactivation through the entire treatment plant and not just of certain treatment segments. Until the State approves this request, the system is required to conduct monitoring under the provisions of paragraph (b)(ii) of this section.

(B) In addition to the disinfection profile generated under paragraph (3)(b)(ii) of this section, a PWS that has existing operational data may use those data to develop a disinfection profile for additional years. Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of paragraph (3)(c) of this section. The State must determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (3)(b)(ii) of

this section. These data must also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

(iv) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (3)(b)(iv)(A) or (3)(b)(iv)(B) of this section.

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

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

(v) If the system uses more than one point of disinfectant application before the first customer, the system must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and ($\sum$ ($CTcalc/CT_{99.9}$)) must be calculated using the method in paragraph (3)(b)(iv) of this section.

(vi) The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (b)(iv)(A) or (B) of this section by 3.0.

(vii) A system that uses either chloramines or ozone for primary disinfection must also calculate the logs of inactivation for viruses using a method approved by the Department.

(viii) The system must retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the Department for review as part of the sanitary survey.

(c) Disinfection Benchmarking

(i) Any system required to develop a disinfection profile under the provisions of paragraphs (3)(a) and (3)(b) of this section and that decides to make a significant change to its disinfection practice must consult with the Department prior to making such change. Significant changes to disinfection practice are:

(A) Changes to the point of disinfection;

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

(C) Changes to the disinfection process; and

(D) Any other modification identified by the Department.

(ii) Any system that is modifying its disinfection practice must calculate its

disinfection benchmark using the following procedure:

(A) For each year of profiling data collected and calculated under paragraph (b) of this section, the system must determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The system must determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* of inactivation by the number of values calculated for that month.

(B) The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of the monthly logs of *Giardia lamblia* inactivation in each year of profiling data.

(iii) A system that uses either chloramines or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a method approved by the Department.

(iv) The system must submit information in paragraphs (3)(c)(iv)(A) through (C) of this section to the Department as part of its consultation process.

(A) A description of the proposed change;

(B) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) under paragraph (b) of this section and benchmark as required by paragraph (c)(2) of this section; and

(C) An analysis of how the proposed change will affect the current levels of disinfection.

(4) Filtration

A public water system subject to the requirements of this section that does not meet all of the criteria in Section C above and paragraph (2) of this section for avoiding filtration must provide treatment consisting of both disinfection, as specified in Section D above, and filtration treatment which complies with the requirements of paragraph 4(a) or 4(b) of this section or Section E(2) or (3) by December 31, 2001.

(a) Conventional filtration treatment or direct filtration.

(i) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in Section F(1)(d) and (3)(a) above.

(ii) The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU, measured as specified in Section F(1)(d) and (3)(a) above.

(iii) A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the Department.

(b) Filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration.

A public water system may use a filtration technology not listed in paragraph (4)(a) of this section or in Section E(2) or (3) if it demonstrates to the Department, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of Section D, consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts, and the Department approves the use of the filtration technology. For each approval, the Department will set turbidity performance requirements that the system must meet at least 95 percent of the time and that the system may not exceed at any time at a level that consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts.

(5) Filtration sampling requirements

(a) Monitoring requirements for systems using filtration treatment. In addition to monitoring required by Section F above, a public water system subject to the requirements of this subpart that provides conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in Section F above, and must calibrate turbidimeters using the procedure specified by the manufacturer. Systems must record the results of individual filter monitoring every fifteen (15) minutes.

(b) If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment.

(6) Reporting and recordkeeping requirements.

In addition to the reporting and recordkeeping requirements in Section G above, a public water system subject to the requirements of this subpart that provides conventional filtration treatment or direct filtration must report monthly to the Department the information specified in paragraphs (6)(a) and (6)(b) of this section beginning December 31, 2001. In addition to the reporting and recordkeeping requirements in Section G above, a public water system subject to the requirements of this subpart that provides filtration approved under paragraph (4)(b) of this section must report monthly to the Department the information specified in paragraph (a) of this section beginning December 31, 2001. The reporting in paragraph (6)(a) of this section is in lieu of the reporting specified in Section G above.

(a) Turbidity measurements as required by paragraph (4) of this section must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

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

(ii) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits

specified in paragraph (4)(a) or (4)(b) of this section.

(iii) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the Department under paragraph (4)(b) of this section.

(b) Systems must maintain the results of individual filter monitoring taken under paragraph (5) of this section for at least three years. Systems must report that they have conducted individual filter turbidity monitoring under paragraph (5) of this section within 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 paragraph (5) of this section within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions in paragraphs (6)(b)(i) through (iv) of this section. Systems that use lime softening may apply to the Department for alternative exceedance levels for the levels specified in paragraphs (6)(b)(i) through (iv) of this section if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(i) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(ii) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

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

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

performance evaluation by the Department or a third party approved by the Department no later than 30 days following the exceedance and have the evaluation completed and submitted to the Department no later than 90 days following the exceedance.

(c) Additional reporting requirements.

(i) If at any time the turbidity exceeds one (1) NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system must inform the Department as soon as possible, but no later than the end of the next business day.

(ii) If at any time the turbidity in representative samples of filtered water exceeds the maximum level set by the Department under paragraph 4(b) of this section for filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system must inform the Department as soon as possible, but no later than the end of the next business day.

I. Enhanced Filtration and Disinfection - Systems Serving Fewer Than 10,000 People (Long Term 1 Enhanced Surface Water Treatment Rule).

(1) General Requirements

(a) The requirements of this regulation constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required for systems with surface water sources or ground water sources under the influence of surface water. This regulation establishes or extends treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium* and turbidity. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(i) 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; and

(ii) Compliance with the profiling and benchmark requirements in paragraphs (4) and (5) of this section.

(b) ***Who is subject to the requirements of this section?*** You are subject to these requirements if your system:

(i) Is a public water system;

(ii) Uses surface water or GWUDI as a source; and

(iii) Serves fewer than 10,000 persons.

(c) ***When must my system comply with these requirements?*** *Y*ou must comply with

these requirements in this regulation beginning January 1, 2005 except where otherwise noted.

(d) ***What does this regulation require?*** There are seven (7) requirements of this subpart, and you must comply with all requirements that are applicable to your system. These requirements are:

(i) You must cover any finished water reservoir that you began to construct on or after March 15, 2002 as described in paragraph (2) of this section;

(ii) If your system is an unfiltered system, you must comply with the updated watershed control requirements described in paragraph (3) of this section;

(iii) If your system is a community or non-transient non-community water systems you must develop a disinfection profile as described in paragraph (4) of this section;

(iv) If your system is considering making a significant change to its disinfection practices, you must develop a disinfection benchmark and consult with the Department for approval of the change as described in paragraph (5) of this section;

(v) If your system is a filtered system, you must comply with the combined filter effluent requirements as described in paragraph (6) of this section;

(vi) If your system is a filtered system that uses conventional or direct filtration, you must comply with the individual filter turbidity requirements as described in paragraph (7) of this section; and,

(vii) You must comply with the applicable reporting and recordkeeping requirements as described in paragraph (8) of this section.

(2) Finished Water Reservoirs

(a) ***Is my system subject to the new finished water reservoir requirements?*** All surface water systems and ground water systems under the direct influence of surface water which serve fewer than 10,000 people are subject to this requirement.

(b) ***What is required of new finished water reservoirs*****?** If your system begins construction of a finished water reservoir on or after March 15, 2002 the reservoir must be covered. Finished water reservoirs for which your system began construction prior to March 15, 2002 are not subject to this requirement.

(3) Additional Watershed Control Requirements for Unfiltered Systems

(a) ***Is my system subject to the updated watershed control requirements?*** If you are a surface water system or a ground water system under the direct influence of surface water serving fewer than 10,000 persons which does not provide filtration, you must continue to comply with all of the filtration avoidance criteria in Section C, as well as the additional watershed control requirements in paragraph (3)(b) of this section.

(b) ***What updated watershed control requirements must my unfiltered system implement to continue to avoid filtration*****?** Your system must take any additional steps

necessary to minimize the potential for contamination by *Cryptosporidium* oocysts in the source water. Your system's watershed control program must, for *Cryptosporidium*:

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

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

(c) ***How does the Department determine whether my system's watershed control requirements are adequate****?* During an onsite inspection conducted under the provisions of Section C(2)(c), the Department must determine whether your watershed control program is adequate to limit potential contamination by *Cryptosporidium* oocysts. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of your program to monitor and control detrimental activities occurring in the watershed; and the extent to which your system has maximized land ownership and/or controlled land use within the watershed.

(4) Disinfection Profile

(a) ***What is a Disinfection Profile and who must develop one?*** A disinfection profile is a graphical representation of your system's level of *Giardia lamblia* or virus inactivation measured during the course of a year. If you are a surface water system or a ground water system under the direct influence of surface water which serves fewer than 10,000 persons, your system must develop a disinfection profile unless the Department determines that your system's profile is unnecessary. The Department may approve the use of a more representative data set for disinfection profiling than the data set required under paragraph (4) (c) through (f) of this section.

(b) ***What criteria must the Department use to determine that a profile is unnecessary?*** The Department may only determine that a system's profile is unnecessary if a system's TTHM and HAA5 levels are below 0.064 mg/L and 0.048 mg/L, respectively. To determine these levels, TTHM and HAA5 samples must be collected after January 1, 1998, during the month with the warmest water temperature, and at the point of maximum residence time in your distribution system. The Department may approve a more representative TTHM and HAA5 data set to determine these levels

(c) ***How does my system develop a Disinfection Profile and when must it begin?*** A disinfection profile consists of three steps:

(i) First, your system must collect data for several parameters from the plant as discussed in paragraph (4)(d) of this section, over the course of twelve (12) months. If your system serves between 500 and 9,999 persons you must begin to collect data no later than July 1, 2003. If your system serves fewer than 500 persons you must begin to collect data no later than January 1, 2004.

(ii) Second, your system must use this data to calculate weekly log inactivation as discussed in paragraphs (4)(e) and (f) of this section.

(iii) Third, your system must use these weekly log inactivations to develop a disinfection profile as specified in paragraph (4)(g) of this section.

(d) ***What data must my system collect to calculate a Disinfection Profile?*** Your

system must monitor the following parameters to determine the total log inactivation using the analytical methods in Section F, once per week on the same calendar day, over twelve (12) consecutive months:

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

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

(iii) The disinfectant contact time(s) ('T') during peak hourly flow; and

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

(e) ***How does my system use this data to calculate an inactivation ratio?*** Use the tables in R-61.58.10.F(1)(c)(v) to determine the appropriate $CT_{99.9}$ value. Calculate the total inactivation ratio as follows, and multiply the value by 3.0 to determine log inactivation of Giardia lamblia:

| If your system * * * | Your system must determine * * * |
|---|---|
| (a) Uses only one point of disinfectant application | (1) One inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow<br>or<br>(2) Successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, your system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine ($\Sigma CTcalc/CT_{99.9}$). |
| (b) Uses more than one point of disinfectant application before the first customer | The ($CTcalc/CT_{99.9}$) value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow using the procedure specified in paragraph (a)(2) of this section. |

(f) ***What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?*** If your system uses chloramines, ozone, or chlorine dioxide for primary disinfection, you must also calculate the logs of inactivation for viruses and develop an additional disinfection profile for viruses using methods approved by the Department.

(g) ***My system has developed an inactivation ratio; what must we do now?*** Each log inactivation serves as a data point in your disinfection profile. Your system will have obtained fifty-two (52) measurements (one (1) for every week of the year). This will allow your system and the Department the opportunity to evaluate how microbial inactivation varied over the course of the year by looking at all fifty-two (52) measurements (your

Disinfection Profile). Your system must retain the Disinfection Profile data in graphic form, such as a spreadsheet, which must be available for review by the Department as part of a sanitary survey. Your system must use this data to calculate a benchmark if you are considering changes to disinfection practices.

(5) Disinfection Benchmark

(a) ***Who has to develop a Disinfection Benchmark?*** If you are a surface water system or a ground water system under the direct influence of surface water you are required to develop a disinfection profile under paragraphs (4)(a) through (g) of this section. Your system must develop a Disinfection Benchmark if you decide to make a significant change to your disinfection practice. Your system must consult with the Department for approval before you can implement a significant disinfection practice change.

(b) ***What are significant changes to disinfection practice?*** Significant changes to disinfection practice include:

(i) Changes to the point of disinfection;

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

(iii) Changes to the disinfection process; or

(iv) Any other modification identified by the Department.

(c) ***What must my system do if we are considering a significant change to disinfection practices?*** If your system is considering a significant change to its disinfection practice, your system must calculate a disinfection benchmark(s) as described in paragraphs (5)(c) and (d) of this section, and provide the benchmark(s) to the Department. Your system may only make a significant disinfection practice change after consulting with the Department for approval. Your system must submit the following information to the Department 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 Department.

(d) ***How is the Disinfection Benchmark calculated?*** If your system is making a significant change to its disinfection practice, it must calculate a disinfection benchmark using the procedure specified in the following table.

| To calculate a disinfection benchmark your system must perform the following steps |
|---|
| Step 1: Using the data your system collected to develop the Disinfection Profile, determine the average *Giardia lamblia* inactivation for each calendar month by dividing the sum of all *Giardia lamblia* inactivations for that month by the number of values calculated for that month.<br>Step 2: Determine the lowest monthly average value out of the twelve (12) values. This value becomes the disinfection benchmark. |

(e) ***What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?*** If your system uses chloramines, ozone or chlorine dioxide for primary disinfection your system must calculate the disinfection benchmark from the data your system collected for viruses to develop the disinfection profile in addition to the *Giardia lamblia* disinfection benchmark calculated under paragraph (5)(d) of this section. This viral benchmark must be calculated in the same manner used to calculate the *Giardia lamblia* disinfection benchmark in paragraph (5)(d) of this section.

(6) Combined Filter Effluent Requirements

(a) ***Is my system required to meet this regulation's combined filter effluent turbidity limits?*** All surface water systems and ground water systems under the direct influence of surface water which serve populations fewer than 10,000, and that utilize filtration other than slow sand filtration or diatomaceous earth filtration, must meet the combined filter effluent turbidity requirements of paragraphs (6)(b) through (d) of this section If your system uses slow sand or diatomaceous earth filtration you are not required to meet the combined filter effluent turbidity limits of this regulation, but you must continue to meet the combined filter effluent turbidity limits in Section E.

(b) ***What strengthened combined filter effluent turbidity limits must my system meet?*** Your system must meet two strengthened combined filter effluent turbidity limits.

(i) The first combined filter effluent turbidity limit is a "95th percentile" turbidity limit that your system must meet in at least ninety (95) percent of the turbidity measurements taken each month. Measurements must continue to be taken as described in Section F(1) and (3). Monthly reporting must be completed according to paragraph (8) of this section. The following table describes the required limits for specific filtration technologies.

| If your system consists of * * * | Your 95th percentile turbidity value is * * * |
|---|---|
| (1) Conventional Filtration or Direct Filtration..... | 0.3 NTU |
| (2) All other 'Alternative' Filtration..... | A value determined by the Department (not to exceed 1 NTU) based on the demonstration described in paragraph (6)(c)of this section. |

(ii) The second combined filter effluent turbidity limit is a "maximum"

turbidity limit which your system may at no time exceed during the month. Measurements must continue to be taken as described in Sections F(1) and C. Monthly reporting must be completed according to paragraph (8) of this section. The following table describes the required limits for specific filtration technologies.

| If your system consists of * * * | Your maximum turbidity value is * * * |
|---|---|
| (1) Conventional Filtration or Direct Filtration….. | 1 NTU |
| (2) All other 'Alternative' Filtration..... | A value determined by the Department (not to exceed 5 NTU) based on the demonstration as described in paragraph (6)(c) of this section. |

(c) ***My system consists of "alternative filtration" and is required to conduct a demonstration--what is required of my system and how does the Department establish my turbidity limits?***

(i) If your system consists of alternative filtration(filtration other than slow sand filtration, diatomaceous earth filtration, conventional filtration, or direct filtration) you are required to conduct a demonstration (see tables in paragraph (6)(b) of this section). Your system must demonstrate to the Department, using pilot plant studies or other means, that your system's filtration, in combination with disinfection treatment, consistently achieves:

(A) 99 percent removal of *Cryptosporidium* oocysts;

(B) 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts; and

(C) 99.99 percent removal and/or inactivation of viruses.

(ii) [Reserved]

(d) ***My system practices lime softening--is there any special provision regarding my combined filter effluent****?* If your system practices lime softening, you may acidify representative combined filter effluent turbidity samples prior to analysis using a protocol approved by the Department.

(7) Individual Filter Turbidity Requirements

(a) ***Is my system subject to individual filter turbidity requirements?*** If your system is a surface water system or a ground water system under the direct influence of surface water serving fewer than 10,000 people and utilizing conventional filtration or direct filtration, you must conduct continuous monitoring of turbidity for each individual filter at your system. The following requirements apply to continuous turbidity monitoring:

(i) Monitoring must be conducted using an approved method in Section F(1);

(ii) Calibration of turbidimeters must be conducted using procedures

specified by the manufacturer;

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

(iv) Monthly reporting must be completed according to paragraph (8) of this section; and

(v) Records must be maintained according to paragraph (8)(b) of this section.

(b) ***What happens if my system's turbidity monitoring equipment fails?*** If there is a failure in the continuous turbidity monitoring equipment, your system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is back on-line. Your system has fourteen (14) days to resume continuous monitoring before a violation is incurred.

(c) ***My system only has two or fewer filters--is there any special provision regarding individual filter turbidity monitoring?*** Yes, if your system only consists of two (2) or fewer filters, you 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 paragraphs (7)(a) through (d) of this section.

(d) ***What follow-up action is my system required to take based on continuous turbidity monitoring?*** Follow-up action is required according to the following tables:

| If * * * | Your system must * * * |
|---|---|
| (a) The turbidity of an individual filter (or the turbidity of combined filter effluent (CFE) for systems with 2 filters that monitor CFE in lieu of individual filters) exceeds 1.0 NTU in two consecutive recordings 15 minutes apart. | Report to the Department by the 10th of the following month and include the filter number(s), corresponding date(s), turbidity value(s) which exceeded 1.0 NTU, and the cause (if known) for the exceedance(s). |

| If a system was required to report to the Department * * * | Your system must * * * |
|---|---|
| (b) For three months in a row and turbidity exceeded 1.0 NTU in two consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters). | Conduct a self-assessment of the filter(s) within 14 days of the day the filter exceeded 1.0 NTU in two consecutive measurements for the third straight month unless a CPE as specified in paragraph (c) of this section was required. Systems with 2 filters that monitor CFE in lieu of individual filters must conduct a self-assessment on both filters. The self-assessment must consist of at least the following components: |

| | |
|---|---|
| | assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report. |
| (c) For two months in a row and turbidity exceeded 2.0 NTU in 2 consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters). | Arrange to have a comprehensive performance evaluation (CPE) conducted by the Department or a third party approved by the Department not later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. If a CPE has been completed by the Department or a third party approved by the Department within the 12 prior months or the system and the Department are jointly participating in an ongoing Comprehensive Technical Assistance (CTA) project at the system, a new CPE is not required. If conducted, a CPE must be completed and submitted to the Department no later than 120 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. |

(e) ***My system practices lime softening--is there any special provision regarding my individual filter turbidity monitoring****?* If your system utilizes lime softening, you may apply to the Department for alternative turbidity exceedance levels for the levels specified in the table in paragraph (7)(d) of this section. You must be able to demonstrate to the Department that higher turbidity levels are due to lime carryover only, and not due to degraded filter performance.

(8) Reporting and Recordkeeping Requirements

(a) ***What does this section require that my system report to the Department?*** This section requires your system to report several items to the Department. The following table describes the items which must be reported and the frequency of reporting. Your system is required to report the information described in the following table, if it is subject to the specific requirement shown in the first column.

| Corresponding requirement | Description of information to report | Frequency |
|---|---|---|
| (a) Combined Filter Effluent Requirements. (paragraphs (6)(a) through (d) of this section). | (1) The total number of filtered water turbidity measurements taken during the month. | By the 10th of the following month. |
| | (2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to your system's required 95th percentile limit. | By the 10th of the following month. |
| | (3) The date and value of any turbidity measurements taken during the month which | By the 10th of the following month |

| | | |
|---|---|---|
| | exceed the maximum turbidity value for your filtration system. | |
| (b) Individual Turbidity Requirements. (paragraph (7)(a) through (e) of this section). | (1) That your system conducted individual filter turbidity monitoring during the month. | By the 10th of the following month. |
| | (2) The filter number(s), corresponding date(s), and the turbidity value(s) which exceeded 1.0 NTU during the month, and cause (if known) for the exceedance(s), but only if 2 consecutive measurements exceeded 1.0 NTU. | By the 10th of the following month. |
| | (3) If a self-assessment is required, the date that it was triggered and the date that it was completed. | By the 10th of the following month (or 14 days after the self-assessment was triggered only if the self-assessment was triggered during the last four days of the month) |
| | (4) If a CPE is required, that the CPE is required and the date that it was triggered. | By the 10th of the following month. |
| | (5) Copy of completed CPE report..... | Within 120 days after the CPE was triggered. |
| (c) Disinfection Profiling..... (paragraphs (4)(a) through (g) of this section) | (1) Results of optional monitoring which show TTHM levels 0.064 mg/L and HAA5 levels 0.048 mg/L (Only if your system wishes to forgo profiling) or that your system has begun disinfection profiling. | (i) For systems serving 500-9,999 by July 1, 2003; (ii) For systems serving fewer than 500 by January 1, 2004. |
| (d) Disinfection Benchmarking (paragraph (5)(a) through (e) of this section) | (1) A description of the proposed change in disinfection, your system's disinfection profile for *Giardia lamblia* (and, if necessary, viruses) and disinfection benchmark, and an analysis of how the proposed change will affect the current levels of disinfection. | Anytime your system is considering a significant change to its disinfection practice. |

(b) **W*hat records does this regulation require my system to keep?*** Your system must keep several types of records based on the requirements of this regulation, in addition to recordkeeping requirements under Section G. The following table describes the necessary records, the length of time these records must be kept, and for which requirement the records pertain. Your system is required to maintain records described in this table, if it is subject to the specific requirement shown in the first column.

| Corresponding requirement | Description of necessary records | Duration of time records must be kept |
|---|---|---|
| (a) Individual Filter Turbidity Requirements (paragraphs (7)(a) through (e) of this section) | Results of individual filter monitoring..... | At least 3 years. |
| (b) Disinfection Profiling (paragraphs (4)(a) through (g) of this section) | Results of Profile (including raw data and analysis)..... | Indefinitely. |
| (c) Disinfection Benchmarking (paragraphs (5)(a) through (e) of this section) | Benchmark (including raw data and analysis)..... | Indefinitely. |

J. Recycle Provisions (Filter Backwash Recycling Rule).

(1) Applicability.

All community water systems (CWSs) and non-transient, non-community waters systems (NTNCWSs) 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 paragraphs (2) through (4) of this section.

(2) Reporting. A system must notify the Department in writing by December 8, 2003, if the system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the information specified in paragraphs (2)(a) and (b) of this section.

(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 reintroduced back into the treatment plant.

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

(3) Treatment technique requirement. 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 R.61-58.B or at an alternate location approved by the Department by June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.

(4) Recordkeeping. The system must collect and retain on file recycle flow information specified in paragraphs (4)(a) through (f) of this section for review and evaluation by the Department beginning June 8, 2004.

(a) Copy of the recycle notification and information submitted to the Department

under paragraph (b) of this section.

(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.

K. Enhanced Treatment for Cryptosporidium (Long Term 2 Surface Water Treatment Rule).

(1) General Requirements

(a) The requirements of R.61-58.10.K are National Primary Drinking Water Regulations that 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 R.61-58.10 A through I.

(b) Applicability.

The requirements of R.61-58.10.K apply to all subpart H systems.

(i) Wholesale systems, as defined in R.61-58.B , must comply with the requirements of R.61-58.10.K based on the population of the largest system in the combined distribution system.

(ii) The requirements of R.61-58.10.K for filtered systems apply to systems required by State Primary Drinking Water Regulations to provide filtration treatment, whether or not the system is currently operating a filtration system.

(iii) The requirements of R.61-58.10.K for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in R.61-58.10.A through I, as applicable.

(c) Requirements.

Systems subject to R.61-58.10.K must comply with the following requirements:

(i) Systems must conduct an initial and a second round of source water monitoring for each plant that treats a surface water or ground water under direct influence (GWUDI) source. This monitoring may include sampling for Cryptosporidium, E. coli, and turbidity as described in R.61-58.10.K(2) through R.61-58.10.K(7), to determine what level, if any, of additional Cryptosporidium treatment they must provide.

(ii) Systems that plan to make a significant change to their disinfection

practice must develop disinfection profiles and calculate disinfection benchmarks, as described in R.61-58.10.K(9) and (10).

(iii) Filtered systems must determine their Cryptosporidium treatment bin classification as described in R.61-58.10.K(11) and provide additional treatment for Cryptosporidium, if required, as described in R.61-58.10.K(12). All unfiltered systems must provide treatment for Cryptosporidium as described in R.61-58.10.K(13). Filtered and unfiltered systems must implement Cryptosporidium treatment according to the schedule in R.61-58.10.K(14).

(iv) Systems with uncovered finished water storage facilities must comply with the requirements to cover the storage facility or treat the discharge from the storage facility as described in R.61-58.10.K(15).

(v) Systems required to provide additional treatment for Cryptosporidium must implement microbial toolbox options that are designed and operated as described in R.61-58.10.K(16) through R.61-58.10.K(21).

(vi) Systems must comply with the applicable recordkeeping and reporting requirements described in R.61-58.10.K(22) through R.61-58.10.K(23).

(vii) Systems must address significant deficiencies identified in sanitary surveys performed by EPA as described in R.61-58.10.K(24).

(2) Source Water Monitoring.

(a) Initial Source Monitoring.

Systems must conduct the following monitoring on the schedule in R.61-58.10.K(2)(c) unless they meet the monitoring exemption criteria in R.61-58.10.K(2)(d).

(i) 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.

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

(iii) E.Coli Monitoring for Filtered Systems Serving Fewer Than 10,000 People.

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

(B) A filtered system serving fewer than 10,000 people may avoid E. coli monitoring if the system notifies the Department that it will monitor for Cryptosporidium as described in R.61-58.10.K(2)(a)(4). The system must notify the Department no later than 3 months prior to the date the system is otherwise required to start E. coli monitoring under R.61-58.10.K(2)(c).

(iv) 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 criteria in (A)

through (D) below, based on monitoring conducted under R.61-58.10.K(2)(a)(iii).

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

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

(C) The system does not conduct E. coli monitoring as described in R.61-58.10.K(2)(a)(iii).

(D) Systems using a GWUDI source must comply with the requirements of R.61-58.10.K(2)(a)(iv) 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 or reservoir sources.

(v) For filtered systems serving fewer than 10,000 people, the Department may approve monitoring for an indicator other than E. coli under R.61-58.10.K(2)(a)(iii). The Department also may approve an alternative to the E. coli concentration in paragraph R.61-58.10.K(2)(a)(iv)(A), (B) or (D) to trigger Cryptosporidium monitoring. This approval by the Department must be in writing and will include the basis for the Department's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 Cryptosporidium level in R.61-58.10.K(11).

(vi) 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.

(vii) 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 R.61-58.10.K(2)(a), unless they meet the monitoring exemption criteria in R.61-58.10.K(2)(d). Systems must conduct this monitoring on the schedule in R.61-58.10.K(2)(c).

(c) Monitoring Schedule

Systems must begin the monitoring required in R.61-58.10.K(2)(a) and (b) no later than the month beginning with the date listed in R.61-58.10.K(2)(c)(i) through (v).

(i) Systems that serve at least 100,000 people must begin the first round of source water monitoring no later than the month beginning October 1, 2006, and must begin the second round of source water monitoring no later than the month beginning April 1, 2015.

(ii) Systems that serve from 50,000 to 99,999 people must begin the first round of source water monitoring no later than the month beginning April 1, 2007, and must begin the second round of source water monitoring no later than the month beginning October 1, 2015.

(iii) Systems that serve from 10,000 to 49,999 people must begin the first round of source water monitoring no later than the month beginning April 1, 2008, and must begin the second round of source water monitoring no later than the month beginning October 1, 2016.

(iv) Systems that serve fewer than 10,000 people and monitor for E. coli (applies only to filtered systems) must begin the first round of source water monitoring no later than the month beginning October 1, 2008, and must begin the second round of source water monitoring no later than the month beginning October 1, 2017.

(v) Systems that serve fewer than 10,000 people and monitor for Cryptosporidium must begin the first round of source water monitoring no later than the month beginning April 1, 2010, and must begin the second round of source water monitoring no later than the month beginning April 1, 2019. (Applies to filtered systems that meet the conditions of R.61-58.10.K(2)(a)(iv) and unfiltered systems).

(d) Monitoring Avoidance.

(i) Filtered systems are not required to conduct source water monitoring under R.61-58.10.K 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 R.61-58.10.K(12).

(ii) Unfiltered systems are not required to conduct source water monitoring under R.61-58.10.K 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 per L in R.61-58.10.K(13).

(iii) If a system chooses to provide the level of treatment in R.61-58.10.K(2)(d)(1) or (2), as applicable, rather than start source water monitoring, the system must notify the Department in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under R.61-58.10.K(3). Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the Department in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in R.61-58.10.K(14).

(e) Plants Operating Only Part of the Year.

Systems with subpart H plants that operate for only part of the year must conduct source water monitoring in accordance with R.61-58.10.K with the following modifications:

(i) Systems must sample their source water only during the months that the

plant operates unless the Department specifies another monitoring period based on plant operating practices.

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

(f) New Sources.

(i) A system that begins using a new source of surface water or ground water under the direct influence of surface water after the system is required to begin monitoring under R.61-58.10.K(2)(c) must monitor the new source on a schedule approved by the Department. Source water monitoring must meet the requirements of R.61-58.10.K. The system must also meet the bin classification and Cryptosporidium treatment requirements of R.61-58.10.K(11) and R.61-58.10.K(12) or R.61-58.10.K(13), as applicable, for the new source on a schedule approved by the Department.

(ii) The requirements of R.61-58.10.K(2)(f) apply to subpart H systems that begin operation after the monitoring start date applicable to the system's size under R.61-58.10.K(2)(c).

(iii) The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under R.61-58.10.K(11) or determination of the mean Cryptosporidium level under R.61-58.10.K(13), as applicable.

(g) Failure to collect any source water sample required under R.61-58.10.K(2) in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of R.61-58.10.K(3) through R.61-58.10.K(7) is a monitoring violation.

(h) Grandfathering Monitoring Data.

Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in R.61-58.10.K(2)(c) to meet the initial source water monitoring requirements in R.61-58.10.K(2)(a). Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in R.61-58.10.K(8).

(3) Sampling Schedules.

(a) Systems required to conduct source water monitoring under R.61-58.10.K(2) must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

(i) Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in R.61-58.10.K(2)(c) for each round of required monitoring.

(ii) Electronic Submittal of Sample Schedules for Systems Serving at Least

10,000 People.

(A) Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under R.61-58.10.K(2)(a) to EPA electronically.

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

(iii) Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring under R.61-58.10.K(2)(a) to the Department.

(iv) Systems must submit sampling schedules for the second round of source water monitoring under R.61-58.10.K(2)(b) to the Department.

(v) If EPA or the Department does not respond to a system regarding its sampling schedule, the system must sample according to the submitted 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 R.61-58.10.K(3)(b)(i) or (ii) applies.

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

(ii) Replacement Samples.

(A) If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in R.61-58.10.K(5), or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

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

(c) Systems that fail to meet the criteria of R.61-58.10.K(3)(b) for any source water sample required under R.61-58.10.K(2) must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the Department for approval prior to when the system begins collecting the missed samples.

(4) Sampling Locations.

(a) Systems required to conduct source water monitoring under R.61-58.K(2) must collect samples for each plant that treats a surface water or a GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the Department may approve one set of monitoring results to be used to satisfy the requirements of R.61-58.10.K(2) for all plants.

(b) Sampling Prior to Chemical Treatment.

(i) Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of R.61-58.10.K(4)(b)(ii).

(ii) The Department may approve a system to collect a source water sample after chemical treatment if the Department determines 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.

(i) Systems that receive Cryptosporidium treatment credit for bank filtration under R.61-58.10.H(4)(b) or R.61-58.10.I(6)(c), as applicable, must collect source water samples in the source water prior to bank filtration.

(ii) 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 R.61-58.10.K(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 R.61-58.10.K(4)(e)(i) or (ii). The use of multiple sources during monitoring must be consistent with routine operational practice.

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

(ii) 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 R.61-58.10.K(4)(e)(ii)(A) or (B) for sample analysis.

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

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

(f) Additional Requirements.

Systems must submit a description of their sampling location(s) to the Department at the same time as the sampling schedule required under R.61-58.10.K(3). This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the Department does not respond to a system regarding sampling location(s), the system must sample at the submitted location(s).

(5) Analytical Methods.

(a) Cryptosporidium. Systems must analyze for Cryptosporidium using EPA-approved methods listed in 40 CFR 141.704 (1-05-06 edition).

(i) Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA, up to a packed pellet volume of at least 2 mL.

(ii) (A) Matrix spike (MS) samples, must be spiked and filtered by a laboratory approved for Cryptosporidium analysis under R.61-58.10.K(6).

(B) If the volume of the matrix spike sample is greater than 10 L, the system may filter all but 10 L of the matrix spike 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.

(iii) Flow cytometer-counted spiking suspensions must be used for matrix spike 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 40 CFR 136.3(a) (1-05-06 edition).

(i) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of R.61-58.10.K(5)(b)(ii).

(ii) The Department may approve on a case-by-case basis the holding of an E. coli sample for up to 48 hours between sample collection and initiation of analysis if the Department determines that analyzing an E. coli sample within 30 hours is not feasible. E. coli samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Methods 9223B as listed in 40 CFR 136.3(a) (1-05-06 edition).

(iii) Samples must be maintained between 0 degrees Celsius and 10 degrees Celsius during storage and transit to the laboratory.

(c) Turbidity. Systems must use methods for turbidity measurement approved in 40 CFR 141.74(a)(1) (1-05-06 edition).

(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 the Department's laboratory certification program.

(b) E. coli. E. coli analyses for compliance with R.61-58.10.K must be performed by a certified laboratory.

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

(7) Reporting Source Water Monitoring Results.

(a) Systems must report results from the source water monitoring required under R.61-58.10.K(2) no later than 10 days after the end of the first month following the month when the sample is collected.

(b) Electronic Reporting for Systems Serving at Least 10,000 People.

(i) All systems serving at least 10,000 people must report the results from the initial source water monitoring required under R.61-58.10.K(2)(a) to EPA electronically.

(ii) If a system serving at least 10,000 people 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 R.61-58.10.K(2)(a) to the Department.

(d) All systems must report results from the second round of source water monitoring required under R.61-58.10.K(2)(b) to the Department.

(e) Systems must report the applicable information in R.61-58.10.K(7)(e)(i) and (ii) for the source water monitoring required under R.61-58.10.K(2).

(i) Systems must report the following data elements for Cryptosporidium analysis: PWS ID, Facility ID, Sample collection date, Sample type (field or matrix spike), Sample volume filtered (to nearest one quarter of a L), Whether or not 100 percent of the filtered volume was examined, and the Number of oocysts counted.

(A) 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.

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

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

(ii) Systems must report the following data elements for each E. coli analysis: PWS ID, Facility ID, Sample collection date, Analytical method number, Method type, Source type (flowing stream, lake or reservoir, GWUDI), E. coli per100 mL, and Turbidity. Systems serving fewer than 10,000 people that are not required to monitor for turbidity under R.61-58.10.K(2) are not required to report turbidity with their E. coli results.

(8) Grandfathering Previously Collected Data.

(a) Sample Requirements.

(i) Systems may comply with the initial source water monitoring requirements of R.61-58.10.K(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 R.61-58.10.K(8) and be approved by the Department.

(ii) A filtered system may grandfather Cryptosporidium samples to meet the requirements of R.61-58.10.K(2)(a) when the system does not have corresponding E. coli and turbidity samples. A system that grandfathers Cryptosporidium samples without E. coli and turbidity samples is not required to collect E. coli and turbidity samples when the system completes the requirements for Cryptosporidium monitoring under R.61-58.10.K(2)(a).

(b) E. coli sample analysis. The analysis of E. coli samples must meet the analytical method and approved laboratory requirements of R.61-58.10.K(5) and R.61-58.10.K(6).

(c) Cryptosporidium sample analysis. Cryptosporidium samples must be analyzed as outlined in 40 CFR 141.707(c) (1-05-06 edition).

(d) Sampling Location. The sampling location must meet the conditions in R.61-58.10.K(4).

(e) Sampling Frequency.

Cryptosporidium samples must have been 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 R.61-58.10.K(3)(b)(i) and (ii) if the system provides documentation of the condition when reporting monitoring results.

(i) The Department may approve grandfathering of previously collected data

where there are time gaps in the sampling frequency if the system conducts Department-specified additional monitoring to ensure that the data used to comply with R.61-58.10.K(2)(a) are seasonally representative and unbiased.

(ii) 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 R.61-58.10.K(11)(b)(v) or R.61-58.10.K(13)(a)(iii), as applicable, when calculating the bin classification for filtered systems or the mean Cryptosporidium concentration for unfiltered systems.

(f) Reporting Monitoring Results for Grandfathering.

Systems that request to grandfather previously collected monitoring results must report the following information specified in R.61-58.10.K(8)(f)(i) and (ii) by the applicable dates listed. Systems serving at least 10,000 people must report this information to EPA unless the Department approves reporting directly to the Department rather than EPA. Systems serving fewer than 10,000 people must report this information to the Department.

(i) 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 R.61-58.10.K(2)(a). Systems must report this information no later than the date the sampling schedule found in R.61-58.10.K(3) is required.

(ii) Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in R.61-58.10.K(8)(f)(ii)(A) through (D) , no later than two months after the applicable date listed in R.61-58.10.K(2)(c).

(A) For each sample result, systems must report the applicable data elements in R.61-58.10.K(7).

(B) Systems must certify that the reported monitoring results include all results that 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, not spiked, and analyzed using the laboratory's routine process for the analytical methods.

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

(D) For Cryptosporidium samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in 40 CFR 141.707 (1-05-06 edition) were met for each sample batch associated with the reported

results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.

(g) If the Department determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the Department may disapprove the data. Alternatively, the Department may approve the previously collected data if the system reports additional source water monitoring data, as determined by the Department, to ensure that the data set used under R.61-58.10.K(11) or R.61-58.10.K(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 R.61-58.10.K(2)(a) and some of the data are rejected due to not meeting the requirements of R.61-58.10.K(8), systems must conduct additional monitoring to replace rejected data on a schedule the Department approves. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

(9) Requirements When Making a Significant Change in Disinfection Practice.

(a) Following the completion of initial source water monitoring under R.61-58.10.K(2)(a), a system that plans to make a significant change to its disinfection practice, as defined in R.61-58.10.K(9)(b), must develop a disinfection profile and calculate a disinfection benchmark for Giardia lamblia and viruses as described in R.61-58.10.K(10). Prior to changing the disinfection practice, the system must notify the Department and must include in this notice the information listed in R.61-58.10.K(9)(a)(i) through (iii).

(i) A completed disinfection profile and disinfection benchmark for Giardia lamblia and viruses as described in R.61-58.10.K(10).

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

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

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

(i) Changes to the point of disinfection;

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

(iii) Changes to the disinfection process; or

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

(10) Developing the Disinfection Profile and Benchmark.

(a) Systems required to develop disinfection profiles under R.61-58.10.K(9) must follow the requirements of R.61-58.10.K(10). Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for Giardia lamblia and viruses. If systems monitor more frequently, the monitoring frequency must be evenly

spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for Giardia lamblia through the entire plant, based on $CT_{99.9}$ values in Tables 1.1 through 1.6, 2.1 and 3.1 of R.61-58.10.F as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the Department.

(b) Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in R.61-58.10(K)(10)(b)(i) through (iv). Systems with more than one point of disinfectant application must conduct the monitoring in R.61-58.10(K)(10)(b)(i) through (iv) for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in 40 CFR 141.74(a) (1-05-06 edition).

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

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

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

(iv) 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 R.61-58.10(K)(10)(b), systems may elect to meet the requirements of R.61-58.10(K)(10)(c)(i) or (ii).

(i) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of R.61-58.10(K)(10)(b) may use these data to develop disinfection profiles 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.

(ii) Systems may use disinfection profile(s) developed under R.61-58.10.H or R.61-58.10.I 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 R.61-58.10.H or R.61-58.10.I 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 R.61-58.10(K)(10)(d)(i) through (iii).

(i) 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 R.61-58.10(K)(10)(d)(i)(A) or (B).

(A) Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the

first customer during peak hourly flow.

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

(ii) Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The (CTcalc/$CT_{99.9}$) value of each segment and the sum of CTcalc/$CT_{99.9}$ must be calculated using the method in R.61-58.10.K(10)(d)(i)(B).

(iii) The system must determine the total logs of inactivation by multiplying the value calculated in R.61-58.10.K(10)(d)(i) or (ii) by 3.0.

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

(e) Systems must use the procedures specified in R.61-58.10.K(10)(e)(i) and (ii) to calculate a disinfection benchmark.

(i) For each year of profiling data collected and calculated under R.61-58.10.K(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.

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

(11) Bin Classification for Filtered Systems.

(a) Following completion of the initial round of source water monitoring required under R.61-58.10.K(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 R.61-58.10.K(2)(a) and must follow the procedures in R.61-58.10.K(11)(b)(i) through (v).

(b) Cryptosporidium bin concentrations. Bin concentration is the cryptospridium concentration(s) used to determine bin classification

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

(ii) 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.

(iii) 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.

(iv) For systems with plants operating only part of the year that monitor fewer than 12 months per year under R.61-58.10.K(2)(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of Cryptosporidium monitoring.

(v) 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 R.61-58.10.K(11)(b)(i) through (iv).

(c) Filtered systems that are required to monitor under R.61-58.10.K(2) must determine their initial bin classification from the Bin Classification Table that follows and using the Cryptosporidium bin concentration calculated under R.61-58.10.K(11)(a) and (b). The bin classification for filtered systems that serve fewer than 10,000 people and are not required to monitor under R.61-58.10.K(2)(a)(iv)is Bin 1.

Bin Classification Table For Filtered Systems

| Cryptosporidium Concentration | Bin Classification |
|---|---|
| Less than 0.075 oocysts per L | Bin 1 |
| 0.075 to less than 1.0 oocysts per L | Bin 2 |
| 1.0 to less than 3.0 oocysts per L | Bin 3 |
| Greater than or equal to 3.0 oocysts per L | Bin 4 |

(d) Following completion of the second round of source water monitoring required under R.61-58.10.K(2)(b), filtered systems must recalculate their Cryptosporidium bin concentration using the Cryptosporidium results reported under R.61-58.10.K(2)(b) and following the procedures in R.61-58.10.K(11)(b)(i) through (iv). Systems must then redetermine their bin classification using this bin concentration and the table in R.61-58.10.K(11)(c).

(e) Reporting Bin Classifications to the Department.

(i) Filtered systems must report their initial bin classification under R.61-58.10.K(11)(c) to the Department for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in R.61-58.10.K(2)(c).

(ii) Systems must report their bin classification under R.61-58.10.K(11)(d) to the Department for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in R.61-58.10.K(2)(c).

(iii) The bin classification report to the Department must include a summary

of source water monitoring data and the calculation procedure used to determine bin classification.

(f) Failure to comply with the conditions of R.61-58.10.K(11)(e) is a violation of the treatment technique requirement.

(12) Filtered System Additional Cryptosporidium Treatment Requirements.

(a) Filtered systems must provide the level of additional treatment for Cryptosporidium specified in this paragraph (12)(a) based on their bin classification as determined under R.61-58.10.K(11) and according to the schedule in R.61-58.10.K(14).

Bin Classifications According to Treatment Type[1]

| Bin Classification | Conventional Filtration (includes softening) | Direct Filtration | Slow sand or diatomaceous earth filtration | Alternative filtration technologies |
|---|---|---|---|---|
| Bin 1 | No additional treatment | No additional treatment | No additional treatment | No additional treatment |
| Bin 2 | 1-log treatment | 1.5-log treatment | 1-log treatment | See note 2 |
| Bin 3 | 2-log treatment | 2.5-log treatment | 2-log treatment | See note 3 |
| Bin 4 | 2.5-log treatment | 3-log treatment | 2.5-log treatment | See note 4 |

Notes:
1. The treatment requirements are valid provided that the water system is in full compliance with R.61-58.10.H & R.61-58.10.I
2. As determined by the Department such that the total Cryptosporidium removal and inactivation is at least 4.0-log.
3. As determined by the Department such that the total Cryptosporidium removal and inactivation is at least 5.0-log.
4. As determined by the Department such that the total Cryptosporidium removal and inactivation is at least 5.5-log.

(b) Cryptosporidium Treatment Requirements.

(i) Filtered systems must use one or more of the treatment and management options listed in R.61-58.10.K(16), termed the microbial toolbox, to comply with the additional Cryptosporidium treatment required in R.61-58.10.K(12)(a).

(ii) Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional Cryptosporidium treatment required under R.61-58.10.K(12)(a) of this section using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in R.61-58.10.K(17) through (21).

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in R.61-58.10.K(17) through (21) for microbial toolbox options that is at least equal to the level of treatment required in R.61-58.10.K(12)(a) is a violation of the treatment technique requirement.

(d) If the Department determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under R.61-58.10.K(2)(a) or (b), significant changes occurred in the system's watershed that could

lead to increased contamination of the source water by Cryptosporidium, the system must take actions specified by the Department to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in R.61-58.10.K(16).

(13) Unfiltered system Cryptosporidium Treatment Requirements.

(a) Determination of Mean Cryptosporidium Level.

(i) Following completion of the initial source water monitoring required under R.61-58.10.K(2)(a), unfiltered systems must calculate the arithmetic mean of all Cryptosporidium sample concentrations reported under R.61-58.10.K(2)(a). Systems must report this value to the Department for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in R.61-58.10.K(2)(c).

(ii) Following completion of the second round of source water monitoring required under R.61-58.10.K(2)(b), unfiltered systems must calculate the arithmetic mean of all Cryptosporidium sample concentrations reported under R.61-58.10.K(2)(b). Systems must report this value to the Department for approval no later than 6 months after the month the system is required to complete the second round of source water monitoring based on the schedule in R.61-58.10.K(2)(c).

(iii) 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 R.61-58.10.K(13)(a)(i) or (ii).

(iv) The report to the Department of the mean Cryptosporidium levels calculated under R.61-58.10.K(13)(a)(i) and (ii) must include a summary of the source water monitoring data used for the calculation.

(v) Failure to comply with the conditions of R.61-58.10.K(13)(a) is a violation of the treatment technique requirement.

(b) Cryptosporidium Inactivation Requirements.

Unfiltered systems must provide the level of inactivation for Cryptosporidium specified in this paragraph (b), based on their mean Cryptosporidium levels as determined under R.61-58.10.K(13)(a) and according to the schedule in R.61-58.10.K(14).

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

(ii) Unfiltered systems with a mean Cryptosporidium level of greater than 0.01 oocysts per 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 R.61-

58.10.K(21) to meet the Cryptosporidium inactivation requirements of R.61-58.10.K(13).

(i) Systems that use chlorine dioxide or ozone and fail to achieve the Cryptosporidium inactivation required in R.61-58.10.K(13)(b) on more than one day in the calendar month are in violation of the treatment technique requirement.

(ii) Systems that use UV light and fail to achieve the Cryptosporidium inactivation required in R.61-58.10.K(13)(b) by meeting the criteria in R.61-58.10.K(21)(d)(iii)(B) are in violation of the treatment technique requirement.

(d) Use of Two Disinfectants.

Unfiltered systems must meet the combined Cryptosporidium inactivation requirements of R.61-58.10.K(13) and Giardia lamblia and virus inactivation requirements of R.61-58.10.D(1) using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either Cryptosporidium, Giardia lamblia, or viruses.

(14) Schedule for compliance with Cryptosporidium Treatment Requirements.

(a) Following initial bin classification under R.61-58.10.K(11)(c), filtered systems must provide the level of treatment for Cryptosporidium required under R.61-58.10.K(12) according to the schedule in R.61-58.10.K(14)(c).

(b) Following initial determination of the mean Cryptosporidium level under R.61-58.10.K(13)(a)(i), unfiltered systems must provide the level of treatment for Cryptosporidium required under R.61-58.10.K(13) according to the schedule in R.61-58.10(K)(14)(c).

(c) Cryptosporidium treatment compliance dates.

(i) Systems that serve at least 100,000 people must comply with Cryptosporidium treatment requirements no later than April 1, 2012.

(ii) Systems that serve from 50,000 to 99,999 people must comply with Cryptosporidium treatment requirements no later than October 1, 2012.

(iii) Systems that serve from 10,000 to 49,999 people must comply with Cryptosporidium treatment requirements no later than October 1, 2013.

(iv) Systems that serve fewer than 10,000 people must comply with Cryptosporidium treatment requirements no later than October 1, 2014.

(v) The Department may grant an additional two years for complying with the treatment technique requirements for systems making capital improvements.

(d) If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under R.61-58.10.K(11)(d), the system must provide the level of treatment for Cryptosporidium required under R.61-58.10.K(12) on a schedule the Department approves.

(e) If the mean Cryptosporidium level for an unfiltered system changes following the

second round of monitoring, as determined under R.61-58.10.K(13)(a)(ii), and if the system must provide a different level of Cryptosporidium treatment under R.61-58.10.K(13) due to this change, the system must meet this treatment requirement on a schedule the Department approves.

(15) Requirements for uncovered finished water storage facilities.

(a) Systems using uncovered finished water storage facilities must comply with the conditions of R.61-58.10.K(15).

(b) Systems must notify the Department of the use of each uncovered finished water storage facility no later than April 1, 2008.

(c) Systems must meet the conditions of R.61-58.10.K(15)(c)(i) or (ii) for each uncovered finished water storage facility or be in compliance with a Department-approved schedule to meet these conditions no later than April 1, 2009.

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

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

(d) Failure to comply with the requirements of R.61-58.10.K(15) is a violation of the treatment technique requirement.

(16) Microbial toolbox options for meeting Cryptosporidium treatment requirements.

(a) Cryptosporidium Treatment Credits.

(i) Systems may receive the treatment credits listed in R.61-58.10.K(16)(b) by meeting the conditions for microbial toolbox options described in R.61-58.10.K(17) through (21). Systems apply these treatment credits to meet the treatment requirements in R.61-58.10(K)(12) or R.61-58.10(K)(13), as applicable.

(ii) Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in R.61-58.10.K(21) only.

(b) Microbial Toolbox Summary Treatment Credits and Criteria

(i) Source Protection and Management Toolbox Options

(A) Watershed control program: 0.5-log credit may be given for Department-approved programs that include the required elements, annual program status report to the Department, and regular watershed surveys. Unfiltered systems are not eligible for this credit. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(17)(a).

(B) Alternative source or intake management: No prescribed credit is given. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake

management strategies. Specific criteria for this credit are detailed in R.61-58.10.K(17)(b).

(ii) Pre Filtration Toolbox Options

(A) Presedimentation basin with coagulation: 0.5-log credit may be given during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative Department-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through the basins. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(18)(a).

(B) Two-stage lime softening: 0.5-log credit for two-stage softening may be given 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 for obtaining and maintaining this credit are detailed in R.61-58.10.K(18)(b).

(C) Bank filtration: 0.5-log credit may be given for a 25-foot setback; 1.0-log credit may be given for a 50-foot setback. The aquifer must be unconsolidated sand consisting of at least 10 percent fines. The average turbidity in the 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 for obtaining and maintaining this credit are detailed in R.61-58.10.K(18)(c).

(iii) Treatment Performance Toolbox Options

(A) Combined filter performance: 0.5-log credit may be given for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(19)(a).

(B) Individual filter performance: 0.5-log credit (in addition to 0.5-log combined filter performance credit) may be given 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 for obtaining and maintaining this credit are detailed in R.61-58.10.K(19)(b).

(C) Demonstration of performance: Credit may be given to unit processes or treatment trains based on a demonstration to the Department with a Department-approved protocol. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(19)(c).

(iv) Additional Filtration Toolbox Options

(A) Bag or cartridge filters (individual filters): Up to 2-log credit may be given based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria for obtaining and

maintaining this credit are detailed in R.61-58.10.K(20)(a).

(B) Bag or cartridge filters (in series): Up to 2.5-log credit may be given based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(20)(a).

(C) Membrane filtration: The log credit that may be given is equal to the removal efficiency demonstrated in challenge testing for a specific device if supported by direct integrity testing. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(20)(b).

(D) Second stage filtration: 0.5-log credit may be given for a second separate granular media filtration stage if the treatment train includes coagulation prior to the first filter. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(20)(c).

(E) Slow sand filters: 2.5-log credit may be given if it is a secondary filtration step. 3.0-log credit may be given if it is a primary filtration process. Neither option can include chlorination before the filters. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(20)(d).

(v) Inactivation Toolbox Options

(A) Chlorine dioxide: Log credit given is based on the measured CT in relation to the CT table. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(21)(b).

(B) Ozone: Log credit given is based on the measured CT in relation to the CT table. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(21)(b).

(C) UV: Log credit given is based on validated UV dose in relation to UV dose table. Reactor validation testing is required to establish UV dose and associated operating conditions. Specific criteria for obtaining and maintaining this credit are detailed in R.61-58.10.K(21)(d).

(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 following requirements:

(i) Systems that intend to apply for the watershed control program credit must notify the Department of this intent no later than two years prior to the treatment compliance date applicable to the system in R.61-58.10.K(14).

(ii) Systems must submit to the Department a proposed watershed control plan no later than one year before the applicable treatment compliance date in R.61-58.10.K(14). The Department must approve the watershed control plan for the system to receive treatment credit. The watershed control plan must include

the elements in R.61-58.10.K(17)(a)(ii)(A) through (D).

(A) 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 R.61-58.10.K(17)(a)(v)(B).

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

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

(D) A statement of goals and specific actions the 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.

(iii) 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 R.61-58.10.K(17)(a)(ii) and must specify ongoing and future actions that will reduce source water Cryptosporidium levels.

(iv) If the Department does not respond to a system regarding approval of a watershed control plan submitted under R.61-58.10.K(17) and the system meets the other requirements of R.61-58.10.K(17), the watershed control program will be considered approved and 0.5 log Cryptosporidium treatment credit will be awarded unless and until the Department subsequently withdraws such approval.

(v) Systems must complete the actions in R.61-58.10.K(17)(a)(v)(A) through (C) to maintain the 0.5-log credit.

(A) Submit an annual watershed control program status report to the Department. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the Department or as the result of the watershed survey conducted under R.61-58.10.K(17)(a)(v)(B). The report must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the Department prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

(B) Undergo a watershed sanitary survey every three years for community water systems and every five years for non-community water

systems and submit the survey report to the Department. The survey must be conducted according to Department guidelines and by persons approved by the Department.

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

(2) If the Department determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the Department requires, which may be earlier than the regular date in R.61-58.10.K(17)(a)(v)(B).

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

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

(b) Alternative Source.

(i) A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the Department approves, a system may determine its bin classification under R.61-58.10.K(11) based on the alternative source monitoring results.

(ii) If systems conduct alternative source monitoring under R.61-58.10.K(17)(b)(i), systems must also monitor their current plant intake concurrently as described in R.61-58.10.K(2).

(iii) Alternative source monitoring under R.61-58.10.K(17)(b)(i) must meet the requirements for source monitoring to determine bin classification, as described in R.61-58.10.K(2) through (7). Systems must report the alternative source monitoring results to the Department, along with supporting information documenting the operating conditions under which the samples were collected.

(iv) If a system determines its bin classification under R.61-58.10.K(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

R.61-58.10.K(14).

(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 R.61-58.10.K(18)(a).

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

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

(iii) The presedimentation basin must achieve the performance criteria in R.61-58.10.K(18)(iii)(A) or (B).

(A) The system must demonstrate 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).

(B) The system must comply with Department-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

(b) Two-stage Lime Softening.

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

(c) Bank Filtration.

Systems receive Cryptosporidium treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in R.61-58.10.K(18)(c). Systems using bank filtration when they begin source water monitoring under R.61-58.10.K(2)(a) must collect samples as described in R.61-58.10.K(4)(d) and are not eligible for this credit.

(i) 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 R.61-58.10.K(18)(c)(iv).

(ii) 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.

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

(iv) 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.

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

(vi) Springs and infiltration galleries are not eligible for treatment credit under R.61-58.10.K(18), but are eligible for credit under R.61-58.10.K(19)(c).

(vii) Bank Filtration Demonstration of Performance.

The Department may approve Cryptosporidium treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this 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 R.61-58.10.K(18)(c)(i) through (v).

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

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

(19) Treatment Performance Toolbox Components.

(a) Combined Filter Performance.

Systems using conventional filtration treatment or direct filtration treatment may 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 40 CFR 141.74(a) and (c) (1-05-06 edition).

(b) Individual Filter Performance.

Systems using conventional filtration treatment or direct filtration treatment may receive 0.5-log Cryptosporidium treatment credit, which can be in addition to the 0.5-log credit under R.61-58.10.K(19)(a), during any month the system meets the criteria in this paragraph (b). Compliance with these criteria must be based on individual filter turbidity monitoring as described in R.61-58.10.H(5) or R.61-58.10.I(7), as applicable.

(i) 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.

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

(iii) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of R.61-58.10.K(19)(b)(i) or (ii) during any month does not receive a treatment technique violation under R.61-58.10.K(12)(c) if the Department determines the following:

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

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

(c) Demonstration of Performance.

The Department may approve Cryptosporidium treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph (c). This treatment credit may be greater than or less than the prescribed treatment credits in R.61-58.10.K(12) or R.61-58.10.K(18) through (21) and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(i) Systems cannot receive the prescribed treatment credit for any toolbox box option in R.61-58.10.K(18) through R.61-58.10.K(21) if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

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

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

maintained during routine operation.

(20) Additional Filtration Toolbox Components.

(a) Bag and Cartridge Filters.

With Department approval, systems may 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 R.61-58.10.K(20)(a)(i) through (x). To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of R.61-58.10.K(20)(a)(ii) through (ix) to the Department. The filters must treat the entire plant flow taken from a subpart H source.

(i) 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 R.61-58.10.K(20)(a)(ii) through (ix). 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 R.61-58.10.K(20)(a)(ii) through (ix).

(ii) 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.

(iii) 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.

(iv) 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 = 10,000 x (Filtrate Detection Limit)

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

(vi) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop. This maximum pressure drop is the pressure drop under which the filter may be used to comply with the requirements of R.61-58.10(K).

(vii) 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.

(viii) 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. A log removal value must be calculated for each of these challenge periods for each filter tested. The log removal value for the filter must be assigned the value of the minimum log removal value observed during the three challenge periods for that filter.

(ix) If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest filter log removal value among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of filter log removal 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.

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

(b) Membrane Filtration.

(i) Systems may receive Cryptosporidium treatment credit for membrane filtration that meets the criteria of this paragraph (b). Membrane cartridge filters that meet the definition of membrane filtration in R.61-58.B are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under R.61-58.10.K(20)(b)(i)(A) and (B).

(A) The removal efficiency demonstrated during challenge testing conducted under the conditions in R.61-58.10.K(20)(b)(ii).

(B) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in R.61-58.10.K(20)(b)(iii).

(ii) Challenge Testing. The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the Department. Challenge testing must be

conducted according to the criteria in R.61-58.10.K(20)(b)(ii)(A) through (G). Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in R.61-58.10.K(20)(b)(ii)(A) through (G).

(A) 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.

(B) 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.

(C) 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 = 3,160,000 x (Filtrate Detection Limit)

(D) 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).

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

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

Where: LRV = log removal value demonstrated during the challenge test; $C_f$ = the feed concentration measured during the challenge test; and $C_p$ = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term $C_p$ is set equal to the detection limit for the purpose of calculating the log removal value. A log removal value must be calculated for each membrane module evaluated during the challenge test.

(F) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value. If fewer than 20 modules are tested, then the challenge test log removal value is equal to the lowest of the representative log removal values among the modules tested. If 20 or more modules are tested, then the challenge test log removal value is equal to the 10th percentile of the representative log removal values 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.

(G) The challenge test must establish a quality control release value 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 quality control release value are not eligible for the treatment credit demonstrated during the challenge test.

(H) 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 quality control release value, additional challenge testing to demonstrate a new removal efficiency and quality control release value must be conducted and submitted to the Department.

(iii) 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 R.61-58.10.K(20)(b)(iii)(A) through (F). 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).

(A) 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.

(B) 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.

(C) The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the Department, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either R.61-58.10.K(20)(b)(iii)(C)(1) or (2) as applicable to the type of direct integrity

test the system uses.

(1) 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.

(2) 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.

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

(E) If the result of a direct integrity test exceeds the control limit established under R.61-58.10.K(20)(b)(iii)(D), 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.

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

(iv) Indirect integrity monitoring. Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in R.61-58.10.K(20)(b)(iv)(A) through (E). 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 R.61-58.10.K(20)(b)(iii)(A) through (E) is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the Department summarizing all continuous indirect integrity monitoring results triggering direct

integrity testing and the corrective action that was taken in each case.

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

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

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

(D) 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 R.61-58.10.K(20)(b)(iii)(A) through (E).

(E) If indirect integrity monitoring includes a Department-approved alternative parameter and if the alternative parameter exceeds a Department-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in R.61-58.10.K(20)(b)(iii)(A) through (E).

(c) Second stage filtration. With Department approval, systems may 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. To receive this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The Department must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

(d) Slow Sand Filtration (as Secondary Filter).

With Department approval, systems may receive 2.5-log Cryptosporidium treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The Department must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

(21) Inactivation Toolbox Components.

(a) Calculation of CT Values.

(i) 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 R.61-58.10.K(21)(b) or (c) must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in R.61-58.10.F(1) and (2).

(ii) 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.

(i) Systems may receive the Cryptosporidium treatment credit listed in the following table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in R.61-58.10.K(21)(a).

CT Values (mg-min/L) for Cryptosporidium Inactivation by Chlorine Dioxide

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

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

(ii) Systems may receive the Cryptosporidium treatment credit listed in the following table by meeting the corresponding ozone CT values for the applicable water temperature, as described in R.61-58.10.K(21)(a).

CT Values (mg-min/L) for Cryptosporidium Inactivation by Ozone

| Log Credit | Water Temperature (degrees C) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than or equal to 0.5 | 1 | 2 | 3 | 5 | 7 | 10 | 15 | 20 | 25 | 30 |
| 0.25 | 6 | 5.8 | 5.2 | 4.8 | 4.0 | 3.3 | 2.5 | 1.6 | 1.0 | 0.6 | .39 |
| 0.5 | 12 | 12 | 10 | 9.5 | 7.9 | 6.5 | 4.9 | 3.1 | 2.0 | 1.2 | .78 |
| 1.0 | 24 | 23 | 21 | 19 | 16 | 13 | 9.9 | 6.2 | 3.9 | 2.5 | 1.6 |
| 1.5 | 36 | 35 | 31 | 29 | 24 | 20 | 15 | 9.3 | 5.9 | 3.7 | 2.4 |
| 2.0 | 48 | 46 | 42 | 38 | 32 | 26 | 20 | 12 | 7.8 | 4.9 | 3.1 |
| 2.5 | 60 | 58 | 52 | 48 | 40 | 33 | 25 | 16 | 9.8 | 6.2 | 3.9 |
| 3.0 | 72 | 69 | 63 | 57 | 47 | 39 | 30 | 19 | 12 | 7.4 | 4.7 |

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

(c) Site-Specific Study.

The Department may approve alternative chlorine dioxide or ozone CT values to those listed in R.61-58.10.K(21)(b) on a site-specific basis. The Department must base this approval on a site-specific study a system conducts that follows a Department-approved protocol.

(d) Ultraviolet Light.

Systems may receive Cryptosporidium, Giardia lamblia, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in R.61-58.10.K(21)(d)(i). Systems must validate and monitor UV reactors as described in R.61-58.10.K(21)(d)(ii) and (iii) to demonstrate that they are achieving a particular UV dose value for treatment credit.

(i) UV Dose Table.

The treatment credits listed in this table are for UV light at a wavelength of 254 nanometers 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 R.61-58.10.K(21)(d)(ii). 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 ($mJ/cm^2$) |
|---|---|---|---|
| 0.5 | 1.6 | 1.5 | 39 |
| 1.0 | 2.5 | 2.1 | 58 |
| 1.5 | 3.9 | 3.0 | 79 |
| 2.0 | 5.8 | 5.2 | 100 |
| 2.5 | 8.5 | 7.7 | 121 |
| 3.0 | 12 | 11 | 143 |
| 3.5 | 15 | 15 | 163 |
| 4.0 | 22 | 22 | 186 |

(ii) 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 R.61-58.10.K(21)(d)(i) (i.e., validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

(A) 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.

(B) Validation testing must include full scale testing of a reactor that conforms uniformly to the UV reactors used by the system. In addition, the validation testing must include inactivation information on a test microorganism whose dose response characteristics have been quantified with a low-pressure mercury vapor lamp.

(C) The Department may approve an alternative approach to validation testing.

(iii) Reactor Monitoring.

(A) Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under R.61-58.10.K(21)(d)(ii). This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the Department designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the Department approves.

(B) 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 R.61-58.10.K(21)(d)(i) and (ii). Systems must demonstrate compliance with this condition by the monitoring required under R.61-58.10.K(21)(d)(iii)(A).

(22) Reporting Requirements.

(a) Systems must report sampling schedules under R.61-58.10.K(3) and source water monitoring results under R.61-58.10.K(7) unless they notify the Department that they will not conduct source water monitoring due to meeting the criteria of R.61-58.10.K(2)(d).

(b) Systems must report the use of uncovered finished water storage facilities to the Department as described in R.61-58.10.K(15).

(c) Filtered systems must report their Cryptosporidium bin classification as described in R.61-58.10.K(11).

(d) Unfiltered systems must report their mean source water Cryptosporidium level as described in R.61-58.10.K(13).

(e) Systems must report disinfection profiles and benchmarks to the Department as described in R.61-58.10.K(9) through (10) prior to making a significant change in disinfection practice.

(f) Systems must report to the Department in accordance with R.61-58.10.K(22)(f)(i) through (xv) for any microbial toolbox options used to comply with treatment requirements under R.61-58.10.K(12) or (13). Alternatively, the Department may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

(i) Watershed Control Program

Systems must submit the following information:

(A) A notice of intention to develop a new program or continue an existing watershed control program should be submitted no later than two years before the applicable treatment compliance date in R.61-

58.10.K(14).

(B) A watershed control plan should be submitted no later than one year before the applicable treatment compliance date in R.61-58.10.K(14).

(C) An annual status report for the watershed control program must be submitted every 12 months beginning one year after the applicable treatment compliance date in R.61-58.10.K(14).

(D) A watershed sanitary survey report must be submitted for community systems every three years beginning three years after the applicable treatment compliance date in R.61-58.10.K(14). For non-community water systems, the watershed sanitary survey report must be submitted every five years beginning five years after the applicable treatment compliance date in R.61-58.10.K(14).

(ii) Alternative source or intake management: Systems must submit verification that the system has relocated the intake or adopted the intake withdrawal procedure reflected in the monitoring results. The verification must be sent no later than the applicable compliance date in R.61-58.10.K(14).

(iii) Presedimentation: A monthly report must be submitted within 10 days following the month in which the monitoring was conducted that contains verification of continuous basin operation, treatment of 100 percent of the flow, continuous addition of a coagulant, and at least 0.5-log mean reduction of influent turbidity or compliance with alternative Department-approved performance criteria beginning on the applicable treatment compliance date in R.61-58.K(14).

(iv) Two-stage lime softening: A monthly report must be submitted that contains verification that chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration and verification that both stages treated 100 percent of the plant flow. The monthly report must be submitted within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.K(14).

(v) Bank Filtration:

(A) Systems must submit information that demonstrates that the aquifer is unconsolidated and predominantly sandy and that the setback distances of at least 25 ft for 0.5-log removal or 50 ft for 1.0-log removal are met. This information must be submitted no later than the applicable treatment compliance date in R.61-58.10.K(14).

(B) If the monthly average of daily maximum turbidity is greater than 1 NTU then the system must report the result and submit an assessment of the cause within 30 days following the month in which the monitoring was conducted beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(vi) Combined filter performance: Systems must submit monthly verification of their combined filter effluent levels within 10 days following the month in

which the monitoring was conducted beginning on the applicable treatment compliance date in R.61-58.10.K(14). The report must verify that the combined filter effluent turbidity levels were less than or equal to 0.15 NTU in at least 95 percent of the 4 hour combined filter effluent measurements taken each month.

(vii) Individual filter performance: Systems must submit a report within 10 days following the month in which the monitoring was conducted beginning on the applicable treatment compliance date in R.61-58.10.K(14). The report must verify that the individual filter effluent turbidity levels were less than or equal to 0.15 in at least 95 percent of samples each month in each filter, and that no individual filter turbidity was greater than 0.3 NTU in two consecutive readings 15 minutes apart.

(viii) Demonstration of Performance.

(A) Systems must submit the results from testing following a Department-approved protocol no later than the applicable treatment compliance date in R.61-58.10.K(14).

(B) As required by the Department, systems must submit monthly verification of operation within conditions of Department approval for demonstration of performance credit. This verification must be submitted within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(ix) Bag Filters and Cartridge Filters:

(A) Systems must submit information that demonstrates that the process meets the definition of bag or cartridge filtration and that the removal efficiency established through challenge testing meets the criteria in R.61-58.10.K(20). This information must be submitted no later than the applicable treatment compliance date in R.61-58.10.K(14).

(B) Systems must submit monthly verification that 100 percent of the plant flow was filtered. The monthly verification must be submitted within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(x) Membrane Filtration:

(A) Systems must submit results of verification testing demonstrating that the removal efficiency established through challenge testing meets the requirements in R.61-58.10.K(20), the type of integrity test method, and the associated test parameters (resolution, sensitivity, test frequency, control limits, and associated baseline). This information must be submitted no later than the applicable treatment compliance date in R.61-58.10.K(14).

(B) Systems must submit a monthly report that summarizes all direct integrity tests above the control limit, and, if applicable, any turbidity or alternative Department-approved indirect integrity monitoring results

triggering direct integrity testing and the corrective action that was taken. This report must be submitted within 10 days following the month that testing was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(xi) Second stage filtration: Systems must submit monthly verification that 100 percent of the flow was filtered through both stages and that the first stage was preceded by coagulation. This verification must be submitted within 10 days following the month that monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(xii) Slow sand filtration (as secondary filter): Systems must submit monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100 percent of the flow from a subpart H source. This verification must be submitted within 10 days following the month that monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(xiii) Chlorine dioxide: Systems must submit a summary of CT values for each day as described in R.61-58.10.K(21). This summary must be submitted within 10 days following the month that monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(xiv) Ozone: Systems must submit a summary of CT values for each day as described in R.61-58.10.K(21). This summary must be submitted within 10 days following the month that monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(xv) UV:

(A) Systems must submit validation test results demonstrating that the operating conditions achieved the required UV dose. This information must be submitted no later than the applicable treatment compliance date in R.61-58.10.K(14).

(B) Systems must submit a 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 R.61-58.10.K(22)(d). This report must be submitted within 10 days following the month that monitoring was conducted, beginning on the applicable treatment compliance date in R.61-58.10.K(14).

(23) Recordkeeping Requirements.

(a) Systems must keep results from the initial round of source water monitoring under R.61-58.10.K(2)(a) and the second round of source water monitoring under R.61-58.10.K(2)(b) until 3 years after bin classification under R.61-58.10.K(11) for filtered systems or determination of the mean Cryptosporidium level under R.61-58.10.K(11) for unfiltered systems for the particular round of monitoring.

(b) Systems must keep any notification to the Department that they will not conduct source water monitoring due to meeting the criteria of R.61-58.10.K(2)(d) for 3 years.

(c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under R.61-58.10.K(17) through (21) and with uncovered finished water reservoirs under R.61-58.10.K(15), as applicable, for 3 years.

(24) Requirements to Respond to Significant Deficiencies Identified in Sanitary Surveys Performed by EPA.

(a) A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.

(b) For the purposes of this section, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that EPA determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

(c) For sanitary surveys performed by EPA, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.

(d) Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by EPA, or if there is no approved schedule, according to the schedule reported under R.61-58.10.K(24)(c) if such deficiencies are within the control of the system.

**R.61-58.11 CONTROL OF LEAD AND COPPER**

A. Applicability.

This regulation establishes 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. This regulation shall apply to each community and noncommunity water system, unless the water system meets all of the following conditions:

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

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

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

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

B. General Requirements.

The requirements of this regulation constitute as the drinking water regulation for lead and copper. Unless otherwise indicated, each of the provisions of this regulation applies to community water systems and non-transient, non-community water systems (hereinafter referred to as "water systems" or "systems").

(1) Lead and Copper Action Levels

(a) The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with Section H below is greater than 0.015 mg/L (i.e., if the "90th percentile" lead level is greater than 0.015 mg/L).

(b) The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with Section H below is greater than 1.3 mg/L (i.e., if the "90th percentile" copper level is greater than 1.3 mg/L).

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

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

(ii) The number of samples taken during the monitoring period shall be multiplied by 0.9;

(iii) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (1)(c)(ii) is the 90th percentile contaminant level; and,

(iv) For water systems serving fewer than 100 people that collect 5 samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.

(2) Corrosion Control Treatment Requirements

(a) All water systems shall install and operate optimal corrosion control treatment as defined in R.61-58.B, Definitions.

(b) Any water system that complies with the applicable corrosion control treatment requirements specified by the Department under Sections C and D below, shall be deemed in compliance with the treatment requirement contained in paragraph (2)(a) of this section.

(3) Source Water Treatment Requirements - Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the Department under Section E below.

(4) 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 Section F below.

(5) Public Education Requirements - Any system exceeding the lead action level shall implement the public education requirements contained in Section G below.

(6) 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 shall be completed in compliance with Section H, I, J, and K below.

(7) Reporting Requirements - Systems shall report to the Department any information required by the treatment provisions of this subpart.

(8) Recordkeeping Requirements - Systems shall maintain records in accordance with Section L below.

(9) Violation of the State Primary Drinking Water Regulations - Failure to comply with the applicable requirements of this regulation shall constitute a violation of the State Primary Drinking Water Regulations.

C. Applicability of Corrosion Control Treatment Steps to Small, Medium-Size and Large Water Systems.

(1) Systems shall complete the applicable corrosion control treatment requirements described in Section D by the deadlines established in this section.

(a) A large system (serving greater than 50,000 persons) shall complete the corrosion control treatment steps specified in paragraph (4) of this section, unless it is deemed to have optimized corrosion control under paragraph (2)(b) or (2)(c) of this section.

(b) A small system (serving 3300 persons or less) and a medium-size system (serving greater than 3,300 and 50,000 persons or less) shall complete the corrosion control treatment steps specified in paragraph (5) of this section, unless it is deemed to have optimized corrosion control under paragraph (2)(a), (2)(b), or (2)(c) of this section.

(2) 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 of the following criteria specified in paragraphs (2)(a) through (2)(c) of this section. Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the Department determines appropriate to ensure optimal corrosion control treatment is maintained.

(a) A small or medium-size water system is deemed to have optimized corrosion control if the system meets the lead and copper action levels during each of two consecutive six-month monitoring periods conducted in accordance with Section H below.

(b) Any water system may be deemed by the Department to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the Department that it has conducted activities equivalent to the corrosion control steps applicable to such system under this section. If the Department makes this determination, it shall provide the system with written notice explaining the basis for its decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with Section D(6) below. Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the Department-designated optimal water quality control parameters in accordance with Section D(7) below and continue to conduct lead and copper tap and water quality parameter sampling in accordance with Sections H(4)(c) and I(4) below, respectively. A system shall provide the Department with the following information in order to support a determination under this paragraph:

(i) The results of all test samples collected for each of the water quality parameters in Section D(3)(c) below;

(ii) a report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in Section D(3)(a), 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 Section H below, at least once every six (6) months for one (1) year after corrosion control has been installed.

(c) Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with Section H below, and source water monitoring conducted in accordance with Section J below, that demonstrates for two (2) consecutive six (6) month monitoring periods that the difference between the 90th percentile tap water lead level computed under Section B(1)(c) and the highest source water lead concentration, is less than the Practical Quantitation Level for lead specified in Section K(1)(a).

(i) Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if the 90th percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two consecutive 6-month monitoring

periods.

(ii) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall continue monitoring for lead and copper at the tap no less frequently than once every three calendar years using the reduced number of sites specified in Section H(3) below and collecting the samples at times and locations specified in Section H(4)(d)(iv) below. Any such system that has not conducted a round of monitoring pursuant to Section H(4) below, since September 30, 1997, shall complete a round of monitoring pursuant to this paragraph no later than September 30, 2000.

(iii) Any water system deemed to have optimized corrosion control pursuant to this paragraph shall notify the Department in writing pursuant to Section L(1)(c) below, of any change in treatment or the addition of a new source. The Department may require any such system to conduct additional monitoring or to take other action the Department deems appropriate to ensure that such systems maintain minimal levels of corrosion in the distribution system.

(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 paragraph (2)(c)(v) of this section 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 paragraph (5) of this section. 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.

(3) Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two consecutive monitoring periods conducted pursuant to Section H below, and submits the results to the Department. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system (or the Department, as the case may be) shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The Department may require a system to repeat treatment steps previously completed by the system where the Department determines that this is necessary to implement properly the treatment requirements of this section. The Department shall notify the system in writing of such a determination and explain the basis for its decision. The requirement for any small or medium-size system to implement corrosion control treatment steps in accordance with Paragraph (5) of this section (including systems deemed to have optimized corrosion control under Paragraph (2)(a) of this section) is triggered whenever any small or medium-size system exceeds the lead or copper action level.

(4) Treatment Steps and Deadlines for Large Systems - Except as provided in paragraph (2)(b) and (c) of this section, large systems shall complete the following corrosion control treatment steps (described in the referenced portions of Sections D, H, and I below) by the indicated dates:

(a) Step 1: The system shall conduct initial monitoring (Section H(4)(a) and Section I(2)) during two consecutive six-month monitoring periods by January 1, 1993.

(b) Step 2: The system shall complete corrosion control studies (Section D.(3 ) below) by July 1, 1994.

(c) Step 3: The Department shall designate optimal corrosion control treatment (Section D(4) below) by January 1, 1995.

(d) Step 4: The system shall install optimal corrosion control treatment (Section D(5) below) by January 1, 1997.

(e) Step 5: The system shall complete follow-up sampling (Section H(4)(b) and Section I(3) below) by January 1, 1998.

(f) Step 6: The Department shall review installation of treatment and designate optimal water quality control parameters (Section D(6) below) by July 1, 1998.

(g) Step 7: The system shall operate in compliance with the Department-specified optimal water quality control parameters (Section D(7) below) and continue to conduct tap sampling (Section H(4)(c) and Section (I)(4) below).

(5) Treatment Steps and Deadlines for Small and Medium-Size Systems - Except as provided in paragraph (2) of this section, small and medium-size systems shall complete the following corrosion control treatment steps (described in the referenced portions of Sections D, H and I below) by the indicated time periods:

(a) Step 1: The system shall conduct initial tap sampling (Section H(4)(a) and Section I(2) below) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under Section (H)(4)(d). A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (Section D(1) below) within six (6) months after it exceeds one of the action levels.

(b) Step 2: Within twelve (12) months after a system exceeds the lead or copper action level, the Department may require the system to perform corrosion control studies (Section D(2) below). If the Department does not require the system to perform such studies, the Department shall specify optimal corrosion control treatment (Section D(4)) within the following time frames:

(i) For medium-size systems, within eighteen (18) months after such system exceeds the lead or copper action level; and,

(ii) For small systems, within twenty-four (24) months after such system exceeds the lead or copper action level.

(c) Step 3: If the Department requires a system to perform corrosion control studies under Step 2, the system shall complete the studies (Section D(3) below) within eighteen (18) months after the Department requires that such studies be conducted.

(d) Step 4: If the system has performed corrosion control studies under Step 2, the Department shall designate optimal corrosion control treatment (Section D(4) below) within six (6) months after completion of Step 3.

(e) Step 5: The system shall install optimal corrosion control treatment (Section D(5) below) within twenty-four (24) months after the Department designates such treatment.

(f) Step 6: The system shall complete follow-up sampling (Section H(4)(b) and Section I(3) below) within 36 months after the Department designates optimal corrosion control treatment.

(g) Step 7: The Department shall review the system's installation of treatment and designate optimal water quality control parameters (Section D(6) below) within six (6) months after completion of Step 6.

(h) Step 8: The system shall operate in compliance with the Department-designated optimal water quality control parameters (Section D(7) below) and continue to conduct tap sampling (Section H(4)(c) and Section I(4) below).

D. Description of Corrosion Control Treatment Requirements.

Each system shall complete the corrosion control treatment requirements described below which are applicable to such system under Section C above.

(1) System Recommendation Regarding Corrosion Control treatment - Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one or more of the corrosion control treatments listed in paragraph (3)(a) of this section which the system believes constitutes optimal corrosion control for that system. The Department may require the system to conduct additional water quality parameter monitoring in accordance with Section I(2) to assist the Department in reviewing the system's recommendation.

(2) Department Decision to Require Studies of Corrosion Control Treatment (applicable to small and medium-size systems) - The Department may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under paragraph (3) of this section to identify optimal corrosion control treatment for the system.

(3) Performance of Corrosion Control Studies

(a) Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:

(i) Alkalinity and pH adjustment;

(ii) Calcium hardness adjustment; and,

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

(b) 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.

(c) 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.

(d) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:

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

(ii) Data 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.

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

(f) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the Department in writing the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in paragraphs (3)(a) through (e) of this section.

(4) Department Designation of Optimal Corrosion Control Treatment

(a) Based upon consideration of available information including, where applicable, studies performed under paragraph (3) of this section and a system's recommended treatment alternative, the Department shall either approve the corrosion control treatment option recommended by the system, or designate alternative corrosion control treatment(s) from among those listed in paragraph (3)(a) of this section. When designating optimal treatment the Department shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(b) The Department shall notify the system of its decision on optimal corrosion

control treatment in writing and explain the basis for this determination. If the Department requests additional information to aid its review, the water system shall provide the information.

(5) Installation of Optimal Corrosion Control - Each system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated by the Department under paragraph (4) of this section.

(6) Department Review of Treatment and Specification of Optimal Water Quality Control Parameters - The Department shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the water system and determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the Department in paragraph (4) of this section. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the Department shall designate:

(a) A minimum value or a range of values for pH measured at each entry point to the distribution system;

(b) A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the Department determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;

(c) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the Department determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

(d) 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; and,

(e) If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed above shall be those that the Department determines to reflect optimal corrosion control treatment for the system. The Department may designate values for additional water quality control parameters determined by the Department to reflect optimal corrosion control for the system. The Department shall notify the system in writing of these determinations and explain the basis for its decisions.

(7) Continued Operation and Monitoring - All systems shall maintain water quality parameter values at or above minimum values or within ranges designated by the Department under paragraph (6) of this section in each sample collected under Section I(4) below. If the water quality parameter value of any sample is below the minimum value or outside the range designated by the Department, then the system is out of compliance with this paragraph. As specified in Section (I)(4) below, the system may take a confirmation sample for any water quality parameter value no later than 3 days after the first sample. If a confirmation sample is taken, the result must be averaged with the first sampling result and the average must be used for any compliance determinations under this paragraph. All systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the Department under paragraph (6) of this section, in accordance with this paragraph for all samples collected under Section I(4)-(6) below. Compliance with the requirements of this paragraph shall be determined every six months,

as specified under Section I(4) below. A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any Department-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the Department. Daily values are calculated as follows. The Department has discretion to delete results of obvious sampling errors from this calculation.

(a) On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both.

(b) On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

(c) 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.

(8) Modification of Department Treatment Decisions - Upon its own initiative or in response to a request by a water system or other interested party, a Department may modify its determination of the optimal corrosion control treatment under paragraph (4) of this section or optimal water quality control parameters under paragraph (6) of this section. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The Department may modify its determination where it concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the Department's decision, and provide an implementation schedule for completing the treatment modifications.

E. Source Water Treatment Requirements.

Systems shall complete the applicable source water monitoring and treatment requirements (described in the referenced portions of paragraph (2) of this section, and in Sections H and J by the following deadlines.

(1) Deadlines for Completing Source Water Treatment Steps

(a) Step 1: A system exceeding the lead or copper action level shall complete lead and copper source water monitoring (Section J(2) below) and make a treatment recommendation to the Department (paragraph (2)(a) of this section) within 6 months after exceeding the lead or copper action level.

(b) Step 2: The Department shall make a determination regarding source water treatment (paragraph (2)(b) of this section) within six (6) months after submission of monitoring results under Step 1.

(c) Step 3: If the Department requires installation of source water treatment, the system shall install the treatment (paragraph (2)(c) of this section) within twenty-four (24) months after completion of Step 2.

(d) Step 4: The system shall complete follow-up tap water monitoring (Section H(4)(b) below) and source water monitoring (Section J(3) below) within thirty-six (36)

months after completion of Step 2.

(e) Step 5: The Department shall review the system's installation and operation of source water treatment and specify maximum permissible source water levels (paragraph (2)(d) of the section) within six (6) months after completion of Step 4.

(f) Step 6: The system shall operate in compliance with the Department-specified maximum permissible lead and copper source water levels (paragraph (2)(d) of this section) and continue source water monitoring (Section J(4) below).

(2) Description of Source Water Treatment Requirements

(a) System Treatment Recommendation - Any system which exceeds the lead or copper action level shall recommend in writing to the Department the installation and operation of one of the source water treatments listed in paragraph (2)(b) of this section. 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.

(b) Department Determination Regarding Source Water Treatment - The Department shall complete an evaluation of the results of all source water samples submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the Department determines that treatment is needed, the Department shall either require installation and operation of the source water treatment recommended by the system (if any) or require the installation and operation of another source water treatment from among the following: ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the Department requests additional information to aid in its review, the water system shall provide the information by the date specified by the Department in its request. The Department shall notify the system in writing of its determination and set forth the basis for its decision.

(c) Installation of Source Water Treatment - Each system shall properly install and operate the source water treatment designated by the Department under paragraph (2)(b) of this section.

(d) Department Review of Source Water Treatment and Specification of Maximum Permissible Source Water Levels - The Department shall review the source water samples taken by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment designated by the Department. Based upon its review, the Department shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and maintained. The Department shall notify the system in writing and explain the basis for its decision.

(e) Continued Operation and Maintenance - Each water system shall maintain lead and copper levels below the maximum permissible concentrations designated by the Department at each sampling point monitored in accordance with Section J. 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 Department.

(f) Modification of Department Treatment Decisions - Upon its own initiative or in response to a request by a water system or other interested party, the Department may modify its determination of the source water treatment under paragraph (b) of this section,

or maximum permissible lead and copper concentrations for finished water entering the distribution system under paragraph (d) of this section. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The Department may modify its determination where it concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the Department's decision, and provide an implementation schedule for completing the treatment modifications.

F. Lead Service Line Replacement Requirements.

(1) Systems that fail to meet the lead action level in tap samples taken pursuant to Section H(4)(b), 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 Section C or Section E for failure to install source water or corrosion control treatment, the Department 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 Section H(4)(b) below, has passed.

(2) 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 portions(s) owned by the system, based a materials evaluation, including the evaluation required under Section H(1) below and relevant legal authorities (e.g. contracts, local ordinances) regarding the portion owner by the system. The first year of lead service line replacement shall begin on the date the action level was exceeded in tap sampling referenced in paragraph (1) of this section.

(3) 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 Section H(2)(c), is less than or equal to 0.015 mg/L.

(4) A water system shall replace that portion of the lead service line that it owns. In cases where the system does not own the entire lead service line, the system shall notify the owner of the line, or the owner's authorized agent, that the system will replace the portion of the service line that it owns and shall offer to replace the owner’s portion of the line. A system is not required to bear the cost of replacing the privately-owned portion of the line, nor is it required to replace the privately-owned portion where the owner chooses not to pay the cost of replacing the privately-owned portion of the line, or where replacing the privately-owned portion would be precluded by State, local or common law. A water system that does not replace the entire length of the service line also shall complete the following tasks.

(a) 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 Department 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 Section H(2)(c) below, 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."

(b) The water system shall provide the information required by paragraph (4)(a) of this section to the residents of individual dwellings by mail or by other methods approved by the Department. In instances where multi-family dwellings are served by the line, the water system shall have the option to post the information at a conspicuous location.

(5) The Department 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 Department shall make this determination in writing and notify the system of its finding within 6 months after the system is triggered into lead service line replacement based on monitoring referenced in paragraph (1) of this section.

(6) Any system may cease replacing lead service lines whenever first draw samples collected pursuant to Section H(2)(b) below, meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the Department. 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 paragraph (2) of this section.

(7) To demonstrate compliance with paragraphs (1) through (4) of this section, a system shall report to the Department the information specified in Section L(5) below.

G. Public Education and Supplemental Monitoring Requirements.

A water system that exceeds the lead action level based on tap water samples collected in accordance with Section H shall deliver the public education materials contained in paragraphs (1) and (2) of this section in accordance with the requirements in paragraph (3) of this section.

(1) Content of written public education materials.

(a) Community water systems. A community water system shall include the following text in all of the printed materials it distributes through its lead public education program. Systems may delete information pertaining to lead service lines, upon approval by the Department, if no lead service lines exist anywhere in the water system service area. Public education language at paragraphs (1)(a)(iv)(B)(5) and (1)(a)(iv)(D)(2) of this section may be modified regarding building permit record availability and consumer access to these records, if approved by the Department. Systems may also continue to utilize pre-printed materials that meet the public education language requirements in this section. Any additional information presented by a system shall be consistent with the information below and be in plain English that can be understood by laypersons.

(i) **INTRODUCTION** - The United States Environmental Protection Agency (EPA) and [insert name of water supplier] are concerned about lead in your drinking water. Although most homes have very low levels of lead in their drinking water, some homes in the community have lead levels above the EPA action level of 15 parts per billion (ppb), or 0.015 milligrams of lead per liter of water (mg/L). Under Federal law we are required to have a program in place to minimize lead in your drinking water by [insert date when corrosion control will be completed for your system]. This program includes corrosion control treatment, source water treatment, and public education. We are also required to replace the portion of each lead service line that we own if the line contributes to

lead concentrations of more than 15 ppb after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation please give us a call at [insert water system's phone number]. This brochure explains the simple steps you can take to protect you and your family by reducing your exposure to lead in drinking water.

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

(iii) **LEAD IN DRINKING WATER**

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

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

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

(iv) **STEPS YOU CAN TAKE IN THE HOME TO REDUCE EXPOSURE TO LEAD IN DRINKING WATER.**

(A) Despite our best efforts mentioned earlier to control water corrosivity and remove lead from the water supply, lead levels in some homes or buildings can be high. To find out whether you need to take action in your own home, have your drinking water tested to determine if it contains excessive concentrations of lead. Testing the water is essential

because you cannot see, taste, or smell lead in drinking water. Some local laboratories that can provide this service are listed at the end of this booklet. For more information on having your water tested, please call [insert phone number of water system].

(B) If a water test indicates that the drinking water drawn from a tap in your home contains lead above 15 ppb, then you should take the following precautions:

(1) Let the water run from the tap before using it for drinking or cooking any time the water in a faucet has gone unused for more than six (6) hours. The longer water resides in your home's plumbing the more lead it may contain. Flushing the tap means running the cold water faucet until the water gets noticeably colder, usually about fifteen (15) to thirty (30) seconds. If your house has a lead service line to the water main, you may have to flush the water for a longer time, perhaps one minute, before drinking. Although toilet flushing or showering flushes water through a portion of your home's plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive measure you can take to protect your family's health. It usually uses less than one or two gallons of water and costs less than [insert a cost estimate based on flushing two times a day for 30 days] per month. To conserve water, fill a couple of bottles for drinking water after flushing the tap, and whenever possible use the first flush water to wash the dishes or water the plants. If you live in a high-rise building, letting the water flow before using it may not work to lessen your risk from lead. The plumbing systems have more, and sometimes larger pipes than smaller buildings. Ask your landlord for help in locating the source of the lead and for advice on reducing the lead level.

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

(3) Remove loose lead solder and debris from the plumbing materials installed in newly constructed homes, or homes in which the plumbing has recently been replaced, by removing the faucet strainers from all taps and running the water from three (3) to five (5) minutes. Thereafter, periodically remove the strainers and flush out any debris that has accumulated over time.

(4) If your copper pipes are joined with lead solder that has been installed illegally since it was banned in 1986, notify the plumber who did the work and request that he or she replace the lead solder with lead-free solder. Lead solder looks dull gray, and when scratched with a key looks shiny. In addition, notify the S.C. Department of Health and Environmental Control about the violation.

(5) Determine whether or not the service line that connects your home or apartment to the water main is made of lead. The best way to determine if your service line is made of lead is by either hiring a licensed plumber to inspect the line or by contacting the plumbing contractor who installed the line. You can identify the plumbing contractor by checking the city's record of building permits which should be maintained in the files of the [insert name of department that issues building permits]. A licensed plumber can at the same time check to see if your home's plumbing contains lead solder, lead pipes, or pipe fittings that contain lead. The public water system that delivers water to your home should also maintain records of the materials located in the distribution system. If the service line that connects your dwelling to the water main contributes more than 15 ppb to drinking water, after our comprehensive treatment program is in place, we are required to replace the portion of the line we own. If the line is only partially owned by the [insert the name of the city, county, or water system that owns the line], we are required to provide the owner of the privately-owned portion of the line with information on how to replace the privately-owned portion of the line, and offer to replace that portion of the line at the owner's expense. If we replace only the portion of the line that we own, we also are required to notify you in advance and provide you with information on the steps you can take to minimize exposure to any temporary increase in lead levels that may results from the partial replacement, to take a follow-up sample at our expense from the line within seventy-two (72) hours after the partial replacement, and to mail or otherwise provide you with the results of that sample within three business days of receiving the results. Acceptable replacement alternatives include copper, steel, iron, and plastic pipes.

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

(C) The steps described above will reduce the lead concentrations in your drinking water. However, if a water test indicates that the drinking water coming from your tap contains lead concentrations in excess of 15 ppb after flushing, or after we have completed our actions to minimize lead levels, then you may want to take the following additional measures:

(1) Purchase or lease a home treatment device. Home treatment devices are limited in that each unit treats only the water that flows from the faucet to which it is connected, and all of the devices require periodic maintenance and replacement. Devices such as reverse osmosis systems or distillers can effectively remove lead from your drinking water. Some activated carbon filters may reduce lead levels at the tap, however

all lead reduction claims should be investigated. Be sure to check the actual performance of a specific home treatment device before and after installing the unit.

(2) Purchase bottled water for drinking and cooking.

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

(1) [insert the name of city or county department of public utilities] at [insert phone number] can provide you with information about your community's water supply, and a list of local laboratories that have been certified by EPA for testing water quality;

(2) [insert the name of city or county department that issues building permits] at [insert phone number] can provide you with information about building permit records that should contain the names of plumbing contractors that plumbed your home; and

(3) S.C. Department of Health and Environmental Control at (803)898-4300 or the [insert the name of the city or county health department] at [insert phone number] can provide you with information about the health effects of lead and how you can have your child's blood tested.

(E) The following is a list of some Department approved laboratories in your area that you can call to have your water tested for lead. [Insert names and phone numbers of at least two laboratories].

(b) Non-transient non-community water systems. A non-transient non-community water system shall either include the text specified in paragraph (1)(a) of this section or shall include the following text in all of the printed materials it distributes through its lead public education program. Water systems may delete information pertaining to lead service lines upon approval by the Department if no lead service lines exist anywhere in the water system service area. Any additional information presented by a system shall be consistent with the information below and be in plain English that can be understood by lay people.

(i) **INTRODUCTION.** The United States Environmental Protection Agency (EPA) and [insert name of water supplier] are concerned about lead in your drinking water. Some drinking water samples taken from this facility have lead levels above the EPA action level of 15 parts per billion (ppb), or 0.015 milligrams of lead per liter of water (mg/L). Under Federal law we are required to have a program in place to minimize lead in your drinking water by [insert date when corrosion control will be completed for your system]. This program includes corrosion control treatment, source water treatment, and public education. We are also required to replace the portion of each lead service line that we own if the line contributes lead concentrations of more than 15 ppb after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation

please give us a call at [insert water system's phone number]. This brochure explains the simple steps you can take to protect yourself by reducing your exposure to lead in drinking water.

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

(iii) **LEAD IN DRINKING WATER**.

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

(B) Lead is unusual among drinking water contaminants in that it seldom occurs naturally in water supplies like rivers and lakes. Lead enters drinking water primarily as a result of the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. These materials include lead-based solder used to join copper pipe, brass and chrome-plated brass faucets, and in some cases, pipes made of lead that connect houses and buildings to water mains (service lines). In 1986, Congress banned the use of lead solder containing greater than 0.2% lead, and restricted the lead content of faucets, pipes and other plumbing materials to 8.0%.

(C) When water stands in lead pipes or plumbing systems containing lead for several hours or more, the lead may dissolve into your drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon if the water has not been used all day, can contain fairly high levels of lead.

(iv) **STEPS YOU CAN TAKE TO REDUCE EXPOSURE TO LEAD IN DRINKING WATER**.

(A) Let the water run from the tap before using it for drinking or cooking any time the water in a faucet has gone unused for more than six hours. The longer water resides in plumbing the more lead it may contain. Flushing the tap means running the cold water faucet for about fifteen (15) to thirty (30) seconds. Although toilet flushing or showering flushes water through a portion of the plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive measure you can take to

protect your health. It usually uses less than one (1) gallon of water.

(B) Do not cook with, or drink water from the hot water tap. Hot water can dissolve more lead more quickly than cold water. If you need hot water, draw water from the cold tap and then heat it.

(C) The steps described above will reduce the lead concentrations in your drinking water. However, if you are still concerned, you may wish to use bottled water for drinking and cooking.

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

(1) [insert the name or title of facility official if appropriate] at [insert phone number] can provide you with information about your facility's water supply; and

(2) S.C. Department of Health and Environmental Control at (803)898-4300 phone number or the [insert the name of the city or county health department] at [insert phone number] can provide you with information about the health effects of lead

(2) Content of Broadcast Materials - A water system shall include the following information in all public service announcements submitted under its lead public education program to television and radio stations for broadcasting:

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

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

(3) Delivery of a Public Education Program

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

(b) A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with Section H below, and that is not already repeating public education tasks pursuant to paragraphs (c), (g), or (h), of this section, shall, within sixty (60) days:

(i) Insert notices in each customer's water utility bill containing the information in paragraph (1) of this section, along with the following alert on the water bill itself in large print: **"SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS IN THEIR DRINKING WATER.**

**LEAD CAN POSE A SIGNIFICANT RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER INFORMATION."** A community water system having a billing cycle that does not include a billing within sixty (60) days of exceeding the action level, or that cannot insert information in the water utility bill without making major changes to its billing system, may use a separate mailing to deliver the information in paragraph (1) of this section as long as the information is delivered to each customer within sixty (60) days of exceeding the action level. Such water systems shall also include the "alert" language specified in this paragraph.

(ii) Submit the information in paragraph (1)(a) of this section to the editorial departments of the major daily and weekly newspapers circulated throughout the community.

(iii) Deliver pamphlets and/or brochures that contain the public education materials in paragraphs (1)(a)(ii) and (1))(a)(iv) of this section to facilities and organizations, including the following:

(A) public schools and/or local school boards;

(B) city or county health department;

(C) Women, Infants, and Children and/or Head Start Program(s) whenever available;

(D) public and private hospitals and/or clinics;

(E) pediatricians;

(F) family planning clinics; and,

(G) local welfare agencies.

(iv) Submit the public service announcement in paragraph (2) of this section to at least five (5) of the radio and television stations with the largest audiences that broadcast to the community served by the water system.

(c) A community water system shall repeat the tasks contained in paragraphs (3)(b)(i), (ii) and (iii) of this section every twelve (12) months, and the tasks contained in paragraphs (3)(b)(iv) of this section every six (6) months for as long as the system exceeds the lead action level.

(d) Within sixty (60) days after it exceeds the lead action level (unless is already is repeating public education tasks pursuant to paragraph (3)(e) of this section), a non-transient non-community water system shall deliver the public education materials specified in paragraphs (1)(a), (b), and (d) of this section as follows:

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

(ii) Distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the non-transient non-community water system. The Department may allow the system to utilize electronic transmission in lieu of

or combined with printed materials as long as it achieves at least the same coverage.

(e) A non-transient noncommunity water system shall repeat the tasks contained in paragraph (3)(d) of this section at least once during each calendar year in which the system exceeds the lead action level.

(f) A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six (6) month monitoring period conducted pursuant to Section H below. Such a system shall recommence public education in accordance with this section if it subsequently exceeds the lead action level during any monitoring period.

(g) A community water system may apply to the Department, in writing, (unless the Department has waived the requirement for prior Department approval) to use the text specified in paragraph (1)(b) of this section in lieu of the text in paragraph (1)(a) of this section and to perform the tasks listed in paragraphs (3)(d) and (3)(e) of this section in lieu of the tasks in paragraphs (3)(b) and (3)(c) of this section 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.

(h) (i) A community water system serving 3,300 or fewer people may omit the task contained in paragraph (3)(b)(iv) of this section. As long as it distributes notices containing the information contained in paragraph (1)(a) of this section to every household served by the system, such systems may further limit their public education programs as follows:

(A) Systems serving 500 or fewer people may forego the task contained in paragraph (3)(b)(ii) of this section. Such a system may limit the distribution of the public education materials required under paragraph (3)(b)(iii) of this section to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children, unless it is notified by the Department in writing that it must make a broader distribution.

(B) If approved by the Department in writing, a system serving 501 to 3,300 people may omit the task in paragraph (3)(b)(ii) of this section and/or limit the distribution of the public education materials required under paragraph (3)(b)(iii) of this section to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children.

(ii) A community water system serving 3,300 or fewer people that delivers public education in accordance with paragraph (3)(h)(i) of this section shall repeat the required public education tasks at least once during each calendar year in which the system exceeds the lead action level.

(4) 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 Section H below 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.

H. Monitoring Requirements for Lead and Copper in Tap Water.

(1) Sample Site Location

(a) By the applicable date for commencement of monitoring under paragraph (4)(a) of this section, 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 paragraph (3) of this section. 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.

(b) A water system shall use the information on lead, copper, and galvanized steel that it is required to collect under R.61-58.5.V, Special Corrosivity Characteristics, of this part [special monitoring for corrosivity characteristics] when conducting a materials evaluation. When an evaluation of the information collected pursuant to R.61-58.5.V, Special Monitoring for Corrosivity Characteristics, is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in paragraph (1) 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.

(c) 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.

(d) 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.

(e) 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.

(f) 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.

(g) A non-transient non-community water system with insufficient tier 1 sites that meet the targeting criteria in paragraph (1)(f) of this section 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.

(h) Any water system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first draw samples from all of the sites identified as being served by such lines.

(2) Sample Collection Methods

(a) All tap samples for lead and copper collected in accordance with this section, with the exception of lead service line samples collected under Section F(3) above, and samples collected under paragraph (2)(e) of this section, shall be first draw samples.

(b) 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 nonresidential building shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to paragraph (2)(e) of this section shall be one liter in volume and shall

be collected at an interior tap from which water is typically drawn for consumption. First draw samples may be collected by the system or the system may allow residents to collect first draw samples after instructing the residents of the sampling procedures specified in this 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.

(c) Each service line sample shall be one 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 of the following three 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.

(d) 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.

(e) A non-transient non-community water system, or a community water system that meets the criteria of Section G(3)(g)(i) and (ii) above, that does not have enough taps that can supply first-draw samples, as defined in R.61-58(B), may apply to the Department in writing to substitute non-first-draw samples. Such systems must collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites. The Department has the discretion to waive the requirement for prior Department approval of non-first-draw sample sites selected by the system, either through State regulation or written notification to the system.

(3) Number of Samples - Water systems shall collect at least one (1) sample during each monitoring period specified in paragraph (4) of this section from the number of sites listed in the first column ("standard monitoring") of the table in this paragraph. A system conducting reduced monitoring under paragraph (4)(d) of this section 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 paragraph (4)(d) of this section. Such reduced monitoring sites shall be representative oft he sites required for standard monitoring. The Department may specify sampling locations when a system in conducting reduced monitoring. The table is as follows:

| **System Size (# People Served)** | **# Of Sites (Standard Monitoring)** | **# Of sites (Reduced Monitoring)** |
|---|---|---|

| | | |
|---|---|---|
| >100,000 | 100 | 50 |
| 10,001 to 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 |

(4) Timing of Monitoring

(a) Initial Tap Sampling - The first six (6)-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 (6)month periods.

(ii) All small and medium-size systems shall monitor during each six (6) 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 Section C above, in which case the system shall continue monitoring in accordance with paragraph (4)(b) of this section; or,

(B) The system meets the lead and copper action levels during two (2) consecutive six (6) month monitoring periods, in which case the system may reduce monitoring in accordance with paragraph (4)(d) of this section

(b) Monitoring After Installation of Corrosion Control and Source Water Treatment

(i) Any large system which installs optimal corrosion control treatment pursuant to Section C(4)(d) above, shall monitor during two (2) consecutive six (6) month monitoring periods by the date specified in Section C(4)(e) above.

(ii) Any small or medium-size system which installs optimal corrosion control treatment pursuant to Section C(5)(e) above, shall monitor during two (2) consecutive six (6) month monitoring periods by the date specified in Section C(5)(f) above.

(iii) Any system which installs source water treatment pursuant to Section E(1)(c) above, shall monitor during two (2) consecutive six (6) month monitoring periods by the date specified in Section E(1)(d) above.

(c) Monitoring After the Department Specifies Water Quality Parameter Values for Optimal Corrosion Control - After the Department specifies the values for water quality

control parameters under Section D(6) above, the system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the Department specifies the optimal values under Section D(6) above.

(d) 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 (6) month monitoring periods may reduce the number of samples in accordance with paragraph (3) of this section, and reduce the frequency of sampling to once per year.

(ii) Any water system that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Department under Section D(6) above, during each of two consecutive six-month monitoring periods may reduce the frequency of monitoring to once per year and to reduce the number of lead and copper samples in accordance with paragraph (3) of this section if it receives written approval from the Department. The Department shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with Section L below, and shall notify the system in writing when it determined the system is eligible to commence reduced monitoring pursuant to this paragraph. The Department shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iii) A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any water system that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the Department under Section D(6) above, during three consecutive years of monitoring may reduce the frequency of monitoring from annually to once every three years if it receives written approval from the Department. The Department shall review monitoring, treatment, and other relevant information submitted by the water system and in accordance with Section L below, shall notify the system in writing, when it determines the system is eligible to reduce the frequency of monitoring to once every three years. The Department shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iv) A water system that reduces the number and frequency of sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in paragraph (1) of this section. Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August or September.

(v) Any water system that demonstrates for two (2) consecutive six (6) month monitoring periods that the tap water lead level computed under Section B(1)(c) above, is less than or equal to 0.005 mg/L and the tap water copper level computed under Section B(1)(c) above, is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with paragraph (3) of this section 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 with paragraph (4)(c) of this section and collect the number of samples specified for standard monitoring under paragraph (3) of this section. Such a system shall also conduct water quality parameter monitoring in accordance with Section I(2), (3) or (4) below (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 paragraph (3) of this section after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of paragraph (4)(d)(i) of this section 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 paragraph (4)(d)(iii) or (4)(d)(v) of this section.

(B) Any water system subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the Department under Section D(6) above, for more than nine days in any six-month period specified in Section I(4) below, shall conduct tap water sampling for lead and copper at the frequency specified in paragraph (4)(c) of this section, collect the number of samples specified for standard monitoring under paragraph (3) of this section, and shall resume monitoring for water quality parameters within the distribution system in accordance with Section I(4) below. 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 paragraph (3) of this section after it has completed two subsequent six-month rounds of monitoring that meet the criteria of paragraph (4)(d)(ii) of this section and the system has received written approval from the Department that it is appropriate to resume reduced monitoring on an annual frequency.

(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 paragraph (4)(d)(iii) or (4)(d)(v) of this section and the system has received written approval from the Department 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 Section I(5)(a) below, and the frequency with which it collects such samples in accordance with Section I(5)(b) below. Such a system may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of Section I(5)(b) below, that it has re-qualified for triennial monitoring.

(vii) Any water system subject to a reduced monitoring frequency under paragraph (4)(d) of this section that either adds a new source of water or changes any water treatment shall inform the Department in writing in accordance with Section L(1)(c) below. The Department may require the system to resume sampling in accordance with paragraph (4)(c) of this section and collect the number of samples specified for standard monitoring under paragraph (3) of this section 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

(5) 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 Department in making any determinations (i.e., calculating the 90th percentile lead or copper level) under this section.

(6) 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 Section B(1)(c) above, or toward meeting the minimum monitoring requirements of paragraph (3) of this section.

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

(i) The laboratory establishes that improper sample analysis caused erroneous results.

(ii) The Department determines that the sample was taken from a site that did not meet the site selection criteria of this section.

(iii) The sample container was damaged in transit.

(iv) There is substantial reason to believe that the sample was subject to tampering.

(b) The system must report the results of all samples to the Department and all supporting documentation for samples the system believes should be invalidated.

(c) To invalidate a sample under paragraph (6)(a) of this section, the decision and the rationale for the decision must be documented in writing. The Department may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.

(d) The water system must collect replacement samples for any samples invalidated under this section if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of paragraph (3) of this section. Any such replacement samples must be taken as soon as possible, but no later than 20 days after the date the Department invalidates the sample or by the end of the applicable monitoring period, whichever occurs later. Replacement samples taken after the end of the applicable monitoring period shall not also be used to meet the monitoring requirements of a subsequent monitoring period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the monitoring period.

(7) Monitoring waivers for small systems. Any small system that meets the criteria of this

paragraph may apply to the Department to reduce the frequency of monitoring for lead and copper under this section to once every nine years (i.e., a "full waiver") if it meets all of the materials criteria specified in paragraph (7)(a) of this section and all of the monitoring criteria specified in paragraph (7)(b) of this section. Any small system that meets the criteria in paragraphs (7)(a) and (b) of this section only for lead, or only for copper, may apply to the Department for a waiver to reduce the frequency of tap water monitoring to once every nine years for that contaminant only (i.e., a "partial waiver").

(a) Materials criteria. The system must demonstrate that its distribution system and service lines and all drinking water supply plumbing, including plumbing conveying drinking water within all residences and buildings connected to the system, are free of lead-containing materials and/or copper-containing materials, as those terms are defined in this paragraph, as follows:

(i) Lead. To qualify for a full waiver, or a waiver of the tap water monitoring requirements for lead (i.e., a "lead waiver"), the water system must provide certification and supporting documentation to the Department that the system is free of all lead-containing materials, as follows:

(A) It contains no plastic pipes which contain lead plasticizers, or plastic service lines which contain lead plasticizers; and

(B) It is free of lead service lines, lead pipes, lead soldered pipe joints, and leaded brass or bronze alloy fittings and fixtures, unless such fittings and fixtures meet the specifications of any standard established pursuant to 42 U.S.C. 300g-6(e) (SDWA section 1417(e)).

(ii) Copper. To qualify for a full waiver, or a waiver of the tap water monitoring requirements for copper (i.e., a "copper waiver"), the water system must provide certification and supporting documentation to the Department that the system contains no copper pipes or copper service lines.

(b) Monitoring criteria for waiver issuance. The system must have completed at least one 6-month round of standard tap water monitoring for lead and copper at sites approved by the Department and from the number of sites required by paragraph (3) of this section and demonstrate that the 90th percentile levels for any and all rounds of monitoring conducted since the system became free of all lead-containing and/or copper-containing materials, as appropriate, meet the following criteria.

(i) Lead levels. To qualify for a full waiver, or a lead waiver, the system must demonstrate that the 90th percentile lead level does not exceed 0.005 mg/L.

(ii) Copper levels. To qualify for a full waiver, or a copper waiver, the system must demonstrate that the 90th percentile copper level does not exceed 0.65 mg/L.

(c) Department approval of waiver application. The Department shall notify the system of its waiver determination, in writing, setting forth the basis of its decision and any condition of the waiver. As a condition of the waiver, the Department may require the system to perform specific activities (e.g., limited monitoring, periodic outreach to customers to remind them to avoid installation of materials that might void the waiver) to avoid the risk of lead or copper concentration of concern in tap water. The small system must continue monitoring for lead and copper at the tap as required by paragraphs (4)(a) through (4)(d) of this section, as appropriate, until it receives written notification from the Department that the waiver has been approved.

(d) Monitoring frequency for systems with waivers.

(i) A system with a full waiver must conduct tap water monitoring for lead and copper in accordance with paragraph (4)(d)(iv) of this section at the reduced number of sampling sites identified in paragraph (3) of this section at least once every nine years and provide the materials certification specified in paragraph (7)(a) of this section for both lead and copper to the Department along with the monitoring results.

(ii) A system with a partial waiver must conduct tap water monitoring for the waived contaminant in accordance with paragraph (4)(d)(iv) of this section at the reduced number of sampling sites specified in paragraph (3) of this section at least once every nine (9) years and provide the materials certification specified in paragraph (7)(a) of this section pertaining to the waived contaminant along with the monitoring results. Such a system also must continue to monitor for the non-waived contaminant in accordance with requirements of paragraph (4)(a) through (4)(d) of this section, as appropriate.

(iii) If a system with a full or partial waiver adds a new source of water or changes any water treatment, the system must notify the Department in writing in accordance with Section L(1)(c) below. The Department has the authority to require the system to add or modify waiver conditions (e.g., require recertification that the system is free of lead-containing and/or copper-containing materials, require additional round(s) of monitoring), if it deems such modifications are necessary to address treatment or source water changes at the system.

(iv) If a system with a full or partial waiver becomes aware that it is no longer free of lead-containing or copper-containing materials, as appropriate, (e.g., as a result of new construction or repairs), the system shall notify the Department in writing no later than sixty (60) days after becoming aware of such a change.

(e) Continued eligibility. If the system continues to satisfy the requirements of paragraph (7)(d) of this section, the waiver will be renewed automatically, unless any of the conditions listed in paragraph (7)(e)(i) through (7)(e)(iii) of this section occurs. A system whose waiver has been revoked may re-apply for a waiver at such time as it again meets the appropriate materials and monitoring criteria of paragraphs (7)(a) and (7)(b) of this section.

(i) A system with a full waiver or a lead waiver no longer satisfies the materials criteria of paragraph (7)(a)(i) of this section or has a 90th percentile lead level greater than 0.005 mg/L.

(ii) A system with a full waiver or a copper waiver no longer satisfies the materials criteria of paragraph (7)(a)(ii) of this section or has a 90th percentile copper level greater than 0.65 mg/L.

(iii)The Department notifies the system, in writing, that the waiver has been revoked, setting forth the basis of its decision.

(f) Requirements following waiver revocation. A system whose full or partial waiver has been revoked by the Department is subject to the corrosion control treatment and lead and copper tap water monitoring requirements, as follows:

(i) If the system exceeds the lead and/or copper action level, the system must implement corrosion control treatment in accordance with the deadlines specified in Section C(5), and any other applicable requirements of this subpart.

(ii) If the system meets both the lead and the copper action level, the system must monitor for lead and copper at the tap no less frequently than once every three years using the reduced number of sample sites specified in paragraph (3) of this section.

(g) Pre-existing waivers. Small system waivers approved by the Department in writing prior to April 11, 2000 shall remain in effect under the following conditions:

(i) If the system has demonstrated that it is both free of lead-containing and copper-containing materials, as required by paragraph (7)(a) of this section and that its 90th percentile lead levels and 90th percentile copper levels meet the criteria of paragraph (7)(b) of this section, the waiver remains in effect so long as the system continues to meet the waiver eligibility criteria of paragraph (7)(e) of this section. The first round of tap water monitoring conducted pursuant to paragraph (7)(d) of this section shall be completed no later than nine years after the last time the system has monitored for lead and copper at the tap.

(ii) If the system has met the materials criteria of paragraph (7)(a) of this section but has not met the monitoring criteria of paragraph (7)(b) of this section, the system shall conduct a round of monitoring for lead and copper at the tap demonstrating that it meets the criteria of paragraph (7)(b) of this section no later than September 30, 2000. Thereafter, the waiver shall remain in effect as long as the system meets the continued eligibility criteria of paragraph (7)(e) of this section. The first round of tap water monitoring conducted pursuant to paragraph (7)(d) of this section shall be completed no later than nine (9) years after the round of monitoring conducted pursuant to paragraph (7)(b) of this section.

I. 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.

(1) General Requirements

(a) 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 Section H(1) above. [Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for coliform sampling under R.61-58.5(G), Microbiological Contaminant Sampling and Analytical Requirements.]

(ii) Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a system draws

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

(b) Number of Samples

(i) Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under paragraphs (2) through (5) of this section from the following number of sites.

| **System Size (# People Served)** | **# Of Sites For Water Quality Parameters** |
|---|---|
| >100,000 | 25 |
| 10,001 to 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 paragraph (3)(c) of the section, 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 paragraph (2) of this section. During each monitoring period specified in paragraphs (3) through (5) of this section, systems shall collect one (1) sample for each applicable water quality parameter at each entry point to the distribution system .

(2) 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 (6) month monitoring period specified in Section H(4)(a) above. All small and medium-size systems shall measure the applicable water quality parameters at the locations specified below during each six (6) month monitoring period specified in Section H(4)(a) during which the system exceeds the lead or copper action level.

(a) 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.

(b) At each entry point to the distribution system: all of the applicable parameters

listed in paragraph (2)(a) above.

(3) Monitoring After Installation of Corrosion Control - Any large system which installs optimal corrosion control treatment pursuant to Section C(4)(d) above, shall measure the water quality parameters at the locations and frequencies specified below during each six (6) month monitoring period specified in Section H(4)(b)(i) above. Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six (6) month monitoring period specified in Section H(4)(b)(ii) above, in which the system exceeds the lead or copper action level.

(a) At taps, two samples for:

(i) pH;

(ii) Alkalinity;

(iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;

(iv) Silica, when an inhibitor containing a silicate compound is used; and,

(v) Calcium, when calcium carbonate stabilization is used as part of corrosion control.

(b) Except as provided in paragraph (3)(c) of the section at each entry point to the distribution system, one (1) sample 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).

(c) Any ground water system can limit entry point sampling described in paragraph (3)(b) of this section 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 Department written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(4) Monitoring After the Department Specifies Water Quality Parameter Values for Optimal Corrosion Control - After the Department specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under Section D(6) above, all large systems shall measure the applicable water quality parameters in accordance with paragraph (3) of this section and determine compliance with the requirements of Section D(7) above, every six month with the first six-month period to begin on the date the Department specified the optimal values under Section D(6) above.

Any small or medium-size system shall conduct such monitoring during each six-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 Section H(4)(d) above, at the time of the action level exceedance, the end of the applicable six-month period under this paragraph shall coincide with the end of the applicable monitoring period under Section H(4)(d) above. Compliance with Department-designated optimal water quality parameter values shall be determined as specified under Section D(7).

(5) Reduced Monitoring

(a) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six (6) month monitoring periods under paragraph (4) of this section shall continue monitoring at the entry point(s) to the distribution system as specified in paragraph (3)(b) of this section. Such system may collect two (2) tap samples for applicable water quality parameters from the following reduced number of sites during each six (6) 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 |

(b) (i) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Department under Section D(6) above, during three consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in this paragraph (5)(a) from every six months to annually. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Department under D(6) during three consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in paragraph (5)(a) from annual to every three years.

(ii) A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in paragraph (5)(a) of this section 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 Section K(1)(a)(ii) above, that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L for copper in Section B(1)(b) above, and that it also has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the Department under Section D(6) above.

(c) A water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

(d) 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 Department under Section D(6) above, for more than nine (9) days in any six (6) month period specified in Section D(7) above, shall resume distribution system tap water sampling in accordance with the number and frequency requirements in paragraph (4) of this section. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in paragraph (5)(a) of this section after it has completed two (2) subsequent consecutive six (6) 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 paragraph (5)(b)(i) or (5)(b)(ii) of this section.

(6) 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 Department in making any determinations (i.e., determining concentrations of water quality parameters) under this section or Section D above.

**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[6]. | No less frequently than every two weeks. |
| After Department 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), | Entry point(s) to distribution system[6]. | No less frequently than every two |
| Reduced Monitoring. | pH, alkalinity, orthophosphate or silica[3], calcium[4]. | Taps. | Every 6 months, annually[7] or every 3 years[8]; |

| | | | |
|---|---|---|---|
| | pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5]. | Entry point(s) to distribution system[6]. | No less frequently than every two weeks. |

[1]Table is for illustrative purposes; consult the text of this section for precise regulatory requirements.
[2]Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.
[3] Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.
[4]Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.
[5]Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.
[6]Ground water systems may limit monitoring to representative locations throughout the system.
[7]Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of monitoring.
[8]Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every 3 years if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of annual monitoring. Water systems may accelerate to triennial monitoring for water quality parameters at the tap if they have maintained 90th percentile lead levels less than or equal to 0.005 mg/L, 90th percentile copper levels less than or equal to 0.65 mg/L, and the range of water quality parameters designated by the Department under Section D(5) above, as representing optimal corrosion control during two consecutive six-month monitoring periods.

J. Monitoring Requirements for Lead and Copper in Source Water.

(1) Sample Location, Collection Methods, and Number of Samples

(a) A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with Section H above, shall collect lead and copper source water samples in accordance with the 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 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 source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(iv) The Department may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples must be done by certified laboratory personnel. Composite samples from a maximum of five (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 fourteen (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.

(b) Where the results of sampling indicate an exceedance of maximum permissible source water levels established under Section E(2)(d) above, the Department may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point. If a Department-required confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the Department-specified maximum permissible levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL.

(2) Monitoring Frequency After System Exceeds Tap Water Action Level - Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system within six months after the exceedance.

(3) Monitoring Frequency After Installation of Source Water Treatment - Any system which installs source water treatment pursuant to Section E(1)(c) above, shall collect an additional source water sample from each entry point to the distribution system during two consecutive six (6) month monitoring periods by the deadline specified in Section E(1)(d) above.

(4) Monitoring frequency after Department specifies maximum permissible source water levels or determines that source water treatment is not needed

(a) A system shall monitor at the frequency specified below in cases where the Department specifies maximum permissible source water levels under Section E(2)(d) above, or determines that the system is not required to install source water treatment under Section E(2)(b) above.

(i) A water system using only groundwater shall collect samples once during the three (3) year compliance period (as that term is defined in R.61-58.A, Definitions) in effect when the applicable Department determination under paragraph (4)(a) of this section is made. Such systems shall collect samples once during each subsequent compliance period.

(ii) A water system using surface water (or a combination of surface and groundwater) shall collect samples once during each year, the first annual monitoring period to begin on the date on which the applicable Department determination is made under paragraph (4)(a) of this section.

(b) 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 paragraph (4)(a)(i) or (ii) of this section.

(5) Reduced Monitoring Frequency

(a) A water system using only ground water may reduce the monitoring frequency for lead and copper in source water to once during each nine-year compliance cycle (as that term is defined in R.61-58.B, Definitions) if the systems meets one of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Department in Section E(2)(d) above, during at least three consecutive compliance periods under paragraph (4)(a) of this section; or

(ii) The Department has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive compliance periods in which sampling was conducted under paragraph (4)(a) of this section, 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.

(b) A water system using surface water (or a combination of surface and ground waters) may reduce the monitoring frequency in paragraph (4)(a) of this section to once during each nine-year compliance cycle (as that term is defined in R.61-58.B, Definitions) if the system meets one of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the Department in Section E(2)(d) above, for at least three (3) consecutive years; or

(ii) The Department 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.

(c) A water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the Department in Section E(1)(e) above.

K. Analytical Methods.

(1) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica, and temperature shall be conducted using EPA-approved methods listed in 40 CFR 141.

(a) Analyses under this section shall only be conducted by laboratories that are certified by the Department.

(b) The Department has the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected an analyzed in

accordance with the requirements of this section.

(c) 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 paragraph (1)(d) below. All levels below the lead and copper MDL must be reported as zero.

(d) The Practical Quantitation Level, or PQL for lead is 0.005 mg/L. The Practical Quantitation Level, or PQL for copper is 0.050 mg/L.

L. Reporting Requirements.

All water systems shall report all of the following information to the Department in accordance with this section.

(1) ***Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.***

(a) Except as provided in paragraph (1)(a)(viii) of this section a water system shall report the information specified below for all tap water samples specified in Section H and for all water quality parameter samples specified in Section I within the first 10 days following the end of each applicable monitoring period specified in Sections H, and I above (i.e., every six-months, annually, every 3 years, or every 9 years).

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under Section H(1)(c), (d), (e), (f), and/or (g) above, 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 Section H(5)(b) above;

(iii) 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 Section B.3(c) above) unless the Department calculates the system's 90th percentile lead and copper levels under paragraph (8) of this section;

(iv) With the exception of initial tap sampling conducted pursuant to Section H(4)(a) above, the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

(v) The results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under Section I(2) through (5) above; and,

(vi) The results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under Section I(2) through (5) above.

(vii) A water system shall report the results of all water quality parameter samples collected under Section I(3) - (6) above, during each six-month monitoring period specified in Section I(4) above, within the first 10 days

following the end of the monitoring period unless the Department has specified a more frequent reporting requirement.

(b) For a non-transient non-community water system, or a community water system meeting the criteria of Section G(3)(g)(i) and (ii) above, that does not have enough taps that can provide first-draw samples, the system must either:

(i) Provide written documentation to the Department identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under Section H(2)(e) above, by the start of the first applicable monitoring period under Section H(4) above, that commences after April 11, 2000, unless the Department has waived prior Department approval of non-first-draw sample sites selected by the system pursuant to Section H(2)(e) above; or

(ii) If the Department has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to Section H(2)(e) above, and include this information with the lead and copper tap sample results required to be submitted pursuant to paragraph (1)(a)(i) of this section

(c) No later than sixty (60) days after the addition of a new source or any change in water treatment, unless the Department requires earlier notification, a water system deemed to have optimized corrosion control under Section C(2)(c) above, a water system subject to reduced monitoring pursuant to Section H(4)(d) above, or a water system subject to a monitoring waiver pursuant to Section H(7) above, shall send written documentation to the Department describing the change. In those instances where prior Department approval of the treatment change or new source is not required, water systems are encouraged to provide the notification to the Department beforehand to minimize the risk the treatment change or new source will adversely affect optimal corrosion control.

(d) Any small system applying for a monitoring waiver under Section H(7) above, or subject to a waiver granted pursuant to Section H(7)(c) above, shall provide the following information to the Department in writing by the specified deadline:

(i) By the start of the first applicable monitoring period in Section H(4) above, any small water system applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of Section H(7)(a) and (b) above.

(ii) No later than nine years after the monitoring previously conducted pursuant to Section H (7)(b) or (d)(i) above, each small system desiring to maintain its monitoring waiver shall provide the information required by Section H(7)(d)(i) and (ii) above.

(iii) No later than 60 days after it becomes aware that it is no longer free of lead-containing and/or copper-containing material, as appropriate, each small system with a monitoring waiver shall provide written notification to the Department, setting forth the circumstances resulting in the lead-containing and/or copper-containing materials being introduced into the system and what corrective action, if any, the system plans to remove these materials.

(iv) By October 10, 2000, any small system with a waiver granted prior to

April 11, 2000 and that has not previously met the requirements of Section H(7)(b) above, shall provide the information required by that paragraph.

(e) Each ground water system that limits water quality parameter monitoring to a subset of entry points under Section I(3)(c) above, shall provide, by the commencement of such monitoring, written correspondence to the Department that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(2) Source Water Monitoring Reporting Requirements

(a) A water system shall report the sampling results for all source water samples collected in accordance with Section J above 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 Section J above.

(b) With the exception of the first round of source water sampling conducted pursuant to Section J(2) above, 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.

(3) Corrosion Control Treatment Reporting Requirements - By the applicable dates under Section C above, systems shall report the following information:

(a) For systems demonstrating that they have already optimized corrosion control, information required in Section C(2)(b) or (c) above.

(b) For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under Section D(1) above.

(c) For systems required to evaluate the effectiveness of corrosion control treatments under Section D(3) above, the information required by that paragraph.

(d) For systems required to install optimal corrosion control designated by the Department under Section D(4) above, a letter certifying that the system has completed installing that treatment.

(4) Source Water Treatment Reporting Requirements - By the applicable dates in Section E above, systems shall provide the following information to the Department:

(a) If required under Section E(2)(a) above, their recommendation regarding source water treatment;

(b) For systems required to install source water treatment under Section E(2)(b) above, a letter certifying that the system has completed installing the treatment designated by the Department within twenty four (24) months after the Department designated the treatment.

(5) Lead Service Line Replacement Reporting Requirements - Systems shall report the following information to the Department to demonstrate compliance with the requirements of Section F above:

(a) Within twelve (12) months after a system exceeds the lead action level in

sampling referred to in Section F(1) above, the system shall demonstrate in writing to the Department that it has conducted a materials evaluation, including the evaluation in Section H(1) above, to identify the initial number of lead service lines in its distribution system, and shall provide the Department with the system's schedule for replacing annually at least 7 percent of the initial number of lead service lines in its distribution system.

(b) Within twelve (12) months after a system exceeds the lead action level in sampling referred to in Section F(1) above, and every twelve (12) months thereafter, the system shall demonstrate to the Department in writing that the system has either:

(i) Replaced in the previous twelve (12) months at least seven (7) percent of the initial lead service lines (or a greater number of lines specified by the Department under Section F(5) above, 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 Section H(2)(c) above, 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 Section F(3) above, shall equal at least seven (7) percent of the initial number of lead lines identified under paragraph (1) of this section (or the percentage specified by the Department under Section F(5) above).

(c) The annual letter submitted to the Department under paragraph (5)(b) 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; and,

(iii) If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

(d) Any system which collects lead service line samples following partial lead service line replacement required by Section F shall report the results to the Department within the first ten days of the month following the month in which the system receives the laboratory results, or as specified by the Department. The Department, at its discretion may eliminate this requirement to report these monitoring results. Systems shall also report any additional information as specified by the Department, and in a time and manner prescribed by the Department, to verify that all partial lead service line replacement activities have taken place.

(6) Public Education Program Reporting Requirements:

(a) Any water system that is subject to the public education requirements in Section G above, shall, within ten days after the end of each period in which the system is required to perform public education tasks in accordance with Section G(3) above, send written documentation to the Department that contains:

(i) A demonstration that the system has delivered the public education materials that meet the content requirements in Section G(1) and (2) above, and

the delivery requirements in Section G(3) above; 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.

(b) Unless required by the Department, a system that previously has submitted the information required by paragraph (6)(a)(ii) of this section need not resubmit the information required by paragraph (6)(a)(ii) of this section, 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.

(7) Reporting of Additional Monitoring Data - Any system which collects sampling data in addition to that required by this section shall report the results to the Department within the first ten (10) days following the end of the applicable monitoring period under Sections H, I and J above, during which the samples are collected.

(8) Reporting of 90th percentile lead and copper concentrations where the Department calculates a system's 90th percentile concentrations. A water system is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by paragraph (1)(a)(iv) of this section if:

(a) The Department has previously notified the water system that it will calculate the water system's 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to paragraph (8)(b)(i) of this section, 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;

(b) The system has provided the following information to the Department by the date specified in paragraph (8)(a) of this section:

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under Section H(1)(c), (d), (e), (f), and/or (g) above, under which the site was selected for the system's sampling pool, pursuant to paragraph (1)(a)(i) of this section; 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

(c) The Department has provided the results of the 90th percentile lead and copper calculations, in writing, to the water system before the end of the monitoring period.

M. Recordkeeping Requirements.

Any system subject to the requirements of this regulation shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, Department determinations, and any other information required by Sections C through J above. Each water system shall retain the records required by this section for no fewer than twelve (12) years.

**R.61-58.12 CONSUMER CONFIDENCE REPORTS**

A. Applicability.

(1) This regulation establishes the minimum requirements for the content of annual reports that community water systems shall deliver to their customers. These reports shall 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. This regulation shall apply only to community water systems.

(2) For the purpose of this regulation, customers are defined as billing units or service connections to which water is delivered by a community water system.

(3) For the purpose of this regulation, detected means: at or above the levels prescribed in R.61-58.5, Maximum Contaminant Levels in Drinking Water.

B. Effective Dates.

(1) Each existing community water system shall deliver its first report by October 19, 1999, its second report by July 1, 2000, and subsequent reports by July 1 annually thereafter. The first report shall contain data collected during, or prior to, calendar year 1998 as prescribed in Section C. below. Each report thereafter shall contain data collected during, or prior to, the previous calendar year.

(2) A new community water system shall deliver its first report by July 1 of the year after its first full calendar year in operation and annually thereafter.

(3) A community water system that sells water to another community water system shall deliver the applicable information required in Section C below, to the buyer system:

(a) No later than April 19, 1999, by April 1, 2000, and by April 1 annually thereafter or

(b) On a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

C. Content of the Reports.

(1) Each community water system shall provide to its customers an annual report that contains the information specified in this section and Section D below.

(2) Information on the source of the water delivered:

(a) Each report shall 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.

(b) If a source water assessment has been completed, the report shall 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 shall 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.

(3) Definitions.

(a) Each report shall 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.

(b) A report for a community water system operating under a variance or an exemption issued under R. 61-58.9, Variances and Exemptions, shall include the following definition: Variances and Exemptions: the Department or EPA permission not to meet an MCL or a treatment technique under certain conditions.

(c) A report which contains data on a contaminants that the Department 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 shall 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 the 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 addition of a disinfectant is necessary for control of microbial contaminants.

(4) Information on Detected Contaminants.

(a) This sub-section 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 an MCL, action level, maximum residual disinfectant level or treatment technique (regulated contaminants);

(ii) Contaminants for which monitoring is required by R.61-58.5.T, Special Monitoring for Inorganic and Organic Contaminants (unregulated contaminants); and

(iii) Disinfection by-products or microbial contaminants for which monitoring is required by Secs. 141.142 and 141.143 (Information Collection Rule for disinfection by-products (DBP) and Microbials (ICR)), of the National Primary Drinking Water Regulations (NPDWR), and which are detected in the finished water.

(b) The data relating to these contaminants shall be displayed in one table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report shall be displayed separately.

(c) The data shall be derived from data collected to comply with EPA and Department monitoring and analytical requirements during calendar year 1998 for the first report and subsequent calendar years thereafter except that:

(i) Where a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) shall include the date and results of the most recent sampling and the report shall include a brief statement indicating that the data presented in the report are from the most recent testing done in accordance with the regulations. No data older than 5 years need be included.

(ii) Results of monitoring in compliance with the ICR (Secs. 141.142 and 141.143 of the NPDWR), need only be included for 5 years from the date of last sample or until any of the detected contaminants becomes regulated and subject to routine monitoring requirements, whichever comes first.

(d) For detected regulated contaminants (listed in Appendix D to this regulation), the table(s) shall contain:

(i) The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in Appendix D to this regulation);

(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 shall indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the report shall include the definitions for treatment technique and/or action level, as appropriate, specified in paragraph(3)(c) of this section;

(iv) For contaminants subject to an MCL, except turbidity and total coliforms, the highest contaminant level used to determine compliance with R. 61-58.5, Maximum Contaminant Levels in Drinking Water, and the range of detected levels, as follows:

(A) When compliance with the MCL is determined annually or less frequently: The highest detected level at any sampling point and the range of detected levels expressed in the same units as the MCL.

(B) When compliance with the MCL is determined 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 R.61-58.5.P(2)(b), 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 system-wide basis by calculating a running annual average of all samples at all monitoring locations: the average and range of detection expressed in the same units as the MCL. The system is required to include individual sample results for the IDSE conducted under R.61-58.14 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.

**Note to paragraph (4)(d)(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 D of this regulation;

(v) For turbidity.

(A) When it is reported pursuant to the requirements of R.61-58.10.C, Filtration and Disinfection [criteria for avoiding filtration]: the highest monthly value. The report should include an explanation of the reasons for measuring turbidity.

(B) When it is reported pursuant to R.61-58.10.E, Filtration and Disinfection [filtration], or R.61-58.10.H(4): The highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in R.61-58.10.E, Filtration, or R.61-58.10.H(4): for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity;

(C) When it is reported pursuant to R.61-58.10.E or R.61-58.10.H(4) or R.61-58.10.I(6): the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in R.61-58.10.E or R.61-58.10.H(4) or R.61-58.10.I(6) 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 40 samples per month; or

(B) The highest monthly percentage of positive samples for systems collecting at least 40 samples per month;

(viii) For fecal coliform: The total number of positive samples; and

(ix) The likely source(s) of detected contaminants to the best of the operator's

knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report shall include one or more of the typical sources for that contaminant listed in Appendix D to this regulation 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) shall clearly identify any data indicating violations of MCLs or treatment techniques and the report shall 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 shall use the relevant language of Appendix D to this regulation.

(7) For detected unregulated contaminants for which monitoring is required (except *Cryptosporidium*), the table(s) shall 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.

(8) Information on *Cryptosporidium*, radon, and other contaminants:

(a) If the system has performed any monitoring for *Cryptosporidium*, including monitoring performed to satisfy the requirements of Sec. 141.143 (NPDWR Microbial Monitoring), which indicates that Cryptosporidium may be present in the source water or the finished water, the report shall include:

(i) A summary of the results of the monitoring; and

(ii) An explanation of the significance of the results.

(b) If the system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report shall include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results.

(c) If the system has performed additional monitoring which indicates the presence of other contaminants in the finished water, the Department strongly encourages systems to report any results which may indicate a health concern. To determine if results may indicate a health concern, the Department recommends 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). EPA and the Department considers detects above a proposed MCL or health advisory level to indicate possible health concerns. For such contaminants, EPA and the Department recommends 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.

(9) Compliance with the State Primary Drinking Water Regulations (SPDWR). In addition to the requirements of this regulation, the report shall 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:

(a) Monitoring and reporting of compliance data;

(b) Filtration and disinfection prescribed by R.61-58.10, Filtration and Disinfection. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or process which constitutes a violation, the report shall include the following language as part of the explanation of potential adverse health effects: "Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches;"

(c) Lead and copper control requirements prescribed by R.61-58.11, Lead and Copper. For systems which fail to take one or more actions prescribed by R.61-58.11.B(2) [Corrosion Control Treatment Requirements], R.61-58.11.C [ Applicability of Corrosion Control Treatment Steps to Small, Medium-Size and Large Water Systems], R.61-58.11(D) [Description of Corrosion Control Treatment Requirements], R.61-58.11.E [Source Water Treatment Requirements], R.61-58.11.F [Lead Service Line Replacement Requirements], the report shall include the applicable language of Appendix D to this regulation for lead, copper, or both;

(d) Treatment techniques for Acrylamide and Epichlorohydrin prescribed by R.61-58.5.AA, Treatment Techniques. For systems which violate the requirements of R.61-58.5.AA, the report shall include the relevant language from Appendix D to this regulation;

(e) Recordkeeping of compliance data;

(f) Special monitoring requirements prescribed by R.61-58.5.T, Special Monitoring for Inorganic and Organic Contaminants, and R.61-58.5.U, Special Monitoring for Sodium; and

(g) Violation of the terms of a variance, an exemption, or an administrative or judicial order.

(10) Variances and Exemptions. If a system is operating under the terms of a variance or an exemption issued under R.61-58.9, Variances and Exemptions, the report shall contain:

(a) An explanation of the reasons for the variance or exemption;

(b) The date on which the variance or exemption was issued;

(c) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(d) A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

(11) Additional information:

(a) The report shall 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 paragraphs (i) through (iii) below or systems may use their own comparable language. The report also shall include the language of paragraph (iv) below:

(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 stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

(C) Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

(D) Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

(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 and the Department prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which shall 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)."

(b) The report shall include the telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report.

(c) In communities with a large proportion of non-English speaking residents, as determined by the Department, the report shall 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.

(d) The report shall include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.

(e) The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.

(f) Systems required to comply with R.61-58.16.

(i) Any ground water system that receives notice from the Department of a significant deficiency or notice from a laboratory of a fecal indicator positive ground water source sample that is not invalidated by the Department must inform its customers in the next report. The report must contain information on any significant deficiency that is uncorrected or any fecal indicator positive ground water source sample. The system must continue to inform the public annually until the Department determines that particular significant deficiency is corrected or the fecal contamination in the ground water source is addressed under R.61-58.16.F(1). Each report must include the following elements.

(A) The nature of the particular significant deficiency or the source of the fecal contamination (if the source is known) and the date the significant deficiency was identified by the Department or the dates of the fecal indicator-positive ground water source samples.

(B) If the fecal contamination in the ground water source has been addressed under R.61-58.16.F(1) 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 R.61-58.16.F(1), the Department approved plan and schedule for correction, including any interim measures completed.

(D) If the system receives notice of a fecal indicator positive ground water source sample that is not invalidated by the Department , the potential health effects using the health effects language of Appendix D of R.61-58.12.

(ii) If directed by the Department, a system with significant deficiencies that have been corrected before the next report is issued must inform its customers of the significant deficiency, how the deficiency was corrected, and the date of correction.

D. Required Additional Health Information.

(1) All reports shall 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)."

(2) 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 0.01 mg/L:

(a) Shall include in its report a short informational statement about arsenic, using language such as: While your drinking water meets State and Federal standards for arsenic, it does contain low levels of arsenic. The Federal standard balances the current understanding of arsenic's possible health effects against the cost of removing arsenic from drinking water. EPA continues to research 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.

(b) May write its own educational statement, but only in consultation with the Department.

(3) A system which detects nitrate at levels above 5 mg/L, but below the MCL:

(a) Shall include a short informational statement about the impacts of nitrate on children using language such as: Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant you should ask advice from your health care provider.

(b) May write its own educational statement, but only in consultation with the Department.

(4) Systems which detect lead above the action level in more than five (5) percent and up to and including ten (10) percent of homes sampled:

(a) Shall include a short informational statement about the special impact of lead on children using language such as: "Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the Safe Drinking Water Hotline (800-426-4791)."

(b) May write its own educational statement, but only in consultation with the Department.

(5) Community water systems that detect TTHM above 0.080 mg/L, but below the MCL in R.61-58.5.L, as an annual average, monitored and calculated under the provisions of R.61-58.5.M, must include health effects language prescribed by of Appendix D to of this regulation.

(6) Beginning in the report due by July 1, 2002 and ending January 22, 2006, a community water system that detects arsenic above 0.01 mg/L and up to and including 0.05 mg/L must include the

arsenic health effects language prescribed by Appendix D to this regulation.

E. Report Delivery and Recordkeeping.

(1) Except as provided in paragraph (7) below, each community water system shall mail or otherwise directly deliver one copy of the report to each customer.

(2) The system shall make a good faith effort to reach consumers who do not get water bills, using means recommended by the Department. The Department expects that an adequate good faith effort will be tailored to the consumers who are served by the system but are not bill-paying customers, such as renters or workers. A good faith effort to reach consumers would include a mix of methods appropriate to the particular system such as: Posting the reports on the Internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-billed customers such as apartment buildings or large private employers; delivery to community organizations.

(3) No later than the date the system is required to distribute the report to its customers, each community water system shall mail a copy of the report to the Department, followed within 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 either provided by or submitted to the Department.

(4) No later than the date the system is required to distribute the report to its customers, each community water system shall deliver the report to any other agency or clearinghouse identified by the Department.

(5) Each community water system shall make its reports available to the public upon request.

(6) Each community water system serving 100,000 or more persons shall post its current year's report to a publicly-accessible site on the Internet.

(7) The Department can waive the requirement of paragraph (1) of this section for community water systems serving fewer than 10,000 persons.

(a) Such systems shall:

(i) Publish the reports in one or more local newspapers serving the area in which the system is located;

(ii) Inform the customers that the reports will not be mailed, either in the newspapers in which the reports are published or by other means approved by the Department; and

(iii) Make the reports available to the public upon request.

(b) Systems serving 500 or fewer persons may forego the requirements of paragraphs (7)(a)(i) above, if they provide notice at least once per year to their customers by mail, door-to-door delivery or by posting in an appropriate location that the report is available upon request.

(8) Any system subject to this regulation shall retain copies of its Consumer Confidence Report for no less than three (3) years.

**R.61-58.13 DISINFECTANT RESIDUALS, DISINFECTION BYPRODUCTS, AND DISINFECTION BYPRODUCT PRECURSORS (STAGE 1 DISINFECTANTS AND DISINFECTION BYPRODUCTS RULE).**

A. Applicability.

This regulation establishes criteria and requirements for the control of disinfectants, disinfection byproducts and disinfection byproduct precursors for 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. In addition, this regulation establishes criteria and requirements for the control of chlorine dioxide for non-community water systems (NCWSs) that use chlorine dioxide as a disinfectant or oxidant in any part of the drinking water treatment process.

B. General Requirements.

(1) The requirements of this regulation constitute national primary drinking water regulations. This regulation establishes 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 R.61-58.5.P and R.61-58.5.Q, respectively, and must meet the treatment technique requirements for disinfection byproduct precursors in Section F of this regulation.

In addition, this regulation establishes criteria under which transient non-community water systems (NCWSs) that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in R.61-58.5.Q.

(2) Compliance Dates - Unless otherwise noted, systems must comply with the requirements of this regulation as follows:

(a) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve 10,000 or more persons must comply with this regulation beginning January 1, 2002. CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this regulation beginning January 1, 2004.

(b) Transient NCWSs that use a surface water source or a ground water source under the influence of surface water which serve 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide and chlorite in this regulation beginning January 1, 2002. Transient NCWSs that use a surface water source or a ground water source under the influence of surface water which serve fewer than 10,000 persons and use chlorine dioxide as a disinfectant or oxidant and systems that use only ground water not under the direct influence of surface water and use chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide and chlorite in this regulation beginning January 1, 2004.

(3) Each CWSs and NTNCWSs regulated under paragraph (1) of this section must be operated by a certified operator of appropriate grade.

(4) Control of Disinfectant Residuals - Notwithstanding the MRDLs in R.61-58.5.Q, 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.

(5) Analytical Methods - Analyses used to determine compliance under this regulation shall be conducted using EPA-approved methods and adhering to EPA approved procedures and minimum reporting levels listed in 40 CFR 141.131 (1-04-06 edition).

(6) Certified Laboratory - Analyses under this regulation for disinfection byproducts must be conducted by a certified laboratory, except as specified in paragraph (7) of this section.

(7) A party approved by the Department must measure daily chlorite samples at the entrance to the distribution system.

(8) Disinfection Residuals - A party approved by the Department must measure residual disinfectant concentration.

(9) Additional Analyses - A party approved by the Department must measure the following parameters where required for compliance with this regulation:

(a) Alkalinity

(b) Bromide

(c) Total Organic Carbon

(d) Specific Ultraviolet Absorbance (SUVA)

(e) pH

C. Monitoring Requirements.

(1) General Requirements

(a) Systems must take all samples during normal operating conditions.

(b) Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required, with Department approval in accordance with criteria developed by the Department and agreed to by the Administrator

(c) Failure to monitor in accordance with the monitoring plan required under paragraph (6) of this section is a monitoring violation.

(d) 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.

(e) Systems may use only data collected under the provisions of this regulation to qualify for reduced monitoring.

(2) Monitoring Requirements for Disinfection Byproducts.

(a) TTHMs and HAA5 - At least twenty-five (25) percent of all samples collected each quarter shall be at locations representing maximum residence time in the distribution system. Remaining samples shall be collected from locations representative of at least average residence time in the distribution systems and representing the entire distribution system, taking into account number of persons served, different sources of water and different treatment methods. The minimum number of samples required shall be determined based on the source of supply and the populations served by a public water system.

(i) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve 10,000 or more persons must collect samples as follows:

(A) Routine Monitoring - A minimum of four (4) water samples per treatment plant per quarter in accordance with paragraph (2)(a) of this section.

(B) Reduced Monitoring - If the system has a source water annual average TOC level, before any treatment, less than 4.0 mg/L and a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L, then the minimum number of samples required may be reduced to one (1) sample per treatment plant per quarter at a distribution system location reflecting maximum residence time.

(C) 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 paragraph (2)(a)(i)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

(D) The system may be returned to routine monitoring at any time at the Department's discretion.

(ii) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve from 500 to 9,999 persons must collect samples as follows:

(A) Routine Monitoring - A minimum of one (1) water sample per treatment plant per quarter at a location representing maximum residence time in the distribution system.

(B) Reduced Monitoring - If the system has a source water annual average TOC level, before any treatment, less than 4.0 mg/L and a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L, then the minimum number of samples required may be reduced to one (1) sample per treatment plant per year during a month of warmest water temperature at a distribution system location reflecting maximum residence time.

(C) 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 paragraph (2)(a)(ii)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

(D) The system may be returned to routine monitoring at any time at the Department's discretion.

(iii) CWSs and NTNCWSs that use a surface water source or a ground water source under the influence of surface water which serve less than 500 persons must collect samples as follows:

(A) Routine Monitoring - A minimum of one water sample per treatment plant per year during a month of warmest water temperature at a location representing maximum residence time in the distribution system.

(B) Reduced Monitoring - There is no reduced monitoring allowed for these systems

(C) Increased Monitoring - If the sample (or average of annual samples, if more than one is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in paragraph (2)(a)(iii)(D) of this section.

(D) Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring their TTHM annual average is less than or equal to 0.060 mg/L and their HAA5 annual average is less than or equal to 0.045 mg/L.

(iv) CWSs and NTNCWSs that use only ground water not under the influence of surface water which serve 10,000 or more persons and use a chemical disinfectant must collect samples as follows:

(A) Routine Monitoring - A minimum of one water sample per treatment plant per quarter at a location representing maximum residence time in the distribution system.

(B) Reduced Monitoring - If the system has a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L, then the minimum number of samples required may be reduced to one (1) sample per treatment plant per year during a month of warmest water temperature at a distribution system location reflecting maximum residence time.

(C) 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 paragraph (2)(a)(iv)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively.

(D) The system may be returned to routine monitoring at any time at the Department's discretion.

(v) CWSs and NTNCWSs that use only ground water not under the influence of surface water which serve less than 10,000 persons and use a chemical disinfectant must collect samples as follows:

(A) Routine Monitoring - A minimum of one (1) water sample per treatment plant per year during a month of warmest water temperature at a location representing maximum residence time in the distribution system.

(B) Increased Monitoring - If the sample taken, or average of annual samples if more than one (1) sample is taken, exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a location representing the maximum residence time in the distribution system, until the system meets the criteria in paragraph (2)(a)(v)(F) of this section for reduced monitoring.

(C) Reduced Monitoring - If the system has a TTHM annual average less than 0.040 mg/L and HAA5 annual average less than 0.030 mg/L for two (2) consecutive years, or a TTHM annual average less than 0.020 mg/L and HAA5 annual average less than 0.015 mg/L for one (1) year, then the minimum number of samples required may be reduced to one sample per treatment plant per three (3) year cycle taken during a month of warmest water temperature at a distribution system location reflecting maximum residence time, with the three (3) year cycle beginning on January 1 following the quarter in which the system qualifies for reduced monitoring.

(D) Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (v)(A) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. If either the TTHM annual average is greater than 0.080 mg/L or the HAA5 annual average is greater than 0.060 mg/L, the system must go to the increased monitoring identified in paragraph (v)(B) of this section in the quarter immediately following the monitoring period in which the system exceeds the 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5 respectively.

(E) The system may be returned to routine monitoring at any time at the Department's discretion.

(F) Systems on increased monitoring may return to routine monitoring if, after at least one (1) year of monitoring their TTHM annual average is less than or equal to 0.060 mg/L and their HAA5 annual average is less than or equal to 0.045 mg/L.

(vi) Monitoring requirements for source water TOC.

In order to qualify for reduced monitoring for TTHM and HAA5 under paragraph C(2)(a)(i)(B) or C(2)(a)(ii)(B) of this section, Subpart H systems not monitoring under the provisions of paragraph C(4) of this section must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the Department. In addition to meeting other criteria for reduced monitoring in paragraph C(2)(a)(i)(B) or C(2)(a)(ii)(B) of this section, the source water TOC running annual average must be less than or equal to 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. Once qualified for reduced monitoring for TTHM and HAA5 under paragraph C(2)(a)(i)(B) or C(2)(a)(ii)(B) of this section, a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

(b) 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 R.61-58.13.C(2)(b)(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 sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting the 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 R.61-58.13.C(2)(b)(ii) to meet the requirement for this monitoring.

(ii) Additional monitoring. On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location

representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) Reduced monitoring.

(A) Chlorite monitoring at the entrance to the distribution system required by R.61-58.13.C(2)(b)(i)(A) may not be reduced.

(B) Chlorite monitoring in the distribution system required by R.61-58.13.C(2)(b)(i)(B) may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under R.61-58.13.C(2)(b)(i)(B) has exceeded the chlorite MCL and the system has not been required to conduct monitoring under R.61-58.13.C(2)(b)(ii). The system may remain on the reduced monitoring schedule until either of the three individual chlorite samples taken quarterly in the distribution system under R.61-58.13.C(2)(b)(i)(B) exceeds the chlorite MCL or the system is required to conduct monitoring under R.61-58.13.C(2)(b)(ii), at which time, the system must revert to routine monitoring.

(c) Bromate

(i) Routine monitoring. Community and non-transient, non-community systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.

(ii) Reduced Monitoring

(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 year. The system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/L based upon representative monthly measurements. If the running annual average source water bromide concentration is greater than or equal to 0.05 mg/L, the system must resume routine monitoring required by R.61-58.13.C(2)(c)(i).

(B) Beginning April 1, 2009, systems may no longer use the provisions of R.61-58.C(2)(c)(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 less than or equal to 0.0025 mg/L based on monthly bromate measurements under R.61-58.13.C(2)(c)(i) for the most recent four quarters, with samples analyzed using analytical methods identified in 40 CFR 141.132 (b)(3)(ii)(B) (1-04-06 edition). If a system has qualified for reduced bromate monitoring under R.61-58.13.C(2)(c)(ii)(A), that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples is less than or equal to 0.0025 mg/L based on samples analyzed using analytical

methods identified in 40 CFR 141.132 (b)(3)(ii)(B) (1-04-06 edition). If the running annual average bromate concentration is greater than 0.0025 mg/L, the system must resume routine monitoring required by R.61-58.13.C(2)(c)(i).

(3) Monitoring requirements for disinfectant residuals.

(a) Chlorine and Chloramines.

(i) Routine Monitoring - Community and nontransient noncommunity water systems that use chlorine or chloramines must measure the residual disinfectant level at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in R.61-58.5.G. Systems that use a surface water source or a ground water source under the influence of surface water may use the results of residual disinfectant concentration sampling conducted under R.61-58.10.F(2)(f) for unfiltered systems or R.61-58.10.F(3)(c) for systems which filter, in lieu of taking separate samples.

(ii) Reduced Monitoring - Monitoring may not be reduced.

(b) Chlorine Dioxide.

(i) Routine Monitoring - CWSs, NTNCWSs, and TNCWSs 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 paragraph (3)(b)(ii) of this section, in addition to the sample required at the entrance to the distribution system.

(ii) Additional Monitoring - On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the system must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) Reduced Monitoring - Chlorine dioxide monitoring may not be reduced.

(4) Monitoring Requirements for Disinfection Byproduct Precursors (DBPP).

(a) Routine Monitoring - Surface water systems and ground water systems under the influence of surface water which use conventional filtration treatment must monitor each treatment plant for Total Organic Carbon (TOC) no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph 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, systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

(b) Reduced Monitoring - Surface water systems and ground water systems under the influence of surface water with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC of equal or greater than 2.0 mg/L.

(5) Bromide - Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

(6) Monitoring Plans - Each system required to monitor under this regulation must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Department and the general public no later than 30 days following the applicable compliance dates in R.61-58.13.B(2). All surface water systems and ground water systems under the influence of surface water serving more than 3300 people must submit a copy of the monitoring plan to the Department no later than the date of the first report required under R.61-58.13.E. The Department may also require the plan to be submitted by any other system. After review, the Department may require changes in any plan elements. The plan must include at least the following elements.

(a) Specific locations and schedules for collecting samples for any parameters included in this regulation.

(b) How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

(c) If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions of R.61-58.5.X, the sampling plan must reflect the entire distribution system

D. Compliance Requirements.

(1) General Requirements.

(a) Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHM, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.

(b) All samples taken and analyzed under the provisions of this regulation must be

included in determining compliance, even if that number is greater than the minimum required.

(c) If, during the first year of monitoring under R.61-58.13.C, 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.

(2) Disinfection Byproducts

(a) TTHMs and HAA5.

(i) For systems monitoring quarterly, compliance with MCLs in R.61-58.5.P must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed in Section C(2)(a) above.

(ii) For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of Section C(2)(a) above, does not exceed the MCLs in R.61-58.5.P. 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 year of quarterly monitoring, unless the result of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three 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 R.61-58.6 in addition to reporting to the Department pursuant to Section E above.

(iv) If a PWS fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(b) Bromate. Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average of all samples taken during the month) collected by the system as prescribed by R.61-58.13.C(2)(c). 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 R.61-58.6, in addition to reporting to the Department pursuant to R.61-58.13.E. If a PWS fails to complete 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.

(c) Chlorite. Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by R.61-58.13.C(2)(b)(i)(B) and R.61-58.13.C(2)(b)(ii). If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to R.61-58.6, in addition to reporting to the Department pursuant to R.61-58.13.E.

(3) Disinfectant Residuals.

(a) 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 Section C(3)(a) above. 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 R.61-58.6, in addition to reporting to the Department pursuant to Section E below.

(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 Section E below must clearly indicate which residual disinfectant was analyzed for each sample.

(b) Chlorine Dioxide.

(i) Acute Violations - Compliance must be based on consecutive daily samples collected by the system under Section C(3)(b) above. If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three (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 R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below. 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 R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below.

(ii) Non-acute Violations - Compliance must be based on consecutive daily samples collected by the system under Section C(3)(b) above. 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 Non-acute health risks in R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below. 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 Non-acute violations under R.61-58.6.E in addition to reporting to the Department pursuant to Section E(3) below.

(4) Disinfection Byproduct Precursors - Compliance must be determined as specified by Section F(3) below. 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 Section F(2)(b) below 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 Section F(2)(c) below 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 Section F(3)(a)(iv) below, is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to R.61-58.6.E, in addition to reporting to the Department pursuant to R.61-58.13.E(4).

E. Reporting and Recordkeeping Requirements.

(1) Systems required to sample quarterly or more frequently must report to the Department within 10 days after the end of each quarter in which samples were collected, notwithstanding the provisions of R.61-58.6. Systems required to sample less frequently than quarterly must report to the Department within 10 days after the end of each monitoring period in which samples were collected.

(2) Disinfection Byproducts - Systems must report the following information:

(a) Systems monitoring for TTHM and HAA5 under the requirements of R.61-58.13.C(2) on a quarterly or more frequent basis must report:

(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 Section D(2)(a) above, the MCL was violated.

(b) Systems monitoring for TTHMs and HAA5 under the requirements of R.61-58.13.C(2) less frequently than quarterly (but at least annually) must report

(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 Section D(2)(a) above, the MCL was violated.

(c) Systems monitoring for TTHMs and HAA5 under the requirements of R.61-58.13.C(2) less frequently than annually must report:

(i) The location, date, and result of each sample taken.

(ii) Whether, based on Section D(2)(a) above, the MCL was violated.

(d) Systems monitoring for chlorite under the requirements of R.61-58.13.C(2) must report:

(i) The number of entry point samples taken each month for the last three (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) sample sets taken in the distribution system.

(iv) Whether, based on Section D(2)(c) above, the MCL was violated, and in which month, and how many times it was violated each month.

(e) System monitoring for bromate under the requirements of R.61-58.13.C(2) must report:

(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 Section D(2)(b) above, the MCL was violated.

(3) Disinfectants - Systems must report the following information:

(a) Systems monitoring for chlorine or chloramines under the requirements of R.61-58.13.C(3) must report:

(i) The number of samples taken during each month of the last quarter.

(ii) The monthly arithmetic average of all samples taken in each month for the last twelve (12) months.

(iii) The arithmetic average of all monthly averages for the last twelve (12) months.

(iv) Whether, based on Section D(3)(a) above, the MRDL was violated.

(b) Systems monitoring for chlorine dioxide under the requirements of R.61-58.13.C(3) must report:

(i) The dates, results, and locations of samples taken during the last quarter.

(ii) Whether, based on Section D(3)(b) above, 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 Non-acute.

(4) Disinfection byproduct precursors and enhanced coagulation or enhanced softening -

Systems must report the following information:

(a) System monitoring monthly or quarterly for TOC under the requirements of R.61-58.13.C(4) and required to meet the enhanced coagulation or enhanced softening requirements in R.61-58.13.F(2)(b) or (c) must report:

(i) The number of paired (source water and treated water) samples taken during the last quarter.

(ii) The location, date, and result 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 R.61-58.13(F)(3)(a).

(v) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in R.61-58.13(F)(2) for the last four (4) quarters.

(b) System monitoring monthly or quarterly for TOC under the requirements of R.61-58.13.C(4) and meeting one or more of the alternative compliance criteria in R.61-58.13.F(1)(a) or (b) must report:

(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 R.61-58.13.F(1)(a)(i) or (iii) or of treated water TOC for systems meeting the criterion in R.61-58.13.F(1)(a)(ii).

(v) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in R.61-58.13.F(1)(a)(v) or of treated water SUVA for systems meeting the criterion in R.61-58.13.F(1)(a)(vi).

(vi) The running annual average of source water alkalinity for systems meeting the criterion in R.61-58.13.F(1)(a)(iii) and of treated water alkalinity for systems meeting the criterion in R.61-58.13.F(1)(b)(i).

(vii) The running annual average for both TTHM and HAA5 for systems meeting the criterion in R.61-58.13.F(1)(a)(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 R.61-

58.13.F(1)(b)(ii).

(ix) Whether the system is in compliance with the particular alternative compliance criterion in R.61-58.13.F(1)(a) or (b).

(5) The Department may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

F. Treatment Technique for Control of Disinfection Byproduct (DBP) Precursors.

(1) Systems using surface water or a ground water under the influence of surface water which utilize conventional filtration treatment must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in paragraph (2) of this section unless the system meets at least one of the alternative compliance criteria listed in paragraph (1)(a) or (1)(b) of this section.

(a) Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems - Systems using surface water or a ground water under the influence of surface water which utilize conventional filtration treatment may use the alternative compliance criteria in paragraphs (1)(a)(i) through (vi) of this section to comply with this section in lieu of complying with paragraph (2) of this section. Systems must still comply with monitoring requirements in R.61-58.13.C(4).

(i) The system's source water TOC level, measured according to EPA approved methods specified in 40 CFR 141.131(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 EPA approved methods specified in 40 CFR 141.131(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 as according to EPA approved methods specified in 40 CFR 141.131(d)(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to EPA approved methods specified in 40 CFR 141.131(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 Section B(2) above, the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in Section B(2) above, to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Department for approval not later than the effective date for compliance in R.61-58.13.B(2). 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 National Primary Drinking Water Regulations.

(iv) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary

disinfection and maintenance of a residual in the distribution system.

(v) The system's source water SUVA, prior to any treatment and measured monthly according to EPA approved methods specified in 40 CFR 141.131(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 EPA approved methods specified in 40 CFR 141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(b) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (2)(b) of this section may use the alternative compliance criteria in paragraphs (1)(b)(i) and (ii) of this section in lieu of complying with paragraph (2) of this section. Systems must still comply with monitoring requirements in R.61-58.13.C(4).

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as $CaCO_3$), measured monthly according to EPA approved methods specified in 40 CFR 141.131(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 40 CFR 141.131(d)(6) (1-04-06 edition) and calculated quarterly as a running annual average.

(2) Enhanced coagulation and enhanced softening performance requirements.

(a) Systems must achieve the percent reduction of TOC specified in paragraph (2)(b) of this section between the source water and the combined filter effluent, unless the Department approves a system's request for alternate minimum TOC removal (Step 2) requirements under paragraph (2)(c) of this section.

(b) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with EPA approved methods specified in 40 CFR 141.131(d). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity greater than 120 mg/L) for the specified source water TOC:

**STEP 1 REQUIRED REMOVAL OF TOC BY ENHANCED COAGULATION AND ENHANCED SOFTENING FOR SURFACE WATER SYSTEMS OR GROUND WATER SYSTEMS UNDER THE INFLUENCE OF SURFACE WATER USING CONVENTIONAL TREATMENT[A,B]**

| Source-Water TOC, mg/L | Source-Water Alkalinity, mg/L as $CaCO_3$ | | |
|---|---|---|---|
| | 0-60 | >60-120 | >120[c] |
| >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% |

[a] Systems meeting at least one of the conditions in paragraphs (1)(a)(i) through (vi) of this section are not required to operate with enhanced coagulation.

[b] Softening systems meeting one of the alternative compliance criteria in paragraph (1)(b) of this section are not required to operate with enhanced softening.

[c] Systems practicing softening must meet the TOC removal requirements in this column.

(c) Systems using surface water or a ground water under the influence of surface water which utilize conventional filtration treatment that cannot achieve the Step 1 TOC removals required by paragraph (2)(b) of this section due to water quality parameters or operational constraints must apply to the Department, within three (3) months of failure to achieve the TOC removals required by paragraph (2)(b) of this section, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Department approves the alternative minimum TOC removal (Step 2) requirements, the Department may make those requirements retroactive for the purposes of determining compliance. Until the Department approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in paragraph (2)(b) of this section.

(d) Alternate minimum TOC removal (Step 2) requirements. Applications made to the Department by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under paragraph (2)(c) of this section must include, as a minimum, results of bench- or pilot-scale testing conducted under paragraph (2)(d)(i) of this section. 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 paragraphs (2)(d)(i) through (v) of this section such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of greater than or equal to 0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Department, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (2)(b) of this section. This requirement will be effective until such time as the Department approves a new value based on the results of a new bench- or pilot-scale test. Failure to achieve Department-set alternative minimum

TOC removal levels is a violation of National Primary Drinking Water Regulations.

(ii) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (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 equivalent addition of iron coagulant) is reached.

(iv) The system may operate at any coagulant dose or pH necessary (consistent with other NPDWRs) to achieve the minimum TOC percent removal approved under paragraph (2)(c) of this section.

(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 Department for a waiver of enhanced coagulation requirements.

(3) Compliance Calculations.

(a) Systems using surface water or a ground water under the influence of surface water other than those identified in paragraph (1)(a) or (1)(b) of this section must comply with requirements contained in R.61-58.13.F(2)(b) or (c). Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) Determine actual monthly TOC percent removal, equal to:

(1- (treated water TOC/source water TOC)) x 100.

(ii) Determine the required monthly TOC percent removal (from either the table in paragraph (2)(b) or from paragraph (2)(c) of this section).

(iii) Divide the value in paragraph (3)(a)(i) of this section by the value in paragraph (3)(a)(ii) of this section.

(iv) Add together the results of paragraph (3)(a)(iii) of this section for the last twelve (12) months and divide by twelve (12).

(v) If the value calculated in paragraph (3)(a)(iv) of this section is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(b) Systems may use the provisions in paragraphs (3)(b)(i) through (v) of this section in lieu of the calculations in paragraph (3)(a)(i) through (v) of this section 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 EPA approved methods specified in 40 CFR 141.131(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 paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(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 paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(iii) In any month that the system's source water SUVA, prior to any treatment and measured according to EPA approved methods specified in 40 CFR 141.131(d)(4), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(iv) In any month that the system's finished water SUVA, measured according to EPA approved methods specified in 40 CFR 141.131(d)(4) (11-8-2006 edition), is less than or equal to 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (3)(a)(iii) of this section) when calculating compliance under the provisions of paragraph (3)(a) of this section.

(c) Systems using surface water or a ground water under the influence of surface water which utilize conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (1)(a) or (1)(b) of this section.

(4) Treatment Technique Requirements for DBP Precursors. The Administrator identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For Systems using surface water or a ground water under the influence of surface water which utilize conventional treatment, enhanced coagulation or enhanced softening.

## R.61-58.14 INITIAL DISTRIBUTION SYSTEM EVALUATIONS

A. Applicability.

This part R.61-58.14 applies to community water systems that use 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. This part also applies to non-transient non-community water systems that serve at least 10,000 people and use 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.

B. General Requirements.

(1) The requirements of this part R.61-58.14 constitute national primary drinking water regulations. The regulations in this part establish monitoring and other requirements for identifying compliance monitoring locations specified in R.61-58.15 for determining compliance with maximum contaminant levels for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5). Public water systems must use an Initial Distribution System Evaluation (IDSE) to determine locations with representative high TTHM and HAA5 concentrations throughout their distribution system. IDSEs are used in conjunction with, but separate from, R.61-58.13 compliance monitoring, to identify and select R.61-58.15 compliance monitoring locations.

(2) Schedule – Systems subject to this part must comply with the requirements of this part on the following schedule:

(a) For systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve 100,000 people or greater:

(i) The standard monitoring plan or system specific study or 40/30 certification must be submitted to the Department by October 1, 2006.

(ii) The standard monitoring or system specific study must be completed by September 30, 2008.

(iii) The IDSE report must be submitted to the Department by January 1, 2009.

(iv) If, within 12 months after the date identified in paragraph 2(a)(i) of this section, the Department does not approve the submitted plan or notify the system that it has not yet completed its review, the submitted plan may be considered approved and the system must complete standard monitoring or a system specific study no later than the date identified in paragraph (2)(a)(ii) of this section.

(v) If, within 3 months after the date identified in R.61-58.14.(2)(a)(iii), the Department does not approve the submitted IDSE report or notify the system that it has not yet completed its review, the submitted report may be considered approved and the system must implement the IDSE recommended monitoring in accordance with R.61-58.15.

(vi) If a system chooses to submit a 40/30 certification, it must be in accordance with R.61-58.14.E.

(b) For systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve between 50,000 and 99,999 people:

(i) The standard monitoring plan or system specific study or a 40/30 certification must be submitted to the Department by April 1, 2007.

(ii) The standard monitoring or system specific study must be completed by March 31, 2009.

(iii) The IDSE report must be submitted to the Department by July 1, 2009.

(iv) If, within 12 months after the date identified in paragraph 2(b)(i) of this section, the Department does not approve the submitted plan or notify the system that it has not yet completed its review, the submitted plan may be considered approved and the system must complete standard monitoring or a system specific study no later than the date identified in paragraph (2)(b)(ii) of this section.

(v) If, within 3 months after the date identified in R.61-58.14.B(2)(b)(iii), the Department does not approve the submitted IDSE report or notify the system that it has not yet completed its review, the submitted report may be considered approved and the system must implement the IDSE recommended monitoring in accordance with R.61-58.15.

(vi) If a system chooses to submit a 40/30 certification, it must be in accordance with R.61-58.14.E.

(c) For systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve between 10,000 and 49,999 people:

(i) The standard monitoring plan or system specific study or 40/30 certification must be submitted to the Department by October 1, 2007.

(ii) The standard monitoring or system specific study must be completed by September 30, 2009.

(iii) The IDSE report must be submitted to the Department by January 1, 2010.

(iv) If, within 12 months after the date identified in paragraph 2(c)(i) of this section, the Department does not approve the submitted plan or notify the system that it has not yet completed its review, the submitted plan may be considered approved and the system must complete standard monitoring or a system specific study no later than the date identified in paragraph (2)(c)(ii) of this section.

(v) If, within 9 months after the date identified in R.61-58.14.B(2)(c)(iii), the Department does not approve the submitted IDSE report or notify the system that it has not yet completed its review, the submitted report may be considered approved and the system must implement the IDSE recommended monitoring in accordance with R.61-58.15.

(vi) If a system chooses to submit a 40/30 certification, it must be in accordance with R.61-58.14.E.

(d) For systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve less than 10,000 people:

(i) The standard monitoring plan or system specific study or 40/30 certification must be submitted to the Department by April 1, 2008 or a very small system waiver must be granted by the Department by April 1, 2008.

(ii) The standard monitoring or system specific study must be completed by March 31, 2010.

(iii) The IDSE report must be submitted to the Department by July 1, 2010.

(iv) If, within 12 months after the date identified in paragraph 2(d)(i) of this section, the Department does not approve the submitted plan or notify the system that it has not yet completed its review, the submitted plan may be considered approved and the system must complete standard monitoring or a system specific study no later than the date identified in paragraph (2)(d)(ii) of this section.

(v) If, within 3 months after the date identified in R.61-58.14.B(2)(d)(iii), the Department does not approve the submitted IDSE report or notify the system that it has not yet completed its review, the submitted report may be considered approved and the system must implement the IDSE recommended monitoring in accordance with R.61-58.15.

(vi) If a system chooses to submit a 40/30 certification, it must be in accordance with R.61-58.14.E.

(e) For systems that are part of a combined distribution system

(i) The standard monitoring plan or system specific study or 40/30 certification must be submitted to the Department at the same time as the system in the combined distribution system with the earliest compliance date.

(ii) The standard monitoring or system specific study must be completed at the same time as the system in the combined distribution system with the earliest compliance date.

(iii) The IDSE report must be submitted to the Department at the same time as the system in the combined distribution system with the earliest compliance date.

(iv) If, within 12 months after the date which is determined by the criteria specified in paragraph 2(e)(i) of this section, the Department does not approve the submitted plan or notify the system that it has not yet completed its review, the submitted plan may be considered approved and the system must complete standard monitoring or a system specific study no later than the date which is determined by the criteria specified in paragraph (2)(e)(ii) of this section.

(v) If, within 3 months after the date identified in R.61-58.14.B(2)(e)(iii), the Department does not approve the submitted IDSE report or notify the system that

it has not yet completed its review, the submitted report may be considered approved and the system must implement the IDSE recommended monitoring in accordance with R.61-58.15.

(vi) If a system chooses to submit a 40/30 certification, it must be in accordance with R.61-58.14.E.

(3) For the purpose of the schedule in this section, the Department may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The Department may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(4) Systems must conduct standard monitoring that meets the requirements in R.61-58.14.C, or a system specific study that meets the requirements in R.61-58.14.D, or certify to the Department that the system meets 40/30 certification criteria under R.61-58.14.E, or qualify for a very small system waiver under R.61-58.14.F.

(a) Systems must have taken the full complement of TTHM and HAA5 compliance samples required under R.61-58.13 during the period specified in R.61-58.14.E(1) to meet the 40/30 certification criteria in R.61-58.14.E. The system must have taken TTHM and HAA5 samples under R.61-58.13 to be eligible for the very small system waiver in R.61-58.14.F.

(b) Systems that have not taken the required samples must conduct standard monitoring that meets the requirements in R.61-58.14.C, or a system specific study that meets the requirements in R.61-58.14.D.

(5) All analyses used to determine compliance with the requirements in R.61-58.14 must be conducted using only the analytical methods specified in 40 CFR 141.131 (1-04-06 edition), or otherwise approved by EPA for monitoring under 40 CFR 141 subpart U (1-04-06 edition).

(6) IDSE results will not be used for the purpose of determining compliance with MCLs in R.61-58.5.P.

C. Standard Monitoring.

(1) Standard Monitoring Plan.

For systems that choose to conduct standard monitoring, the standard monitoring plan must comply with paragraphs (1)(a) through (1)(d) of this section. The standard monitoring plan must be prepared and submitted to the Department according to the schedule in section B of this part.

(a) The standard monitoring plan must include a schematic of the system's distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating locations and dates of all projected standard monitoring, and all projected R.61-58.13 compliance monitoring.

(b) The standard monitoring plan must include justification of standard monitoring location selection and a summary of data relied upon to justify standard monitoring

location selection.

(c) The standard monitoring plan must specify the population served and system type (subpart H or ground water).

(d) The system must retain a complete copy of the standard monitoring plan submitted under this section C, including any Department modification of the standard monitoring plan, for as long as the system is required to retain the IDSE report under R.61-58.14.C(3)(d).

(2) Standard Monitoring.

(a) Systems conducting standard monitoring must monitor as indicated in this paragraph (2)(a). Systems 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. Systems must collect one monitoring period during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature. Systems must review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature.

(i) Consecutive systems receiving water from a Subpart H source and serving less than 500 people must collect two (2) dual sample sets taken during the peak historical month for TTHM or HAA5 levels or the during the month of warmest water temperature at the following locations:

(A) One (1) dual sample set near the entry point to the distribution system.

(B) One (1) dual sample set at a high TTHM location.

(ii) Non-consecutive systems utilizing a Subpart H source and serving less than 500 people must collect two (2) dual sample sets taken during the peak historical month for TTHM or HAA5 levels or the during the month of warmest water temperature at the following locations:

(A) One (1) dual sample set at a high TTHM location.

(B) One (1) dual sample set at a high HAA5 location.

(iii) Consecutive systems receiving water from a Subpart H source and serving between 500 and 3,300 people must collect two (2) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set near the entry point to the distribution system.

(B) One (1) dual sample set at a high TTHM location.

(iv) Non-consecutive systems utilizing a Subpart H source and serving between 500 and 3,300 people must collect two (2) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set at a high TTHM location.

(B) One (1) dual sample set at a high HAA5 location.

(v) Consecutive systems receiving water from a Subpart H source or non-consecutive systems utilizing a Subpart H source and serving between 3,301 and 9,999 people must collect four (4) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set at the average residence time.

(B) Two (2) dual sample sets at high TTHM locations.

(C) One (1) dual sample set at a high HAA5 location.

(vi) Consecutive systems receiving water from a Subpart H source or non-consecutive systems utilizing a Subpart H source and serving between 10,000 and 49,999 people must collect eight (8) dual sample sets every 60 days for six (6) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set near the entry point to the distribution system.

(B) Two (2) dual sample sets at average residence time.

(C) Three (3) dual sample sets at high TTHM locations.

(D) Two (2) dual sample sets at high HAA5 locations.

(vii) Consecutive systems receiving water from a Subpart H source or non-consecutive systems utilizing a Subpart H source and serving between 50,000 and 249,999 people must collect sixteen (16) dual sample sets every 60 days for six (6) consecutive monitoring periods at the following locations:

(A) Three (3) dual sample sets near entry points to the distribution system.

(B) Four (4) dual sample sets at average residence time.

(C) Five (5) dual sample sets at high TTHM locations.

(D) Four (4) dual sample sets at high HAA5 locations.

(viii) Consecutive systems receiving water from a Subpart H source or non-consecutive systems utilizing a Subpart H source and serving between 250,000 and 999,999 people must collect twenty-four (24) dual sample sets every 60 days for six (6) consecutive monitoring periods at the following locations:

(A) Four (4) dual sample sets near entry points to the distribution system.

(B) Six (6) dual sample sets at average residence time.

(C) Eight (8) dual sample sets at high TTHM locations.

(D) Six (6) dual sample sets at high HAA5 locations.

(ix) Consecutive systems receiving water from a Subpart H source or non-consecutive systems utilizing a Subpart H source and serving between 1,000,000 and 4,999,999 people must collect thirty-two (32) dual sample sets every 60 days for six (6) consecutive monitoring periods at the following locations:

(A) Six (6) dual sample sets near entry points to the distribution system.

(B) Eight (8) dual sample sets at average residence time.

(C) Ten (10) dual sample sets at high TTHM locations.

(D) Eight (8) dual sample sets at high HAA5 locations.

(x) Consecutive systems receiving water from a Subpart H source or non-consecutive systems utilizing a Subpart H source and serving 5,000,000 or more people must collect forty (40) dual sample sets every 60 days for six (6) consecutive monitoring periods at the following locations:

(A) Eight (8) dual sample sets near entry points to the distribution system.

(B) Ten (10) dual sample sets at average residence time.

(C) Twelve (12) dual sample sets at high TTHM locations.

(D) Ten (10) dual sample sets at high HAA5 locations.

(xi) Consecutive systems receiving water from a ground water source and serving less than 500 people must collect two (2) dual sample sets taken during the peak historical month for TTHM or HAA5 levels or the during the month of warmest water temperature at the following locations:

(A) One (1) dual sample set near the entry point to the distribution system.

(B) One (1) dual sample set at a high TTHM location.

(xii) Non-consecutive systems utilizing a ground water source and serving less than 500 people must collect two (2) dual sample sets taken during the peak historical month for TTHM or HAA5 levels or the during the month of warmest water temperature at the following locations:

(A) One (1) dual sample set at a high TTHM location.

(B) One (1) dual sample set at a high HAA5 location.

(xiii) Consecutive systems receiving water from a ground water source or non-

consecutive systems utilizing a ground water source and serving between 500 and 9,999 people must collect two (2) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set at a high TTHM location.

(B) One (1) dual sample set at a high HAA5 location.

(xiv) Consecutive systems receiving water from a ground water source or non-consecutive systems utilizing a ground water source and serving between 10,000 and 99,999 people must collect six (6) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set near the entry point to the distribution system.

(B) One (1) dual sample set at average residence time.

(C) Two (2) dual sample sets at high TTHM locations.

(D) Two (2) dual sample sets at high HAA5 locations.

(xv) Consecutive systems receiving water from a ground water source or non-consecutive systems utilizing a ground water source and serving between 100,000 and 499,999 people must collect eight (8) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) One (1) dual sample set near the entry point to the distribution system.

(B) One (1) dual sample set at average residence time.

(C) Three (3) dual sample sets at high TTHM locations.

(D) Three (3) dual sample sets at high HAA5 locations.

(xvi) Consecutive systems receiving water from a ground water source or non-consecutive systems utilizing a ground water source and serving 500,000 or more people must collect twelve (12) dual sample sets every 90 days for four (4) consecutive monitoring periods at the following locations:

(A) Two (2) dual sample sets near entry points to the distribution system.

(B) Two (2) dual sample sets at average residence time.

(C) Four (4) dual sample sets at high TTHM locations.

(D) Four (4) dual sample sets at high HAA5 locations.

(b) Samples must be taken at locations other than the existing monitoring locations utilized for compliance with R.61-58.13. Monitoring locations must be distributed throughout the distribution system.

(c) If the number of entry points to the distribution system is fewer than the specified number of entry point monitoring locations, excess entry point samples must be replaced equally at high TTHM and HAA5 locations. If there is an odd extra location number, the system must take a sample at a high TTHM location. If the number of entry points to the distribution system is more than the specified number of entry point monitoring locations, the system must take samples at entry points to the distribution system having the highest annual water flows.

(d) Monitoring under this section C may not be reduced.

(3) IDSE Report

The IDSE report must include the elements required in paragraphs (3)(a) through (3)(d) of this section C. The system must submit their IDSE report to the Department according to the schedule in R61-58.14.B(2).

(a) The IDSE report must include all TTHM and HAA5 analytical results from R.61-58.13 compliance monitoring and all standard monitoring conducted during the period of the IDSE as individual analytical results and LRAAs presented in a tabular or spreadsheet format acceptable to the Department. If changed from the standard monitoring plan submitted under paragraph (1) of this section C, the report must also include a schematic of the distribution system, the population served, and system type (subpart H or ground water).

(b) The IDSE report must include an explanation of any deviations from the approved standard monitoring plan.

(c) The IDSE report must recommend and justify compliance monitoring locations for compliance with R.61-58.15 and timing based on the protocol in R.61-58.14.G.

(d) Systems must retain a complete copy of the IDSE report submitted under this section for 10 years after the date that the report is submitted. If the Department modifies the monitoring requirements for compliance with R.51-58.15 that is recommended in the IDSE report or if the Department approves alternative monitoring locations, systems must keep a copy of the Department's notification on file for 10 years after the date of the Department's notification. Systems must make the IDSE report and any Department notification available for review by the Department or the public.

D. System Specific Studies.

(1) System Specific Study Plan. For systems that choose to conduct a system specific study, the system specific study plan must be based on either existing monitoring results as required under paragraph (1)(a) of this section or modeling as required under paragraph (1)(b) of this section. The system specific study plan must be prepared and submitted to the Department according to the schedule in section B of this part.

(a) Existing monitoring results. Systems may comply by submitting monitoring results collected before they are required to begin monitoring under section B of this part. The monitoring results and analysis must meet the criteria in paragraphs (1)(a)(i) and (1)(a)(ii) of this section.

(i) Minimum requirements.

(A) TTHM and HAA5 results must be based on samples collected and analyzed in accordance with 40 CFR 141.131 (1-04-06 edition). 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 (1)(a)(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 R.61-58.13 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 TTHM samples | Number of HAA5 samples |
|---|---|---|---|---|
| Subpart H | Less than 500 | 3 | 3 | 3 |
| Subpart H | 500 – 3,300 | 3 | 9 | 9 |
| Subpart H | 3,301 – 9,999 | 6 | 36 | 36 |
| Subpart H | 10,000 – 49,999 | 12 | 72 | 72 |
| Subpart H | 50,000 – 249,999 | 24 | 144 | 144 |
| Subpart H | 250,000 – 999,999 | 36 | 216 | 216 |
| Subpart H | 1,000,000 – 4,999,999 | 48 | 288 | 288 |
| Subpart H | 5,000,000 or greater | 60 | 360 | 360 |
| Ground Water | Less than 500 | 3 | 3 | 3 |
| Ground Water | 500 – 9,999 | 3 | 9 | 9 |
| Ground Water | 10,000 – 99,999 | 12 | 48 | 48 |
| Ground Water | 100,000 – 499,999 | 18 | 72 | 72 |
| Ground Water | 500,000 or greater | 24 | 96 | 96 |

(ii) Reporting monitoring results. The information in this paragraph (1)(a)(ii) must be reported.

(A) Systems must report previously collected monitoring results and certify that the reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent results of samples taken for compliance with R.61-58.13.

(B) Systems 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) The system specific study monitoring plan must include a schematic of the 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) The system specific study plan must specify the population served and system type (subpart H or ground water).

(E) The system must retain a complete copy of the specific study plan submitted under this paragraph (1)(a), including any EPA or Department modification of the system specific study plan, for as long as they are required to retain the IDSE report under paragraph 2(g) of this section.

(F) If previously collected data that fully meet the number of samples required under paragraph (1)(a)(i)(B) of this section is submitted by the system and the Department rejects some of the data, the system must either conduct additional monitoring to replace rejected data on a schedule the Department approves or conduct standard monitoring under section R.61-58.14.C.

(b) Modeling. Systems 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 (1)(b).

(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 paragraphs (1)(b)(i)(B)(1) through (1)(b)(i)(B)(9) of this section.

(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;

(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. The system specific study plan must include the information in this paragraph (1)(b)(ii).

(A) Tabular or spreadsheet data demonstrating that the model meets requirements in paragraph (1)(b)(i)(B) of this section.

(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 section R.61-58.14.C during the historical month of high TTHM. These samples must be taken at locations other than existing R.61-58.13 compliance monitoring locations.

(E) Description of how all requirements will be completed no later than 12 months after the system submits their system specific study plan.

(F) Schematic of the 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 R.61-58.13 compliance monitoring.

(G) Population served and system type (subpart H or ground water).

(H) Systems must retain a complete copy of their system specific study plan submitted under this paragraph (1)(b), including any EPA or Department modification of their system specific study plan, for as long as they are required to retain their IDSE report under paragraph (2)(g) of this section.

(iii) Systems that submit a model that does not fully meet the requirements under paragraph (1)(b) of this section, must correct the deficiencies and respond to EPA’s or the Department’s inquiries concerning the model. If the system fails to correct deficiencies or respond to inquiries to the Department's satisfaction, the system must conduct standard monitoring under R.61-58.14.C

(2) IDSE report.

The IDSE report must include the elements required in paragraphs (2)(a) through (2)(f) of this section. Systems must submit their IDSE report according to the schedule in R.61-58.14.B(2).

(a) The IDSE report must include all TTHM and HAA5 analytical results from R.61-58.13 compliance monitoring and all system specific study monitoring conducted during the period of the system specific study presented in a tabular or spreadsheet format acceptable to the Department. If changed from the system specific study plan submitted under paragraph (1) of this section, the IDSE report must also include a schematic of the distribution system, the population served, and system type (subpart H or ground water).

(b) If the system used the modeling provision under paragraph (1)(b) of this section, they must include final information for the elements described in paragraph (1)(b)(ii) of this section, and a 24-hour time series graph of residence time for each R.61-58.15 compliance monitoring location selected.

(c) The IDSE report must recommend and justify R.61-58.15 compliance monitoring locations and timing based on the protocol in R.61-58.14.G

(d) The IDSE report must include an explanation of any deviations from the system's approved system specific study plan.

(e) The IDSE report must include the basis (analytical and modeling results) and justification used to select the recommended R.61-58.15 monitoring locations.

(f) Systems may submit their IDSE report in lieu of a system specific study plan on the schedule identified in R.61-58.14.B(2) for submission of the system specific study plan if the system believes that it has the necessary information by the time that the system specific study plan is due. If the system elects this approach, their IDSE report must also include all information required under paragraph (1) of this section.

(g) Systems must retain a complete copy of the IDSE report submitted under this section for 10 years after the date that the IDSE report is submitted. If the Department modifies the monitoring requirements for compliance with R.51-58.15 that are recommended in the IDSE report or if the Department approves alternative monitoring locations, water systems must keep a copy of the Department's notification on file for 10 years after the date of the Department's notification. Systems must make the IDSE report and any Department notification available for review by the Department or the public.

E. 40/30 Certification.

(1) Eligibility

Systems are eligible for 40/30 certification if they had no TTHM or HAA5 monitoring violations under R.61-58.13 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 this paragraph (1).

(a) If 40/30 certification is due October 1, 2006, then eligibility for 40/30 certification is based on eight consecutive calendar quarters of results of monitoring for compliance with R.61-58.13 beginning no earlier than January 2004.

(b) If 40/30 certification is due April 1, 2007, then eligibility for 40/30 certification is

based on eight consecutive calendar quarters of results of monitoring for compliance with R.61-58.13 beginning no earlier than January 2004.

(c) If 40/30 certification is due October 1, 2007, then eligibility for 40/30 certification is based on eight consecutive calendar quarters of results of monitoring for compliance with R.61-58.13 beginning no earlier than January 2005.

(d) If 40/30 certification is due April 1, 2008, then eligibility for 40/30 certification is based on eight consecutive calendar quarters of results of monitoring for compliance with R.61-58.13 beginning no earlier than January 2005.

(e) If a system is on reduced monitoring under R.61-58.13 and was not required to monitor during the specified monitoring period, eligibility is based on compliance samples taken during the 12 months preceding the specified period.

(2) 40/30 Certification

(a) Systems applying for 40/30 certification must certify to the Department that every individual compliance sample taken under R.61-58.13 during the periods specified in paragraph (1) of this section were less than or equal to 0.040 mg/L for TTHM and less than or equal to 0.030 mg/L for HAA5, and that no TTHM or HAA5 monitoring violations were incurred during the period specified in paragraph (1) of this section.

(b) The Department may require that systems applying for 40/30 certification submit compliance monitoring results, distribution system schematics, and/or recommended R.61-58.15 compliance monitoring locations in addition to their certification. If the system fails to submit the requested information, the Department may require standard monitoring under R.61-58.14.C or a system specific study under R.61-58.14.D

(c) The Department may still require standard monitoring under R.61-58.14.C or a system specific study under R.61-58.14.D even if a system meets the criteria in paragraph (1) of this section.

(d) Systems must retain a complete copy of the 40/30 certification submitted under this section for 10 years after the date that the certification is submitted. Systems must make the certification, all data upon which the certification is based, and any Department notification available for review by the Department or the public.

F. Very Small System Waivers.

(1) If a system serves fewer than 500 people and has taken TTHM and HAA5 samples under R.61-58.13, the system is not required to comply with this part R.61-58.14 unless the Department notifies the system that it must conduct standard monitoring under R.61-58.14.C or a system specific study under R.61-58.14.D.

(2) If a system has not taken TTHM and HAA5 samples under R.61-58.13 or if the Department notifies the system that they must comply with the part R.61-58.14, the system must conduct standard monitoring under R.61-58.14.C or a system specific study under R.61-58.14.D.

G. Stage 2 Disinfection Byproducts Rule Compliance Monitoring Location Recommendations.

(1) The IDSE report must include recommendations and justification for where and during what month(s) TTHM and HAA5 monitoring for compliance with requirements of R.61-58.15

should be conducted. Recommendations must be based on the criteria in paragraphs (2) through (5) of this section.

(2) Systems must select the number of monitoring locations specified in the table in this paragraph (2). These recommended locations will be used as R.61-58.15 (Stage 2 Disinfection Byproducts Requirements) routine compliance monitoring locations, unless the Department requires different or additional locations. Monitoring locations should be distributed throughout the distribution system to the extent possible.

| Source Water Type | Population size category | Monitoring frequency | Total monitoring locations per monitoring period | Highest TTHM monitoring locations | Highest HAA5 monitoring locations | Existing R.61-58.13 compliance monitoring locations |
|---|---|---|---|---|---|---|
| Subpart H | Less than 500 | per year | 2 | 1 | 1 | - |
| Subpart H | 500 – 3,300 | per quarter | 2 | 1 | 1 | - |
| Subpart H | 3,301 – 9,999 | per quarter | 2 | 1 | 1 | - |
| Subpart H | 10,000 – 49,999 | per quarter | 4 | 2 | 1 | 1 |
| Subpart H | 50,000 – 249,999 | per quarter | 8 | 3 | 3 | 2 |
| Subpart H | 250,000 – 999,999 | per quarter | 12 | 5 | 4 | 3 |
| Subpart H | 1,000,000 – 4,999,999 | per quarter | 16 | 6 | 6 | 4 |
| Subpart H | 5,000,000 or greater | per quarter | 20 | 8 | 7 | 5 |
| Ground Water | Less than 500 | per year | 2 | 1 | 1 | - |
| Ground Water | 500 – 9,999 | per year | 2 | 1 | 1 | - |
| Ground Water | 10,000 – 99,999 | per quarter | 4 | 2 | 1 | 1 |
| Ground Water | 100,000 – 499,999 | per quarter | 6 | 3 | 2 | 1 |
| Ground Water | 500,000 or greater | per quarter | 8 | 3 | 3 | 2 |

(a) All systems must monitor during the month of highest disinfection byproduct (DBP) concentrations.

(b) Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500- 3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location, and month, if monitored annually.

(3) Systems must recommend R.61-58.15 compliance monitoring locations based on standard

monitoring results, system specific study results, and R.61-58.13 compliance monitoring results. Systems must follow the protocol in paragraphs (3)(a) through (3)(h) of this section. If required to monitor at more than eight locations, a system must repeat the protocol as necessary. If a system does not have existing R.61-58.13 compliance monitoring results or if they do not have enough existing R.61-58.13 compliance monitoring results, they must repeat the protocol, skipping the provisions of paragraphs (3)(c) and (3)(g) of this section as necessary, until the required total number of monitoring locations have been identified.

(a) Location with the highest TTHM LRAA not previously selected as an R.61-58.15 monitoring location.

(b) Location with the highest HAA5 LRAA not previously selected as an R.61-58.15 monitoring location.

(c) Existing R.61-58.13 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 an R.61-58.15 monitoring location.

(d) Location with the highest TTHM LRAA not previously selected as an R.61-58.15 monitoring location.

(e) Location with the highest TTHM LRAA not previously selected as an R.61-58.15 monitoring location.

(f) Location with the highest HAA5 LRAA not previously selected as an R.61-58.15 monitoring location.

(g) Existing R.61-58.13 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 R.61-58.15 monitoring location.

(h) Location with the highest HAA5 LRAA not previously selected as an R.61-58.15 monitoring location.

(4) A system may recommend locations other than those specified in paragraph (3) of this section if they include a rationale for selecting other locations. If the Department approves the alternate locations, the system must monitor at these locations to determine compliance under R.61-58.15.

(5) The recommended schedule must include R.61-58.15 monitoring during the peak historical month for TTHM and HAA5 concentration, unless the Department approves another month. Once the peak historical month has been identified, and if the system is required to conduct routine monitoring at least quarterly, the system must schedule R.61-58.15 compliance monitoring at a regular frequency of every 90 days or fewer.

## R.61-58.15 STAGE 2 DISINFECTION BYPRODUCTS REQUIREMENTS

A. Applicability.

This part R.61-58.15 applies to community water systems an non-transient non-community water systems 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.

B. General Requirements.

(1) The requirements of this part R.61-58.15 constitute national primary drinking water regulations. The regulations in this part 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 levels for chlorine and chloramine for certain consecutive systems.

(2) Schedule – Systems subject to this part R.61-58.15 must comply with the requirements of this part on the following schedule:

(a) Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve 100,000 people or greater must comply with this part R.61-58.15 by April 1, 2012.

(b) Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve between 50,000 and 99,999 people must comply with this part R.61-58.15 by October 1, 2012.

(c) Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve between 10,000 and 49,999 people must comply with this part R.61-58.15 by October 1, 2013.

(d) Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system and serve less than 10,000 must comply with this part R.61-58.15 by October 1, 2013 if no Cryptosporidium monitoring is required under R.61-58.10.K(2)(a)(iv), or by October 1, 2014 if Cryptosporidium monitoring is required under R.61-58.10.K(2)(a)(iv).

(e) Systems that are part of a combined distribution system must comply with this part R.61-58.15 at the same time as the system with the earliest compliance date in the combined distribution system.

(f) The Department may grant systems up to an additional 24 months from the specified date for compliance with MCLs and operational evaluation levels if capital improvements are required to comply with an MCL.

(g) Systems monitoring frequency is specified in R.61-58.15.C(1)(b)

(i) If systems are required to conduct quarterly monitoring, then they must begin monitoring in the first full calendar quarter that includes the compliance date in this paragraph (2).

(ii) If systems are required to conduct monitoring at a frequency that is less

than quarterly, then they must begin monitoring in the calendar month recommended in the IDSE report prepared under R.61-58.14.C or R.61-58.14.D or the calendar month identified in the monitoring plan developed under R.61-58.15.D no later than 12 months after the compliance date in this paragraph (2).

(h) If systems are required to conduct quarterly monitoring, then they must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters). If systems are required to conduct monitoring at a frequency that is less than quarterly, then they must make compliance calculations beginning with the first compliance sample taken after the compliance date.

(i) Reserved.

(j) For the purpose of the schedule in this paragraph (2), the Department may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The Department may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(3) Monitoring and compliance.

(a) In order for systems that are required to monitor quarterly to comply with MCLs in R.61-58.5.P(2)(b), they must calculate LRAAs for TTHM and HAA5 using monitoring results collected under this part R.61-58.15 and determine that each LRAA does not exceed the MCL. If the system fails to complete four consecutive quarters of monitoring, they must calculate compliance with the MCL based on the average of the available data from the most recent four quarters. If the system takes more than one sample per quarter at a monitoring location, they must average all samples taken in the quarter at that location to determine a quarterly average to be used in the LRAA calculation.

(b) In order for systems required to monitor yearly or less frequently to determine compliance with MCLs in R.61-58.5.P(2)(b), they must determine that each sample taken is less than the MCL. If any sample exceeds the MCL, the system must comply with the requirements of section R.61-58.15.G. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.

(4) Systems are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if they fail to monitor.

C. Routine Monitoring.

(1) Monitoring

(a) If a system submitted an IDSE report, they must begin monitoring at the locations and months recommended in the IDSE report submitted under section R.61-58.14.G following the schedule in R.61-58.15.B(2), unless the Department requires other locations or additional locations after its review. If the system submitted a 40/30 certification under

section R.61-58.14.E or they qualified for a very small system waiver under section R.61-58.14.F or they are a non-transient non-community water system serving less than 10,000 people, they must monitor at the location(s) and dates identified in their monitoring plan in R.61-58.13.C(6), updated as required by section R.61-58.15.D.

(b) Systems must monitor at no fewer than the number of locations identified in this paragraph (1)(b).

| Source water type | Population size category | Monitoring frequency | Distribution system monitoring locations per monitoring period |
|---|---|---|---|
| Subpart H | Less than 500 | per year | 2 |
| Subpart H | 500 – 3,300 | per quarter | 2 |
| Subpart H | 3,301 – 9,999 | per quarter | 2 |
| Subpart H | 10,000 – 49,999 | per quarter | 4 |
| Subpart H | 50,000 – 249,999 | per quarter | 8 |
| Subpart H | 250,000 – 999,999 | per quarter | 12 |
| Subpart H | 1,000,000 – 4,999,999 | per quarter | 16 |
| Subpart H | 5,000,000 or greater | per quarter | 20 |
| Ground water | Less than 500 | per year | 2 |
| Ground water | 500 – 9,999 | per year | 2 |
| Ground water | 10,000 – 99,999 | per quarter | 4 |
| Ground water | 100,000 – 499,999 | per quarter | 6 |
| Ground water | 500,000 or greater | per quarter | 8 |

(i) All systems must monitor during month of highest DBP concentrations.

(ii) Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500-3,300. Systems on annual monitoring and subpart H systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. Only one location with a dual sample set per monitoring period is needed if highest TTHM and HAA5 concentrations occur at the same location (and month, if monitored annually).

(c) Undisinfected systems that begin using a disinfectant other than UV light after the dates in R.61-58.14 for complying with the Initial Distribution System Evaluation requirements must consult with the Department to identify compliance monitoring locations for this part R.61-58.15. The systems must then develop a monitoring plan under R.61-58.15.D that includes those monitoring locations.

(2) Analytical Methods – Analyses used to determine compliance with this part R.61-58.15 must by conducted using an approved method listed in 40 CFR 141.131 (1-04-06 edition) for TTHM and HAA5 analyses.

(3) Certified Laboratory - Analyses under this part R.61-58.15 for disinfection byproducts must be conducted by a certified laboratory.

D. Stage 2 DBP Monitoring Plans.

(1) Monitoring Plan Development.

(a) Systems must develop and implement a monitoring plan to be kept on file for Department and public review. The monitoring plan must contain the elements in paragraphs (1)(a)(i) through (1)(a)(iv) of this section and be complete no later than the date the system conducts initial monitoring under this part R.61-58.15.

(i) Monitoring locations;

(ii) Monitoring dates;

(iii) Compliance calculation procedures; and.

(iv) Monitoring plans for any other systems in the combined distribution system if the Department has reduced monitoring requirements under the authority granted in 40 CFR 142.16(m) (1-04-06 edition).

(b) For systems that were not required to submit an IDSE report under either section R.61-58.14.C or section 61-58.14.D, and do not have sufficient R.61-58.13 monitoring locations to identify the required number of R.61-58.15 compliance monitoring locations indicated in R.61-58.14.G(2), they must identify additional locations by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. Systems must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If a system has more R.61-58.13 monitoring locations than required for R.61-58.15 compliance monitoring in R.61-58.14.G(2), they must identify which locations they will use for R.61-58.15 compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of R.61-58.15 compliance monitoring locations have been identified.

(2) Subpart H systems serving > 3,300 people must submit a copy of the monitoring plan required under this section to the Department prior to the date the system begins initial monitoring under this part R.61-58.15, unless the IDSE report submitted under R.61-58.14 contains all the information required by this section.

(3) Systems may revise their monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for Department approved reasons, after consultation with the Department regarding the need for changes and the appropriateness of changes. If a system changes monitoring locations, they must replace existing compliance monitoring locations that have the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The Department may also require modifications in the monitoring plan. Subpart H systems serving > 3,300 people, must submit a copy of their modified monitoring plan to the Department prior to the date they are required to comply with the revised monitoring plan.

E. Reduced Monitoring.

(1) Systems may reduce monitoring to the level specified in this paragraph (1) any time the LRAA is less than or equal to 0.040 mg/L for TTHM and less than or equal to 0.030 mg/L for HAA5 at all monitoring locations. Only data collected under the provisions of R.61-58.15 or R.61-58.13 may be used to qualify for reduced monitoring. In addition, the source water annual average

TOC level, before any treatment, must be less than or equal to 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either R.61-58.13.C(2)(a)(vi) or R.61-58.13.C(4). Systems on reduced monitoring under this section that are required to monitor quarterly must take dual sample sets every 90 days.

(a) Subpart H systems serving less than 500 people may not reduce monitoring.

(b) Subpart H systems serving between 500 and 3,300 people and meeting the criteria in this paragraph (1) may reduce monitoring to one (1) TTHM sample per year taken at the location and during the quarter with the highest TTHM single measurement, and one (1) HAA5 sample per year taken at the location and during the quarter with the highest HAA5 single measurement. One (1) dual sample set per year may be taken if the highest TTHM and HAA5 measurements occurred at the same location during the same quarter.

(c) Subpart H systems serving between 3,301 and 9,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to one (1) dual sample set per year taken at the location and during the quarter with the highest TTHM single measurement, and one (1) dual sample set per year taken at the location and during the quarter with the highest HAA5 single measurement.

(d) Subpart H systems serving between 10,000 and 49,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to two (2) dual sample sets per quarter taken at the locations with the highest TTHM and HAA5 LRAAs.

(e) Subpart H systems serving between 50,000 and 249,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to four (4) dual sample sets per quarter taken at the locations with the two highest TTHM and two highest HAA5 LRAAs.

(f) Subpart H systems serving between 250,000 and 999,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to six (6) dual sample sets per quarter taken at the locations with the three highest TTHM and three highest HAA5 LRAAs.

(g) Subpart H systems serving between 1,000,000 and 4,999,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to eight (8) dual sample sets per quarter taken at the locations with the four highest TTHM and four highest HAA5 LRAAs.

(h) Subpart H systems serving 5,000,000 or more people and meeting the criteria in this paragraph (1) may reduce monitoring to ten (10) dual sample sets per quarter taken at the locations with the five highest TTHM and five highest HAA5 LRAAs.

(i) Ground water systems serving less than 500 people and meeting the criteria in this paragraph (1) may reduce monitoring to one (1) TTHM sample every third year taken at the location and during the quarter with the highest TTHM single measurement, and one (1) HAA5 sample every third year taken at the location and during the quarter with the highest HAA5 single measurement. One (1) dual sample set every third year may be taken if the highest TTHM and HAA5 measurements occurred at the same location during the same quarter.

(j) Ground water systems serving between 500 and 9,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to one (1) TTHM sample per year taken at the location and during the quarter with the highest TTHM single measurement,

and one (1) HAA5 sample per year taken at the location and during the quarter with the highest HAA5 single measurement. One (1) dual sample set per year may be taken if the highest TTHM and HAA5 measurements occurred at the same location during the same quarter.

(k) Ground water systems serving between 10,000 and 99,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to one (1) dual sample set per year taken at the location and during the quarter with the highest TTHM single measurement and one (1) dual sample set per year taken at the location and during the quarter with the highest HAA5 single measurement.

(l) Ground water systems serving between 100,000 and 499,999 people and meeting the criteria in this paragraph (1) may reduce monitoring to two (2) dual sample sets per quarter taken at the locations with the highest TTHM and HAA5 LRAAs.

(m) Ground water systems serving 500,000 or more people and meeting the criteria in this paragraph (1) may reduce monitoring to four (4) dual sample sets per quarter taken at the locations with the two highest TTHM and two highest HAA5 LRAAs.

(2) Systems on reduced monitoring may remain on reduced monitoring as long as the TTHM LRAA is less than or equal to 0.040 mg/L and the HAA5 LRAA is less than or equal to 0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample is less than or equal to 0.060 mg/L and each HAA5 sample is less than or equal to 0.045 mg/L (for systems with annual or less frequent monitoring). In addition, the source water annual average TOC level, before any treatment, must be less than or equal to 4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either R.61-58.13.C(2)(a)(vi) or R.61-58.13.C(4).

(3) If the LRAA based on quarterly monitoring at any monitoring location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 or if the annual (or less frequent) sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5, or if the source water annual average TOC level, before any treatment, is greater than 4.0 mg/L at any treatment plant treating surface water or ground water under the direct influence of surface water, the system must resume routine monitoring under R.61-58.15.C or begin increased monitoring if R.61-58.15.G applies.

(4) Systems may be returned to routine monitoring at the Department's discretion.

F. Additional Requirements for Consecutive Systems.

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, must comply with analytical and monitoring requirements for chlorine and chloramines in R.61-58.13.B and R.61-58.13.C(3)(a) and the compliance requirements in R.61-58.13.D(3)(a) beginning April 1, 2009, unless required earlier by the Department, and report monitoring results under R.61-58.13.E(3).

G. Conditions Requiring Increased Monitoring.

(1) If a system is required to monitor at a particular location annually or less frequently than annually under R.61-58.15.C or R.61-58.15.E, they must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations if a TTHM sample is greater than 0.080 mg/L or a HAA5 sample is greater than 0.060 mg/L at any location.

(2) A system is in violation of the MCL when the LRAA exceeds the R.61-58.15 MCLs in R.61-58.5.P, 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). A system is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if they fail to monitor.

(3) A system may return to routine monitoring once they have conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is less than or equal to 0.060 mg/L for TTHM and less than or equal to 0.045 mg/L for HAA5.

H. Operational Evaluation Levels.

(1) A system has exceeded the operational evaluation level at any monitoring location where the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by 4 to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average, exceeds 0.060 mg/L.

(2) Operational Evaluations

(a) If a system exceeds the operational evaluation level, they must conduct an operational evaluation and submit a written report of the evaluation to the Department no later than 90 days after being notified of the analytical result that causes them to exceed the operational evaluation level. The written report must be made available to the public upon request.

(b) The 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) A system may request and the Department may allow them to limit the scope of their evaluation if they are able to identify the cause of the operational evaluation level exceedance.

(ii) A request to limit the scope of the evaluation does not extend the schedule in paragraph (2)(a) of this section for submitting the written report. The Department must approve this limited scope of evaluation in writing and the system must keep that approval with the completed report.

I. Requirements for Remaining on Reduced TTHM and HAA5 Monitoring Based on R.61-58.13 Results.

A system on reduced monitoring under R.61-58.13 may remain on reduced monitoring after the dates identified in R.61-58.15.B for compliance with this subpart only if they qualify for a 40/30 certification under R.61-58.14.E or have received a very small system waiver under R.61-58.14.F, plus they meet the reduced monitoring criteria in R.61-58.15.E(1), and they do not change or add monitoring locations from those used for compliance monitoring under R.61-58.13. If the system's monitoring locations under this part R.61-58.15 differ from the monitoring locations under R.61-58.13, the system may not remain on reduced monitoring after the dates identified R.61-58.15.B for compliance with this part R.61-58.15.

J. Requirements for Remaining on Increased TTHM and HAA5 Monitoring Based on R.61-58.13 Results.

If a system was on increased monitoring under R.61-58.13.C(2)(a), they must remain on increased monitoring until they qualify for a return to routine monitoring under R.61-58.15.G(3). The system must conduct increased monitoring under R.61-58.15.G at the monitoring locations in the monitoring plan developed under R.61-58.15.D beginning at the date identified in R.61-58.15.B for compliance with this part and remain on increased monitoring until they qualify for a return to routine monitoring under R.61-58.15.G(3).

K. Reporting and Recordkeeping Requirements.

(1) Reporting

(a) Systems must report the following information for each monitoring location to the Department within 10 days of the end of any quarter in which monitoring is required:

(i) Number of samples taken during the last quarter.

(ii) Date and results of each sample taken during the last quarter.

(iii) Arithmetic average of quarterly results for the last four quarters for each monitoring location (LRAA), beginning at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter. If the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, the system must report this information to the Department as part of the first report due following the compliance date or anytime thereafter that this determination is made. If a system is required to conduct monitoring at a frequency that is less than quarterly, they must make compliance calculations beginning with the first compliance sample taken after the compliance date, unless they are required to conduct increased monitoring under R.61-58.15.G.

(iv) Whether, based on R.61-58.5.P(2)(b) and this part R.61-58.15, 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.

(b) Subpart H systems seeking to qualify for or remain on reduced TTHM/HAA5 monitoring, must report the following source water TOC information for each treatment

plant that treats surface water or ground water under the direct influence of surface water to the Department within 10 days of the end of any quarter in which monitoring is required:

(i) The number of source water TOC samples taken each month during last quarter.

(ii) The date and result of each sample taken during last quarter.

(iii) The quarterly average of monthly samples taken during last quarter or the result of the quarterly sample.

(iv) The running annual average (RAA) of quarterly averages from the past four quarters.

(v) Whether the RAA exceeded 4.0 mg/L.

(c) The Department may choose to perform calculations and determine whether the MCL was exceeded or the system is eligible for reduced monitoring in lieu of having the system report that information.

(2) Recordkeeping.

Systems must retain any R.61-58.15 monitoring plans and monitoring results as required by R.61-58.6.D.

**R.61-58.16 GROUND WATER RULE**

A. Applicability.

This part R.61-58.16 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 40 CFR 141, Subpart H. For the purposes of this part, "ground water system" is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.

B. General Requirements.

The requirements of R.61-58.16 constitute national primary drinking water regulations. Systems subject to this part must comply with the following requirements:

(1) Sanitary survey information requirements for all ground water systems as described in R.61-58.16.D.

(2) Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 percent (4-log) treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in R.61-58.16.E

(3) Treatment technique requirements, described in R.61-58.16.F, that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under R.61-58.16.E, or that have significant deficiencies that are identified by the Department or that are identified by EPA under the Safe Drinking Water Act section 1445. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of R.61-58.16.F 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 Department-approved combination of 4-log virus inactivation and removal) before or at the first customer.

(4) Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in R.61-58.16.F(2).

(5) If requested by the Department, ground water systems must provide the Department with any existing information that will enable the Department to perform a hydrogeologic sensitivity assessment. For the purposes of this part R.61-58.16, "hydrogeologic sensitivity assessment" is a determination of whether ground water systems obtain water from hydrogeologically sensitive settings.

C. Compliance Date.

Ground water systems must comply, unless otherwise noted, with the requirements of R.61-58.16 beginning December 1, 2009.

D. Sanitary Surveys For Ground Water Systems.

(1) Ground water systems must provide the Department, at the Department's request, any existing information that will enable the Department to conduct a sanitary survey.

(2) For the purposes of R.61-58.16, a "sanitary survey," as conducted by the Department, includes by 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.

(3) The sanitary survey must include an evaluation of the applicable components listed in paragraphs R.61-58.16.D(3)(a) through (h).

(a) Source,

(b) Treatment,

(c) Distribution system

(d) Finished water storage

(e) Pumps, pump facilities, and controls,

(f) Monitoring, reporting, and data verification,

(g) System management and operation, and

(h) Operator compliance with Department requirements.

E. Ground Water Source Microbial Monitoring and Analytical Methods.

(1) Triggered source water monitoring

(a) A ground water system must conduct triggered source water monitoring if the conditions identified in paragraphs (1)(a)(i) and (1)(a)(ii) of this section apply.

(i) the system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and

(ii) The system is notified that a sample collected under R.61-58.5.G(1) is total coliform positive and the sample is not invalidated under R.61-58.5.G(3).

(b) 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 R.61-58.5.G(1) except as provided in R.61-58.16.E(1)(b)(ii).

(i) The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the sample.

(ii) If approved by the Department, systems with more than one ground water source may meet the requirements of R.61-58.16.E(1)(b) by sampling a representative ground water source or sources. If directed by the Department, systems must submit a triggered source water monitoring plan for Department approval that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under R.61-58.5.G(1) 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 R.61-58.5.G(2) and to satisfy the monitoring requirements of R.61-58.16.E(1)(b) for that ground water source only if the Department approves the use of E.coli as a fecal indicator for source water monitoring. If the repeat sample collected from the ground water source is E.coli positive, the system must comply with R.61-58.16.E(1)(c).

(c) Additional Requirements. If the Department does not require corrective action under R.61-58.16.F(1)(b) for a fecal indicator positive source water sample collected under R.61-58.16.E(1)(b) that is not invalidated under R.61-58.16.E(4), the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator positive sample.

(d) Consecutive and wholesale systems

(i) In addition to the other requirements of R.61-58.16.E(1), a consecutive ground water system that has a total coliform positive sample collected under R.61-58.5.G(1) 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 R.61-58.16.E(1), a wholesale ground water system must comply with R.61-58.16.E(1)(d)(ii)(A) and R.61-58.16.E(1)(d)(ii)(B).

(A) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under R.61-58.5.G(1) is total coliform positive must, within 24 hours of being notified, collect a sample from its ground water source(s) under R.61-58.16.E(1)(b) and analyze it for a fecal indicator under R.61-58.16.E(3).

(B) If the sample collected under R.61-58.16.E(1)(d)(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 positive sample within 24 hours of being notified of the monitoring result and must meet the requirements of R.61-58.16.E(1)(c).

(e) Exceptions to the triggered source water monitoring requirements. A ground water system is not required to comply with the source water monitoring requirements of R.61-58.16.E(1) if either one of the following conditions exists:

(i) The Department determines, and documents in writing, that the total coliform positive sample collected under R.61-58.5(G)(1) is caused by a distribution system deficiency; or

(ii) The total coliform positive sample collected under R.61-58.5(G)(1) is collected at a location that meets Department criteria for distribution system conditions that will cause total coliform positive samples.

(2) Assessment source water monitoring. If directed by the Department, ground water systems must conduct assessment source water monitoring that meets Department-determined requirements

for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under R.61-58.16.E(1)(b) to meet the requirements of R.61-58.16.E(2). Department-determined assessment source water monitoring may include, but not be limited to the following:

(a) Collection of a total of 12 ground water source samples that represent each month the system provides ground water to the public.

(b) Collection of samples from each well unless the system obtains written Department approval to conduct monitoring at one or more wells within the ground water system that are representative of multiple wells used by that system and that draw water from the same hydrogeologic setting.

(c) Collection of a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used.

(d) Analysis of all ground water source samples using one of the analytical methods listed in R.61-58.16.E(3) for the presence of E. coli, enterococci, or coliphage.

(e) Collection of ground water source samples at a location prior to any treatment of the ground water source unless the Department approves a sampling location after treatment.

(f) Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the Department approves an alternate sampling location that is representative of the water quality of that well.

(3) Analytical methods.

(a) A ground water system subject to the source water monitoring requirements of R.61-58.16.E(1) must collect a standard sample volume of at least 100 ml for fecal indicator analysis regardless of the fecal indicator or analytical method used.

(b) A ground water system must analyze all ground water source samples collected under R.61-58.16.E(1) for E.coli, enterococci, or coliphage using EPA-approved methods listed in 40 CFR 141.402(c)(2) (Federal Register 11-8-2006 edition).

(4) Invalidation of a fecal indicator positive ground water source sample.

(a) A ground water system may obtain Department invalidation of a fecal indicator positive ground water source sample collected under R.61-58.16.E(1) only under the conditions specified as follows:

(i) The system provides the Department with written notice from the laboratory that improper sample analysis occurred.

(ii) The Department determines and documents in writing that there is substantial evidence that a fecal indicator positive ground water source sample is not related to source water quality.

(b) If the Department invalidates a fecal indicator positive ground water source sample, the ground water system must collect another source water sample under R.61-58.16.E(1) within 24 hours of being notified by the Department of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods listed in 40 CFR 141.402(c)(2) (Federal Register 11-8-2006

edition). The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Department will specify how much time the system has to collect the sample.

(5) Sampling location.

(a) Any ground water source sample required under R.61-58.16.E(1) must be collected at a location prior to any treatment of the groundwater source unless the Department approves a sampling location after treatment.

(b) If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a Department-approved location to meet the requirements under R.61-58.16.E(1) if the sample is representative of the water quality of that well.

(6) New sources. If directed by the Department, a ground water system that places a new ground water source into service after November 30, 2009, must conduct assessment source water monitoring under R.61-58.16.E(2). If directed by the Department, the system must begin monitoring before the ground water source is used to provide water to the public.

(7) Public notification. A ground water system with a ground water source sample collected under R.61-58.16.E(1) or (2) that is fecal indicator positive and that is not invalidated under R.61-58.16.E(4), including consecutive systems served by the ground water source, must conduct public notification under R.61-58.6.E(2).

(8) Monitoring violations. Failure to meet the requirements of R.61-58.16.E(1) through (6) is a monitoring violation and requires the ground water system to provide public notification under R.61-58.6.E(4).

F. Treatment technique requirements for ground water systems.

(1) Ground water systems with significant deficiencies or source water fecal contamination.

(a) The treatment technique requirements of R.61-58.16.F must be met by ground water systems when a significant deficiency is identified or when a ground water source sample collected under R.61-58.16.E(1)(c) is fecal indicator positive.

(b) If directed by the Department, a ground water system with a ground water source sample collected under R.61-58.16.E(1)(b), R.61-58.16.E(1)(d), or R.61-58.16.E(2) that is fecal indicator positive must comply with the treatment technique requirements of R.61-58.16.F.

(c) When a significant deficiency is identified at a Subpart H public water system that uses both ground water and surface water or GWUDI, the system must comply with R.61-58.16.F except in cases where the Department determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or GWUDI.

(d) Unless the Department directs the ground water system to implement a specific corrective action, the ground water system must consult with the Department regarding the appropriate corrective action within 30 days of receiving written notice from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under R.61-58.16.E(1)(c) was found to be fecal indicator positive, or direction from the Department that a fecal indicator positive sample collected under R.61-58.16.E(1)(b), R.61-58.16.E(1)(d), or R.61-58.16.E(2) requires corrective action. For the purposes of R.61-58.16, significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources,

treatment, storage, or distribution system that the Department determines to be causing, or have the potential for causing, the introduction of contamination into the water delivered to consumers.

(e) Within 120 days, or earlier if directed by the Department, of receiving written notification from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under R.61-58.16.E.(1)(c) was found to be fecal indicator positive, or direction from the Department that a fecal indicator positive sample collected under R.61-58.16.E(1)(b), R.61-58.16.E(1)(d), or R.61-58.16.E(2) requires corrective action, the ground water system must either:

(i) Have completed corrective action in accordance with applicable Department plan review processes or other Department guidance or direction, if any, including Department-specified interim measures; or

(ii) Be in compliance with a Department-approved corrective action plan and schedule subject to the following conditions:

(A) Any subsequent modifications to a Department-approved corrective action plan and schedule must also be approved by the Department.

(B) If the Department specifies interim measures for the protection of public health pending Department approval of the corrective action plan and schedule or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the Department.

(f) Corrective action alternatives. Ground water systems that meet the conditions of R.61-58.16.F(1)(a) or (b) 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.

(iv) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(g) Special notice to the public of significant deficiencies or source water fecal contamination.

(i) In addition to the applicable public notification requirements of R.61-58.6.E(2), a community ground water system that receives notice from the Department of a significant deficiency or notification of a fecal indicator positive ground water source sample that is not invalidated by the Department must inform the public served by the water system under R.61-58.12.C(11)(f) 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 Department to be corrected under R.61-58.16.F(1)(e).

(ii) In addition to the applicable public notification requirements of R.61-58.6.E(2), a non-community ground water system that receives notice from the Department of a significant deficiency must inform the public served by the water system in a manner approved by the Department of any significant deficiency that has not been corrected within 12 months of being notified by the

Department, or earlier if directed by the Department. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:

(A) The nature of the significant deficiency and the date the significant deficiency was identified by the Department.

(B) The Department-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed.

(C) For systems with a large proportion of non-English speaking consumers, as determined by the Department, information in the appropriate language(s) regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.

(iii) If directed by the Department, a non-community water system with significant deficiencies that have been corrected must inform its customers of the significant deficiencies, how the deficiencies were corrected, and the dates of correction under R.61-58.16.F(1)(g)(ii).

(2) Compliance monitoring

(a) Existing ground water sources. A ground water system that is not required to meet the source water monitoring requirements of R.61-58.16 because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for any ground water source before December 1, 2009, must notify the Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the specified ground water source and begin compliance monitoring in accordance with R.61-58.16.F(2)(c) by December 1, 2009. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission. If the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source, the system must conduct ground water source monitoring as required under R.61-58.16.E.

(b) 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 R.61-58.16 because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source must comply with all of the requirements of R.61-58.16.F(2)(b)(i) to (iii).

(i) The system must notify the Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission.

(ii) The system must conduct compliance monitoring under R.61-58.16.F(2)(c) within 30 days of placing the source in service.

(iii) The system must conduct ground water source monitoring under R.61-58.16.E if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(c) Monitoring requirements. A ground water system subject to the requirements of R.61-58.16.F(1), R.61-58.16.F(2)(a), or R.61-58.16.F(2)(b) 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) A ground water systems that serves greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods specified in 40 CFR 141.74(a)(2) at a location approved by the Department and must record the lowest residual disinfectant concentration each day that the water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water system serves the 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) A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods specified in 40 CFR 141.74(a)(2) at a location approved by the Department and record the residual disinfection concentration each day that the water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. The ground water system must take a daily grab sample during the hour of peak flow or at another time specified by the Department. If any daily grab sample measurement falls below the Department-determined residual disinfectant concentration, the ground water system must take follow up samples every four hours until the residual disinfectant concentration is restored to the Department-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of R.61-58.16.F.(2)(c)(i)(A).

(ii) Membrane filtration. A ground water system that uses membrane filtration to meet the requirements of R.61-58.16 must monitor the membrane filtration process in accordance with all Department-specified monitoring requirements and must operate the membrane filtration in accordance with all Department-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when the following conditions are met:

(A) The membrane has an absolute molecular weight cut-off 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 Department-specified compliance requirements.

(C) The integrity of the membrane is intact.

(iii) Alternative treatment. A ground water system that uses a Department-approved alternative treatment to meet the requirements of R.61-58.16 by providing at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer must:

(A) Monitor the alternative treatment in accordance with all Department-specified monitoring requirements.

(B) Operate the alternative treatment in accordance with all compliance requirements that the Department determines to be necessary to achieve at least 4-log treatment of viruses.

(3) A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the Department 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 R.61-58.16.E.

(4) Failure to meet the monitoring requirements of R.61-58.16.F(2) is a monitoring violation and requires the ground water system to provide public notification under R.61-58.6.E(4).

G. Treatment technique violations for ground water systems.

(1) A ground water system with a significant deficiency is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of receiving written notice from the Department of the significant deficiency, the system:

(a) Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department specified interim actions and measures, or

(b) Is not in compliance with a Department-approved corrective action plan and schedule.

(2) Unless the Department invalidates a fecal indicator positive ground water source sample under R.61-58.16.E(4), a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of meeting the conditions of R.61-58.16.F(1)(a) or R.61-58.16.F(1)(b), the system:

(a) Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department-specified interim measures, or

(b) Is not in compliance with a Department-approved corrective action plan and schedule.

(3) A ground water system subject to the requirements of R.61-58.16.F(2)(c) that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique 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.

(4) Ground water systems must give public notification under R.61-58.6.E(3) for the treatment technique violations specified in R.61-58.16.G(1), G(2), and G(3).

H. Reporting and recordkeeping for ground water systems.

(1) Reporting. In addition to the requirements of R.61-58.6.B, a ground water system regulated under R.61-58.16 must provide the following information to the Department:

(a) A ground water system conducting compliance monitoring under R.61-58.16.F(2) must notify the Department any time the system fails to meet any Department-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system must notify the Department as soon as possible, but in no case later than the end of the next business day.

(b) After completing any corrective action under R.61-58.16.F(1), a ground water system must notify the Department within 30 days of completion of the corrective action.

(c) If a ground water system subject to the requirements of R.61-58.16.E(1) does not conduct source water monitoring under R.61-58.16.E(1)(e)(ii), the system must provide documentation to the Department within 30 days of the total coliform positive sample that it met the Department criteria.

(2) Recordkeeping. In addition to the requirements of R.61-58.6.D, a ground water system regulated under R.61-58.16 must maintain the following information in its records:

(a) Documentation of corrective actions shall be kept for a period of not less than ten years.

(b) Documentation of notice to the public as required under R.61-58.16.F(1)(g) shall be kept for a period of not less than three years.

(c) Records of decisions under R.61-58.16.E(1)(e)(ii) and records of invalidation of fecal indicator positive ground water source samples under R.61-58.16.E(4) shall be kept for a period of not less than five years.

(d) For consecutive systems, documentation of notification to the wholesale system(s) of total coliform positive samples that are not invalidated under R.61-58.5.G(3) shall be kept for a period of not less than five years.

(e) For systems, including wholesale systems, that are required to perform compliance monitoring under R.61-58.16.F(2):

(i) Records of the Department-specified minimum disinfectant residual shall be kept for a period of not less than ten years.

(ii) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the Department-specified minimum residual disinfectant concentration for a period of more than four hours shall be kept for a period of not less than five years.

(iii) Records of Department-specified compliance requirements for membrane filtration and of parameters specified by the Department for Department-approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours shall be kept for a period of not less than five years.

## APPENDIX A TO 61-58.6: VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE[1]

| CONTAMINANT | MCL/MRDL/TT/VIOLATIONS[2] | | MONITORING & TESTING PROCEDURE VIOLATIONS | |
|---|---|---|---|---|
| | TIER OF PUBLIC NOTICE REQUIRED | CITATION | TIER OF PUBLIC NOTICE REQUIRED | CITATION |
| **I. Violations of the State Primary Drinking Water Regulations (SPDWR):[3]** | | | | |
| **A. Microbiological Contaminants** | | | | |
| 1. Total coliform | 2 | 61-58.5.F(1) | 3 | 61-58.5.G(1) - (5) |
| 2. Fecal coliform/E. coli | 1 | 61-58.5.F(2) | [4]1, 3 | 61-58.5.G(5) |
| 3. Turbidity MCL | 2 | 61-58.10.E, H, & I | 3 | 61-58.10.F |
| 4. Turbidity MCL (average of 2 days samples greater than 5 NTU) | [5] 2, 1 | 61-58.10.C, E, H & I | 3 | 61-58.10.F |
| 5. Turbidity (for TT violations resulting from a single exceedance of maximum allowable turbidity level) | [6] 2, 1 | 61-58.10.C(i)(b)<br>61-58.10.C(3)(b)<br>61-58.10.F(2)(b),<br>61-58.10.E(1)(b),<br>61-58.10.E(2)(b),<br>61-58.10.E(3)(b),<br>61-58.10.E(4),<br>61-58.10.H(4)(a)(ii),<br>61-58.10.H(4)(b),<br>61-58.10.I(6)(b) | 3 | 61-58.10.F<br><br><br><br>61-58.10.F(3)<br>61-58.10.H<br><br><br><br><br>61-58.10(I)(7)(a) (i)-(iii) & (b) |
| 6. Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. allowable turbidity level (TT). | 2 | 61-58.10.B - E | | 61-58.10 |
| 7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. turbidity level (TT) | [7] 2 | 61-58.10.B - E<br>61-58.10.I(1)-(7) | 3 | 61-58.10.H(3), (5)<br>61-58.10.I(4) & (5)<br>61-58.10.I(7) |
| 8. Filter Backwash Recycling Rule violations | 2 | 61-58.10.J(3) | 3 | 61-58.10.J(2) & (4) |
| 9. Long Term 1 Enhanced Surface Water | 2 | 61-58.10.I(1)-(7) | 3 | 61-58.10.I.(4) & (5) |

| | | | | |
|---|---|---|---|---|
| Treatment Rule Violations. | | | | 61-58.10.I(7) |
| 10. LT2ESWTR Violations | 2 | 61-58.10.K(11) - (21) | [22]2,3 | 61-58.10.K(2) - (6) & 61-58.10.K(9) - (10) |
| 11. Ground Water Rule Violations | 2 | 61-58.16.G | 3 | 61-58.16.E(8) 61-58.16.F(4) |

**B. Inorganic Chemicals (IOCs)**

| | | | | |
|---|---|---|---|---|
| 1. Antimony | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 2. Arsenic | 2 | [8]61-58.5.B(2) | 3 | [9]61-58.5.C(7) |
| 3. Asbestos (fibers >10μm) | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (8) |
| 4. Barium | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 5. Beryllium | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 6. Cadmium | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 7. Chromium (total) | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 8. Cyanide | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 9. Fluoride | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 10. Mercury (inorganic) | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 11. Nitrate | 1 | 61-58.5.B(2) | [10] 1, 3 | 61-58.5.C(7), (10) 61-58.5.C(12) |
| 12. Nitrite | 1 | 61-58.5.B(2) | [10] 1, 3 | 61-58.5.C (7,) (10), 61-58.5.C(12) |
| 13. Total Nitrate and Nitrite | 1 | 61-58.5.B(2) | 3 | 61-58.5.C(7) |
| 14. Selenium | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |
| 15. Thallium | 2 | 61-58.5.B(2) | 3 | 61-58.5.C(7), (9) |

**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 | 61-58.11.B - G | 3 | 61-58.11.H - K |

**D. Synthetic Organic Chemicals (SOCs)**

| | | | | |
|---|---|---|---|---|
| 1. 2,4-D | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 2. 2,4,5-TP (Silvex) | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 3. Alachlor | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 4. Atrazine | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 5. Benzo(a)pyrene (PAHs) | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 6. Carbofuran | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 7. Chlordane | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 8. Dalapon | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 9. Di (2-ethylhexyl) adipate | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |

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|---|---|---|---|---|
| 10. Di (2-ethylhexyl) phthalate | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 11. Dibromochloropropane | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 12. Dinoseb | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 13. Dioxin (2,3,7,8-TCDD) | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 14. Diquat | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 15. Endothall | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 16. Endrin | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 17. Ethylene dibromide | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 18. Glyphosate | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 19. Heptachlor | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 20. Heptachlor epoxide | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 21. Hexachlorobenzene | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 22. Hexachlorocyclo-pentadiene | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 23. Lindane | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 24. Methoxychlor | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 25. Oxamyl (Vydate) | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 26. Pentachlorophenol | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 27. Picloram | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 28. Polychlorinated biphenyls (PCBs) | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 29. Simazine | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| 30. Toxaphene | 2 | 61-58.5.D | 3 | 61-58.5.E(7) |
| **E. Volatile Organic Chemicals (VOCs)** | | | | |
| 1. Benzene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 2. Carbon tetrachloride | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 3. Chlorobenzene (monochlorobenzene) | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 4. o-Dichlorobenzene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 5. p-Dichlorobenzene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 6. 1,2-Dichloroethane | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 7. 1,1-Dichloroethylene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 8. cis-1,2-Dichloroethylene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 9. trans-1,2-Dichloroethylene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 10. Dichloromethane | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 11. 1,2-Dichloropropane | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 12. Ethylbenzene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 13. Styrene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 14. Tetrachloroethylene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 15. Toluene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 16. 1,2,4-Trichlorobenzene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 17. 1,1,1-Trichloroethane | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 18. 1,1,2-Trichloroethane | 2 | 61-58.5.N | 3 | 61-58.5.O |

| | | | | |
|---|---|---|---|---|
| 19. Trichloroethylene | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 20. Vinyl chloride | 2 | 61-58.5.N | 3 | 61-58.5.O |
| 21. Xylenes (total) | 2 | 61-58.5.N | 3 | 61-58.5.O |

**F. Radioactive Contaminants**

| | | | | |
|---|---|---|---|---|
| 1. Beta/photon emitters | 2 | 61-58.5.H(4) | 3 | 61-58.5.K(1), 61-58.5.I.(3) |
| 2. Alpha emitters | 2 | 61-58.5.H(3) | 3 | 61-58.5.K(1), 61-58.5.I(2) |
| 3. Combined radium (226 & 228) | 2 | 61-58.5.H(2) | 3 | 61-58.5.K(1), 61-58.5.I2) |
| 4. Uranium | [11]2 | 61-58.5.H(5) | [12] 3 | 61-58.5.K(1), 61-58.5.I(2) |

**G. Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs).[13]**

| | | | | |
|---|---|---|---|---|
| 1. Total trihalomethanes (TTHMs) | 2 | [14] 61-58.5.L, 61-58.5.P | 3 | [14] 61-58.5.M 61-58.13.C(1), (2) 61-58.14, 61-58.15 |
| 2. Haloacetic Acids (HAA5) | 2 | 61-58.5.P | 3 | 61-58.13.C(1), (2) 61-58.14, 61-58.15 |
| 3. Bromate | 2 | 61-58.5.P | 3 | 61-58.13.C(1), (2) |
| 4. Chlorite | 2 | 61-58.5.P | 3 | 61-58.13.C(1), (2) |
| 5. Chlorine (MRDL) | 2 | 61-58.5.Q | 3 | 61-58.13.C(1), (3) |
| 6. Chloramine (MRDL) | 2 | 61-58.5.Q | 3 | 61-58.13.C(1), (3) |
| 7. Chlorine dioxide (MRDL) where any 2 consecutive daily samples at entrance to distribution system only are above MRDL | 2 | 61-58.5.Q, 61-58.13.D | 2 [15], 3 | 61-58.13.C(1), (3), 61-58.13.C(3)(b) |
| 8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL | [16] 1 | 61-58.5.Q, 61-58.13.D(3) | 1 | 61-58.13.C(1), (3), 61-58.13.D(3)(b) |
| 9. Control of DBP precursors--TOC (TT) | 2 | 61-58.13.F(1), (2) | 3 | 61-58.13.C(1), (4) |
| 10. Bench marking and disinfection profiling. | N/A | N/A | 3 | 61-58.10.G(3) 61-58.10.H(3) 61-58.10.I(4) & (5) |
| 11. Development of monitoring plan | N/A | N/A | 3 | 61-58.13.C(6) |

**H. Other Treatment Techniques**

| | | | | |
|---|---|---|---|---|
| 1. Acrylamide (TT) | 2 | 61-58.5.AA | N/A | N/A |
| 2. Epichlorohydrin (TT) | 2 | 61-58.5.AA | N/A | N/A |

**II. Unregulated Contaminant Monitoring:** [17]

| | | | | |
|---|---|---|---|---|
| A. Unregulated contaminants | N/A | N/A | 3 | 61-58.5.T |
| B. Nickel | N/A | N/A | 3 | 61-58.5.C(9), (17) |

**III. Public Notification for Variances and Exemptions:**

| | | | | |
|---|---|---|---|---|
| A. Operation under a variance or exemption | 3 | [18]61-58.9 | N/A | N/A |
| B. Violation of conditions of a variance or exemption | 2 | [19]61-58.9 | N/A | N/A |

**IV. Other Situations Requiring Public Notification:**

| | | | | |
|---|---|---|---|---|
| A. Fluoride secondary maximum contaminant level (SMCL) exceedance | 3 | 61-58.5.R | N/A | N/A |
| B. Exceedance of nitrate MCL for non-community systems, as allowed by Department | 1 | 61-58.5.B(3) | N/A | N/A |
| C. Availability of unregulated contaminant monitoring data | 3 | 61-58.5.T | N/A | N/A |
| D. Waterborne disease outbreak | 1 | 61-58.B(156)<br>61-58.10.C(3)(b)(ii) | N/A | N/A |
| E. Other waterborne emergency[20] | 1 | N/A | N/A | N/A |
| F. Source Water Sample Positive for Ground Water Rule Fecal indicators: E. coli, enterococci, or coliphage | 1 | 61-58.16.E(7) | N/A | N/A |
| G. Other situations as determined by the Department | [21]1, 2, 3 | N/A | N/A | N/A |

Appendix A to R.61-58.6 - Endnotes

[1.] Violations and other situations not listed in this table (e.g., failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the Department. The Department may, at its option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under R.61-58.6.E(2)(a) and (3)(a).

[2.] MCL--Maximum contaminant level, MRDL--Maximum residual disinfectant level, TT--Treatment technique
[3.] The term Violations of State Primary Drinking Water Regulations (SPDWR) 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 consecutive days must consult with the Department within 24 hours after learning of the violation. Based on this consultation, the Department may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the Department in the 24-hour period, the violation is automatically elevated to Tier 1.
[6.] Systems with treatment technique violations involving a single exceedance of a maximum turbidity limit under the Surface Water Treatment Rule (SWTR) Interim Enhanced Surface Water Treatment Rule (IESWTR), or the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) are required to consult with the Department within 24 hours after learning of the violation. Based on this consultation, the Department may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the Department in the 24-hour period, the violation is automatically elevated to Tier 1.
[7.] Most of the requirements of the Interim Enhanced Surface Water Treatment Rule, R.61-58.10.B - C become effective January 1, 2002 for surface water systems and ground water systems under the direct influence of surface water serving at least 10,000 persons. However, R.61-58.10.H(3) 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 the citations are R.61-58.5(B)(2).
[9.] The arsenic Tier 3 violations MCL citations are effective January 23, 2006. Until then, the citations are R.61-58.C(7).
[10.] 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.
[11.] The uranium MCL, Tier 2 violation citations are effective December 8, 2003 for all community water systems.
[12.] The uranium Tier 3 violation citations are effective December 8, 2000 for all community water systems.
[13.] Community and non-transient non-community surface water systems and ground water systems under the direct influence of surface water 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. Transient non-community surface water systems and ground water systems under the direct influence of surface water 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. Transient non-community surface water systems and ground water systems under the direct influence of surface water 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.] R.61-58.5.L, and R.61-58.13.C(1) - (2) apply until R.61-58.14 and R.61-58.15 take effect under the schedule in R.61-58.14.
[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 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 R.61-58.5.T

[18.] This citation refers to the requirements in R.61-58.9 that ``a schedule prescribed ….for a public water system granted a variance [or exemption] shall require compliance by the system . . ."

[19.] In addition to R.61-58.9 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 R.61-58.6.E(2)(a) for situations that do not meet the definition of a waterborne disease outbreak given in R.61-58.B(174) 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 Department 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 R.61-58.6.E(11). All other monitoring and testing procedure violations are Tier 3.

**APPENDIX B TO R.61-58.6: STANDARD HEALTH EFFECTS LANGUAGE FOR PUBLIC NOTIFICATION**

| Contaminant | MCLG [1] mg/L | MCL [2] mg/L | Standard health effects language for public notification |
|---|---|---|---|
| **State Primary Drinking Water Regulations (SPDWR):** | | | |
| **A. Microbiological Contaminants:** | | | |
| 1a. Total coliform | Zero | See footnote[3] | Coliforms are bacteria that are naturally present in the 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 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. |
| 1c. Fecal Indicators (Ground Water Rule) | | | 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. |
| i. E. coli | Zero | TT | |
| ii. enterococci | None | TT | |
| iii. coliphage | None | TT | |
| 1d. Ground Water Rule 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 microbial growth. Turbidity may indicate 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)[8] | None | TT | Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches. |

**B. Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and Filter Backwash Recycling Rule (FBRR) violations:**

| | | | |
|---|---|---|---|
| 3. *Giardia lamblia* (SWTR/IESWTR/LT1ESWTR) | Zero | TT[10] | Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. |
| 4. Viruses (SWTR/IESWTR/LT1ESWTR) | | | |
| 5. Heterotrophic plate count (HPC) bacteria [9] (SWTR/IESWTR/LT1ESWTR). | | | |
| 6. *Legionella* (SWTR/IESWTR/LT1ESWTR). | | | |
| 7. *Cryptosporidium* (IESWTR/FBRR/LT1ESWTR). | | | |

**C. Inorganic Chemicals (IOCs):**

| | | | |
|---|---|---|---|
| 8. Antimony | 0.006 | 0.006 | Some people who drink water containing antimony well in 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 |

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|---|---|---|---|
| | | | 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. |
| 16. Fluoride | 4.0 | 4.0 | Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums. |
| 17. Mercury (inorganic) | 0.002 | 0.002 | Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage. |
| 18. Nitrate | 10 | 10 | Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome. |
| 19. Nitrite | 1 | 1 | Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome. |
| 20. Total Nitrate and Nitrite | 10 | 10 | Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome. |
| 21. 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 could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor. |
| **E. Synthetic Organic Chemicals (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 kidneys, liver, or adrenal glands. |
| 26. 2,4,5-TP (Silvex) | 0.05 | 0.05 | Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems. |
| 27. Alachlor | Zero | 0.002 | Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer. |
| 28. Atrazine | 0.003 | 0.003 | Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties. |
| 29. Benzo(a)pyrene (PAHs) | Zero | 0.0002 | Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer. |
| 30. Carbofuran | 0.04 | 0.04 | Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems. |
| 31. Chlordane | Zero | 0.002 | Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer. |
| 32. Dalapon | 0.2 | 0.2 | Some people who drink water containing dalapon well in excess of the MCL over many years could 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 toxic effects such as weight loss, liver enlargement or possible reproductive difficulties. |
| 34. Di (2-ethylhexyl) phthalate | Zero | 0.006 | Some people who drink water containing di(2-ethylhexyl) phthalate well in excess of the MCL 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 of the MCL over |

| | | | |
|---|---|---|---|
| | | | many years could experience reproductive difficulties and may have an increased risk of getting cancer. |
| 36. Dinoseb | 0.007 | 0.007 | Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties. |
| 37. Dioxin (2,3,7,8-TCDD). | Zero | $3 \times 10^{-8}$ | 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. Hexachlorocyclo pentadiene | 0.05 | 0.05 | Some people who drink water containing Hexachlorocyclo-pentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach. |
| 47. Lindane | 0.0002 | 0.0002 | Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver. |
| 48. Methoxychlor | 0.04 | 0.04 | Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties. |
| 49. Oxamyl (Vydate) | 0.2 | 0.2 | Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects. |
| 50. Pentachlorophenol | Zero | 0.001 | Some people who drink water containing pentachlorophenol in excess of |

| | | | |
|---|---|---|---|
| | | | the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer. |
| 51. Picloram | 0.5 | 0.5 | Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver. |
| 52. Polychlorinated biphenyls (PCBs). | Zero | 0.0005 | Some people who drink water containing PCBs in excess of 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. |
| 63. trans-1,2-Dichloroethylene | 0.1 | 0.1 | Some people who drink water containing trans-1,2-dichloroethylene well |

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| | | | 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. |
| **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 |

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| | | | many years may have an increased risk of getting cancer. |
| 77. Alpha emitters | Zero | 15 pCi/L[16] | 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 | 30µg/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 sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs):[18]**

| | | | |
|---|---|---|---|
| 80. Total trihalomethanes (TTHMs) | N/A | 0.08017[19,20] | Some people who drink water containing trihalomethanes excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system and may have an increased risk of getting cancer. |
| 81. Haloacetic Acids (HAA) | N/A | 0.060[21] | Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer. |
| 82. Bromate | Zero | 0.010 | Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer. |
| 83. Chlorite | 0.08 | 1.0 | Some infants and young children who drinking water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia. |
| 84. Chlorine | 4 (MRDLG)[22] | 4.0 (MRDL)[23] | Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort. |
| 85. Chloramines | 4 (MRDLG) | 4.0 (MRDL) | Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia. |
| 86a. Chlorine dioxide, where any 2 consecutive daily samples taken | 0.8 (MRDLG) | 0.8 (MRDL) | Some infants and young children who drink water containing chlorine dioxide in excess of a the MRDL could experience nervous system |

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| at the entrance to the distribution system are above the MRDL. | | | effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine ioxide in excess of the MRDL. Some people may experience anemia.<br>***Add for public notification only:*** The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers. |
| 86b. Chlorine dioxide, where one or more water distribution system are above the MRDL | 0.8 (MRDLG) | 0.8 (MRDL) | Some infants and young children who drink containing chlorine dioxide in excess of the MRDL could experience nervous effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.<br>***Add for public notification only:*** The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure. |
| 87. Control of DBP precursors (DBP) | 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). Drinking water containing these by-products in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer. |
| **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 to R.61-58.6 - 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 sample per month may be positive for total coliforms.
4. There are various regulations that set turbidity standards for different types of systems, including the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule, and the 2002 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.
5. NTU - Nephelometric turbidity unit
6 There are various regulations that set turbidity standards for different types of systems, including 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. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95 percent of samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the Department.
7. TT - Treatment technique
8. There are various regulations that set turbidity standards for different types of systems, including the 1989 Surface Water Treatment Rule (SWTR), the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR), and the 2002 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 Department. For systems subject to the LT1ESWTR (systems serving fewer than 10,000 people, using surface water or ground water under the direct influence of surface water) that use conventional filtration or direct filtration, after January 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 Department.
9. The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful. HPC is simply an alternative method of determining disinfectant residual levels. The number of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.
10. SWTR, IESWTR, and LT1ESWTR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.
11. These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.
12. Millions fibers per liter.
13. Action Level = 0.015 mg/L
14. Action Level = 1.3 mg/L
15. Millirems per years
16. 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 R.61-58.10 Community and non-transient non-community systems serving greater than, or equal to, 10,000 must comply with R.61-58.13 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 R.61-58.13 DBP MCLs and MRDLs beginning January 1, 2004. Transient non-community surface water systems and ground water systems under the direct influence of surface water serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. All other 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 that must comply with R.61-58.14 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 R.61-58.15.

[20.] The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.

[21.] The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.

[22.] MRDLG--Maximum residual disinfectant level goal.

[23.] MRDL--Maximum residual disinfectant level.

**APPENDIX C TO R.61-58.6 - LIST OF ACRONYMS USED IN PUBLIC NOTIFICATION REGULATION**

CCR Consumer Confidence Report
CWS Community Water System
DBP Disinfection Byproduct
EPA Environmental Protection Agency
FBR Filter Backwash Recycle Rule
GWR Ground Water 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 Public Water System
SDWA Safe Drinking Water Act
SMCL Secondary Maximum Contaminant Level
SOC Synthetic Organic Chemical
SPDWR State Primary Drinking Water Regulations
SWTR Surface Water Treatment Rule
TCR Total Coliform Rule
TT Treatment Technique
TWS Transient Non-Community Water System
VOC Volatile Organic Chemical

**APPENDIX D TO R.61-58.12: CONSUMER CONFIDENCE REPORTS: 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 |
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| **Microbiological contaminants:** | | | | | | |
| Total Coliform Bacteria | MCL: (systems that collect ∃ 40 samples/month) 5% of monthly samples are positive; (systems that collect <40 samples/month) 1 positive monthly sample. | | MCL: (systems that collect ≥40 samples/month) 5% of monthly samples are positive; (systems that collect <40 samples/month) 1 positive monthly sample. | 0 | Naturally present in the environmentt | Coliforms are bacteria that are naturally present in the 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 | Total organic carbon (TOC) has no health effects. However, total in the environment organic carbon provides |

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| | | | | | a medium for the formation of disinfection by-products. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these by-products in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer. |
| 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 | N/A | 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 in excess of the MCL over many years may have an increased risk of getting cancer. |
| Alpha emitters (pCi/L) | 15 pCi/L | 15 | N/A | 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 | N/A | 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 (pCi/L) | 30 μg/L | 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 getting cancer and kidney |

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| | | | | | | toxicity. |
| **Inorganic contaminants:** | | | | | | |
| Antimony (ppb) | .006 | 1000 | 6 | 6 | Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder. | Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar. |
| Arsenic (ppb) | [1]0.010 | 1000 | [1]10. | [1]0 | 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; production wastes; 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 ofnatural deposits. | Some people who drink water containing barium in of the MCL over many years could experience an increase in their blood pressure. |
| Beryllium (ppb) | .004 | 1000 | 4 | 4 | Discharge from metal refineries and coal-burning factories; Discharge from 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 |
| Bromate (ppb) | .010 | 1000 | 10 | 0 | By-product of drinking water | Some people who drink water containing bromate in excess of the MCL over |

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| | | | | | chlorination. | many years may have an increased risk of getting cancer. |
| Cadmium (ppb) | .005 | 1000 | 5 | 5 | Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints. | Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage. |
| 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 to their eyes and nose. Some people 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. |
| Chlorine dioxide (ppb) | MRDL = .8 | 1000 | MRDL = 800 | MRDLG = 800 | Water additive used to control microbes | Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. |
| 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. |

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| Chromium (ppb) | .1 | 1000 | 100 | 100 | Discharge from steel and pulp; mills; Erosion of Natural deposits. | Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis. |
| Copper (ppm) | AL=1.3 | | AL=1.3 | 1.3 | Corrosion of household plumbing. Erosion of natural deposits. | Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor. |
| Cyanide (ppb) | 2 | 1000 | 200 | 200 | Discharge from steel/metal factories; Discharge from plastic and fertilizer factories. | Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid. |
| Fluoride (ppm) | 4 | | 4 | 4 | Erosion of natural deposits; Water additive which 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 years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums. |
| Lead (ppb) | AL=.015 | 1000 | AL=15 | 0 | Corrosion of household plumbing systems; Erosion of natural deposits | Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure. |

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| Mercury [inorganic] (ppb) | .002 | 1000 | 2 | 2 | Erosion of natural deposits;discharge from refineries and factories; Runoff from landfills; Runoff from cropland. | Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage |
| Nitrate (ppm) | 10 | | 10 | 10 | Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits. | Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, 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 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) | .05 | 1000 | 50 | 50 | Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines. | Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation |
| Thallium (ppb) | .002 | 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:**

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| 2,4-D (ppb) | .07 | 1000 | 70 | 70 | Runoff from herbicide used on row crops. | Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands. |
| 2,4,5-TP [Silvex](ppb) | .05 | 1000 | 50 | 50 | Residue of banned herbicide | Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems. |
| Acrylamide | TT | | TT | 0 | Added to water during sewage/ wastewater treatment. | Some people who drink water containing high levels of acrylamide over a long period of time could have an increased problems with their nervous system or blood, and may have risk of getting cancer. |
| Alachlor (ppb) | .002 | 1000 | 2 | 0 | Runoff from herbicide used on row crops. | Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer. |
| Atrazine (ppb) | .003 | 1000 | 3 | 3 | Runoff from herbicide used on row crops. | Some people who drink water containing atrazine well in excess of the MCL over many years could experience on problems with their cardiovascular system or reproductive difficulties. |
| Benzo(a)pyrene [PAH] (nanograms/l). | .0002 | 1,000,000 | 200 | 0 | Leaching from linings of water storage tanks 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) | .04 | 1000 | 40 | 40 | Leaching of soil fumigant used on rice and alfalfa. | Some people who drink carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems. |
| Chlordane (ppb) | .002 | 1000 | 2 | 0 | Residue of banned termiticide | Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer. |

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| Dalapon (ppb) | .2 | 1000 | 200 | 200 | Runoff from herbicide used on rights of way. | Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes. |
| Di(2-ethylhexyl) adipate (ppb). | .4 | 1000 | 400 | 400 | Discharge from chemical factories. | Some people who drink water containing di(2-ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or possible reproductive difficulties. |
| Di(2-ethylhexyl) phthalate (ppb). | .006 | 1000 | 6 | 0 | Discharge from rubber and chemical factories. | Some people who drink water containing di(2-ethylhexyl) phthalate well 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) | .0002 | 1,000,000 | 200 | 0 | Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards. | Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer. |
| Dinoseb (ppb) | .007 | 1000 | 7 | 7 | Runoff from herbicide used on 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) | .02 | 1000 | 20 | 20 | Runoff from herbicide use. | Some people who drink water containing diquat in excess of the MCL over many years could get cataracts. |
| Dioxin [2,3,7,8-TCDD] (ppq). | .00000003 | 1,000,000,000 | 30 | 0 | Emissions from waste incineration and other combustion; Discharge from chemical factories. | Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer. |
| Endothall (ppb) | .1 | 1000 | 100 | 100 | Runoff from herbicide use. | Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines. |

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| Endrin (ppb) | .002 | 1000 | 2 | 2 | Residue of banned insecticide. | Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems. |
| Epichlorohydrin. | TT | | TT | 0 | Discharge from industrial chemical factories; An impurity of some water treatment chemicals. | Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer. |
| Ethylene dibromide (ppt) | .00005 | 1,000,000 | 50 | 0 | Discharge from petroleum refineries. | Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer. |
| Glyphosate (ppb) | .7 | 1000 | 700 | 700 | Runoff from herbicide use | Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties. |
| Heptachlor (ppt) | .0004 | 1,000,000 | 400 | 0 | Residue of banned pesticide. | Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer. |
| Heptachlor epoxide (ppt) | .0002 | 1,000,000 | 200 | 0 | Breakdown of heptachlor. | Some people who drink water containing heptachlor epoxidein excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer. |
| Hexachlorobenzene (ppb) | .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) | .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. |

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| Lindane (ppt) | .0002 | 1,000,000 | 200 | 200 | Runoff/leaching from insecticide used on cattle, lumber, gardens. | Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver. |
| Methoxychlor (ppb) | .04 | 1000 | 40 | 40 | Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock. | Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties |
| Oxamyl [Vydate] (ppb) | .2 | 1000 | 200 | 200 | Runoff/leaching from insecticide used on apples potatoes and tomatoes. | Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects. |
| PCBs [Polychlorinated biphenyls] (ppt). | .0005 | 1,000,000 | 500 | 0 | Runoff from landfills Discharge of waste chemicals | Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer. |
| Pentachlorophenol (ppb) | .001 | 1000 | 1 | 0 | Discharge from wood preserving factories | Some people who drink water containing pentachlorophenolin excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer. |
| Picloram (ppb) | .5 | 1000 | 500 | 500 | Herbicide runoff | Some people who drink water containing picloram in excess of the MCL over many years couple experience problems with their liver. |
| Simazine (ppb) | .004 | 1000 | 4 | 4 | Herbicide runoff | Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood. |
| Toxaphene (ppb) | .003 | 1000 | 3 | 0 | Runoff/leaching from insecticide used on cotton and cattle. | Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer |

**Volatile organic contaminants:**

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| Benzene (ppb) | .005 | 1000 | 5 | 0 | Discharge from factories; Leaching from gas storage tanks and landfills. | Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer. |
| Carbon tetrachloride (ppb) | .005 | 1000 | 5 | 0 | Discharge from chemical plants and other industrial activities. | Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with in their liver and may have an increased risk of getting cancer. |
| 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) | .6 | 1000 | 600 | 600 | Discharge from industrial chemical | Some people who drink water containing o-dichlorobenzene well in excess of the MCL over liver, kidneys, or circulatory systems. |
| p-Dichlorobenzene (ppb) | .075 | 1000 | 75 | 75 | Discharge from industrial chemical factories | Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood. |
| 1,2-Dichloroethane (ppb) | .005 | 1000 | 5 | 0 | Discharge from industrial chemical factories. | Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer |
| 1,1-Dichloroethylene (ppb) | .007 | 1000 | 7 | 7 | Discharge from industrial chemical factories. | Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver. |
| cis-1,2-Dichloroethylene (ppb) | .07 | 1000 | 70 | 70 | Discharge from industrial chemical factories. | Some people who drink water containing cis-1,2-dichloroethy -lene in excess of the MCL over many years could experience problems with their liver. |

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| trans-1,2-Dichloroethylene (ppb). | .1 | 1000 | 100 | 10 | Discharge from industrial chemical factories. | Some people who drink water containing trans-1,2-dichloro-ethy lene well in excess of the MCL over many years could experience problems with their liver. |
| Dichloromethane (ppb) | .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 increase risk of getting cancer. |
| 1,2-Dichloropropane (ppb) | .005 | 1000 | 5 | 0 | Discharge from industrial chemical factories. | Some people who drink water containing 1,2-Dichloropropane excess of the MCL over many years may have an increased risk of getting cancer. |
| Ethylbenzene (ppb) | .7 | 1000 | 700 | 700 | Discharge from petroleum refineries. | Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys. |
| Haloacetic Acids (HAA) (ppb). | .060 | 1000 | 60 | N/A | By-product of drinking water disinfection. | Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer. |
| Styrene (ppb) | .1 | 1000 | 100 | 100 | Discharge from rubber and plastic factories and leaching from landfills. | Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys or circulatory system. |
| Tetrachloroethylene (ppb) | .005 | 1000 | 5 | 0 | Discharge from factories and dry cleaners. | Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer. |
| 1,2,4-Trichlorobenzene (ppb) | .07 | 1000 | 70 | 70 | Discharge from textile-finishing factories. | Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands. |
| 1,1,1-Trichloroethane (ppb) | .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 liver, problems with their nervous system, or circulatory system. |

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| 1,1,2-Trichloroethane (ppb). | .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) | .005 | 1000 | 5 | 0 | Discharge from metal degreasing sites and other factories | Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer. |
| TTHMs [Total trihalomethanes] (ppb) | 0.10/.080 | 1000 | 100/80 | N/A | By-product of drinking water disinfection. | Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer. |
| 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) | .002 | 1000 | 2 | 0 | Leaching from PVC piping; Discharge from 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. |

**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

**Appendix D to R.61-58.12 - endnotes**

[1] These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.