3745-81-01 **Primary drinking water standards definitions.**

As used in this chapter:

(A)

(1) "Action level" is the concentration of lead or copper in water specified in paragraph (C) of rule 3745-81-80 of the Administrative Code.

(2) "Actual CT" means the CT value or the sum of CT values that is representative of the disinfection as determined in accordance with rule 3745-81-72 of the Administrative Code.

(3) "Approved effective volume factor" means the ratio of the disinfectant contact time (T) to the theoretical contact time. The theoretical contact time is the lowest daily clearwell operating volume during the peak hourly flow divided by the peak hourly flow.

(4) "Average household size" for the purposes of determining if a system is a "public water system" as defined in this rule, means 2.44 individuals per service connection in accordance with the 2010 federal census for the state of Ohio.

(B)

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

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

(3) "Best available technology" or "BAT" means the best technology, treatment techniques, or other means which the director may approve, after examination for efficacy under field conditions and taking cost into consideration, for a public water system to use for achieving compliance with a maximum contaminant level. For synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

(C)

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

(2) "Chemical Abstracts Service registry number" or "CAS number" means the hyphenated number assigned by the "American Chemical Society's Chemical Abstracts Service" to uniquely designate a chemical substance, regardless of the various names used for this substance.

(3) "Clean compliance history" means, for the purposes of rules 3745-81-50 to 3745-81-55 of the Administrative Code, a record of no violations or exceedances of any of the following:

(a) Maximum contaminant levels under rule 3745-81-54 of the Administrative Code.

(b) Monitoring requirements under rule 3745-81-51 or paragraph (B) of rule 3745-81-52 of the Administrative Code.

(c) Treatment technique triggers under rule 3745-81-53 of the Administrative Code.

(d) Treatment technique requirements under rule 3745-81-53 of the Administrative Code.

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

(5) "Coliform bacteria" means any of the enterobacteriaceae group, including all aerobic and facultative anaerobic gram-negative, nonspore-forming bacilli which utilize lactose with or without the formation of gas.

(6) "Combined distribution system" means an interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water. Combined distribution systems do not include consecutive systems which receive water from a

wholesale system only on an emergency basis or receive only a small percentage and small volume of water from a wholesale system. Combined distribution systems do not include wholesale systems which deliver water to a consecutive system only on an emergency basis or deliver only a small percentage and small volume of water to a consecutive system.

(7) "Combined population" means the total number of individuals served by the public water system as a prime supplier plus those individuals served through a consecutive water system.

(8) "Compliance cycle" means the nine-year cycle for monitoring during which public water systems shall monitor. Each compliance cycle consists of three three-year compliance periods.

(9) "Compliance period" means one of the three periods of three consecutive calendar years within a compliance cycle. Each compliance cycle has three three-year compliance periods.

(10) "Comprehensive performance evaluation" or "CPE" means a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. A CPE is conducted to identify factors that may be adversely impacting a plant's performance. The comprehensive performance evaluation consists of at least the following components: assessments 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.

(11) "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.

(12) "Consecutive water system" means a public water system that receives water from one or more public water systems, excluding emergency interconnections or interconnections where only a small percentage and small volume of water are received. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

(13) "Consumer notice," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means notification of individual tap results from lead tap water monitoring in accordance with rule 3745-81-85 of the Administrative Code.

(14) "Contact time" or "CT" means the mathematical product of a "residual disinfectant concentration" (C), which is determined before or at the first customer, and the corresponding "disinfectant contact time" (T).

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

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

(17) "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.

(D)

(1) "Depressurized seasonal system," means a seasonal system where all of the waterlines are drained during the off-season.

(2) "Direct filtration" means a series of processes, including coagulation and filtration but excluding sedimentation, resulting in substantial removal of particles from water.

(3) "Director of environmental protection" or "director" means the director of the Ohio environmental protection agency and includes an authorized representative of the director.

(4) "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.

(5) "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.

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

(7) "Disinfection profile" means a summary of Giardia lamblia inactivation through the treatment plant.

(8) "District office" means the office of the Ohio environmental protection agency located in the district within which the subject water system is located.

(9) "Dose equivalent" means the product of the absorbed dose from ionizing radiation and such other 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 of Radiological Units and Measurements (ICRU)."

(10) "Dual sample set" means a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected in accordance with rule 3745-81-24 of the Administrative Code.

(E)

(1) "Effective corrosion inhibitor residual," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

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

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

(F)

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

(2) "Filtration" means a process for removing particles from water by passage through porous media.

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

(4) "Finished water storage facility" means a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection, aeration or recirculation.

(5) "First-draw sample" means a one-liter sample of tap water, collected in accordance with rule 3745-81-86 of the Administrative Code, that has been standing in plumbing pipes at least six hours and is collected without flushing the tap.

(6) "Flocculation" means a process which enhances agglomeration of particles into larger, more easily settleable particles through gentle stirring.

(7) "Flowing stream" means a course of running water flowing in a definite channel.

(8) "Fully pressurized year-round seasonal system" means a system where none of the waterlines are drained during the off-season, and no one has access to the water for more than ninety consecutive days during the year.

(G)

(1) "GAC10" means granular activated carbon filter beds with an empty-bed contact time of ten minutes based on average daily flow and a carbon reactivation frequency of every one hundred eighty days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with rule 3745-81-12 of the Administrative Code shall be one hundred twenty days.

(2) "GAC20" means granular activated carbon filter beds with an empty-bed contact time of twenty minutes based on average daily flow and a carbon reactivation frequency of every two hundred forty days.

(3) "Grab sample" means a single, physical sample of water collected at a particular time and place which represents the composition of the water only at the time and place.

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

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

(6) "Ground water" means any water below the surface of the earth in a zone of saturation which is not directly influenced by surface water, which is obtained through a well constructed in accordance with plans approved by the director under section 6109.07 of the Revised Code and Chapter 3745-9 of the Administrative Code.

(7) "Ground water source," for the purpose of rules 3745-81-41 to 3745-81-45 of the Administrative Code, means a well.

(8) "Ground water system" means any public water system that uses ground water except for those that combine all of their ground water with surface water prior to treatment under rule 3745-81-71 of the Administrative Code. A ground water system also includes consecutive systems receiving finished ground water.

(H)

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

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

(3) "High background count" or "HBC" means that the total number of bacterial colonies exceeds two hundred on a forty-seven-millimeter diameter membrane filter used for coliform detection.

(4) "Human consumption" means the ingestion or absorption of water or water vapor as the result of drinking, cooking, dishwashing, hand washing, bathing, showering or oral hygiene.

(5) "Hydrogeologic barriers" means physical, biologic or chemical factors, singularly or in combination, that prevent the movement of viable pathogens

from a contamination source to a water supply well.

(6) "Hydrogeologic sensitivity assessment" or "HSA" means an evaluation of a ground water source's susceptibility to pathogen contamination at a specific site, using all available data. All available data may include well construction, hydrogeologic, geologic and water quality data, which is evaluated in conjunction with the local distribution of pathogen sources.

(I) [Reserved.]

(J) [Reserved.]

(K) [Reserved.]

(L)

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

(2) "Large water system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a public water system that serves more than fifty thousand persons.

(3) "Lead service line" means a service line made of lead which connects a water main to a building inlet and any lead pigtail, gooseneck, or other fitting which is connected to such a lead line.

(4) "Lead threshold level" means the concentration of lead in an individual tap water sample as specified in rule 3745-81-80 of the Administrative Code.

(5) "Legionella" means a genus of bacteria, some species of which may cause Legionnaires' disease.

(6) "Level one assessment" means an evaluation to identify the possible presence of significant deficiencies, deficiencies in distribution system coliform monitoring practices and, when possible, the likely reason that the public water system triggered the assessment. A level one assessment is conducted by the public water system operator or owner. The system shall conduct the assessment consistent with any instructions from the director that tailor

specific assessment elements with respect to the size and type of the system and the size, type and characteristics of the distribution system. Minimum elements of a level one assessment include all of the following:

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

(b) Changes in distribution system maintenance and operation that could affect distributed water quality, including water storage.

(c) Source and treatment considerations that could affect distributed water quality, where appropriate (e.g., whether a ground water system is disinfected).

(d) Existing water quality monitoring data.

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

(7) "Level two assessment" means an evaluation to identify the possible presence of significant deficiencies, deficiencies in distribution system coliform monitoring practices and, when possible, the likely reason that the public water system triggered the assessment. A level two assessment provides a more detailed examination of the public water system (including the public water system's monitoring and operational practices) than does a level one assessment, through the use of a more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. A level two assessment is conducted by an individual approved by the director. The public water system shall comply with any expedited actions or additional actions required by the director in the case of an Escherichia coli maximum contaminant level violation. Minimum elements of a level two assessment are the same as those for a level one assessment, which include all of the following:

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

(b) Changes in distribution system maintenance and operation that could affect distributed water quality, including water storage.

(c) Source and treatment considerations that could affect distributed water quality, where appropriate (e.g., whether a ground water system is

disinfected).

(d) Existing water quality monitoring data.

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

(8) "Limited scope site visit" or "LSSV" means an onsite review, which may include aspects of a sanitary survey as defined in this rule. The onsite review may be triggered when determined by the agency that a portion of the public water system is to be evaluated, when the system is in need of technical assistance, or for any other purpose identified by the agency to review compliance with rule requirements.

(9) "Locational running annual average" or "LRAA" means the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

(M)

(1) "Man-made beta particle and photon emitters" means all radionuclides emitting beta particles or photons listed in the maximum permissible body burdens and maximum permissible concentrations of radionuclides in air and water for occupational exposures, "NBS Handbook 69," except the daughter products of thorium-232, uranium-235 and uranium-238.

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

(3) "Maximum contaminant level goal" or "MCLG" means 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.

(4) "Maximum residual disinfectant level" or "MRDL" means the highest level of disinfectant allowed under conditions specified in rule 3745-81-10 of the Administrative Code.

(5) "Medium water system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a public water system that serves greater than three thousand three hundred and less than or equal to fifty thousand persons.

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

(7) "Method detection limit" or "MDL" is the minimum concentration of a substance that can be measured and reported with ninety-nine per cent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

(8) "Minimal treatment," for the purpose of rule 3745-81-42 of the Administrative Code, means either no treatment, treatment consisting of only cartridge filtration or cation exchange, or a combination of only cartridge filtration and cation exchange.

(9) "Monitor" means the sampling of public drinking water, the submittal of samples to a laboratory certified for the appropriate analysis, and the analysis for the contaminants or characteristics of the water.

(N)

(1) "New source" means any of the following:

(a) A well that is located in a new well field.

(b) A new well that is located in an existing well field for which the results of source water analysis conducted in accordance with rule 3745-9-09 or 3745-91-06 of the Administrative Code indicate the presence of any primary inorganic or radiological contaminant above eighty per cent of the MCL standard or any organic contaminant (except trihalomethanes) at detectable concentrations.

(c) An intake that is located in a surface water body not previously used.

(d) A new intake that is located in a previously used surface water body for which the results of source water analysis conducted in accordance with rule 3745-91-06 of the Administrative Code indicate the presence of

any primary inorganic or radiological contaminant above eighty per cent of the MCL standard or any organic contaminant (except trihalomethanes) at detectable concentrations.

(2) "Normal operating conditions" means the operational and treatment processes routinely used by a public water system which are representative of the practices under which water is typically delivered to consumers. Public water systems required to collect samples during normal operating conditions shall not deliberately change distribution or treatment processes, or operating practices during or just prior to sample collection for the sole purpose of influencing sample results collected for compliance purposes. Practices not considered normal operating conditions include but are not limited to the following examples for the collection of disinfection byproduct or total organic carbon samples: deliberately flushing the distribution system just prior to the collection of samples; temporarily performing enhanced coagulation or softening just prior to the collection of samples; deliberately reducing chlorine dosage just prior to the collection of samples; deliberately turning off pre-chlorination just prior to the collection of samples. For systems that do not have an approved disinfection treatment system, practices not considered normal operating conditions also include adding disinfectant to any part of the water system prior to collecting a total coliform compliance sample or having a chlorine residual in the distribution system at the time of collecting a total coliform compliance sample.

(O)

(1) "Off season," means the time during the year when a depressurized seasonal system drains all of its waterlines, when a partially depressurized seasonal system drains some of its lines, or when a fully pressurized year-round seasonal system does not have public access to the water.

(2) "Operating season," means the time during the year when the public water system is fully pressurized and the public has access to the water.

(3) "Optimal corrosion control treatment," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while ensuring that the treatment does not cause the water system to violate any national primary drinking water regulations.

(P)

(1) "Partially depressurized seasonal system," means a seasonal system where some of the waterlines are drained during the off-season.

(2) "Person" means an individual, corporation, company, association, partnership, the state, any political subdivision, agency, institution, or instrumentality thereof or federal agency.

(3) "Picocurie" or "pCi" means that quantity of radioactive material producing two and twenty-two hundredths nuclear transformations per minute.

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

(5) "Point of disinfectant application" means a location where disinfectant is added to a water system, and water downstream of this location is protected from recontamination.

(6) "Point-of-entry treatment device" is a treatment device applied to the drinking water entering a house or building for the purpose of reducing the contaminants in the drinking water distributed through all, or a portion of, the house or building.

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

(8) "Potable water" means water that is intended for human consumption.

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

(10) "Public education" for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means delivery of educational materials, in accordance with rule 3745-81-85 of the Administrative Code, when an action level is exceeded.

(11) "Public notification" means notification to persons served by a public water system of violations or other situations in accordance with rule 3745-81-32 of

the Administrative Code.

(12) "Public water system" or "PWS" means a system which provides water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least sixty days out of the year. Such term includes any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system, and any water supply system serving an agriculture labor camp, as defined in section 3733.41 of the Revised Code. Such term does not include any "special irrigation district," as defined in 40 CFR 141.2. A public water system is either a "community water system" or a "noncommunity water system." An existing public water system is prohibited from splitting the distribution system or adding additional sources to avoid regulation by Chapter 6109. of the Revised Code.

(a) "Community water system" or "CWS" means a public water system which serves at least fifteen service connections available for use by year-round residents or regularly serves at least twenty-five year-round residents. For the purposes of determining regulation under Chapter 6109. of the Revised Code, the population calculations and defaults in this rule will be used unless documentation proving otherwise is presented and is acceptable to the director.

The population of a CWS shall be determined by an actual count of residents or by multiplying the number of service connections by the average household size.

In the case of a prison cell, nursing home bed, or an otherwise occupied or intended to be occupied living space that is or may be occupied on a day-to-day basis by an individual, the population shall be determined by an actual count of beds available.

(b) "Noncommunity water system" or "NCWS" means a public water system that is not a community water system. A noncommunity water system is either a "nontransient noncommunity water system" or a "transient noncommunity water system." For the purposes of determining regulation under Chapter 6109. of the Revised Code, the population calculations and defaults in this rule will be used unless documentation proving otherwise is presented and is acceptable to the director.

When the average number of individuals regularly served by a

noncommunity water system cannot be readily determined, the director shall determine the population served on a case by case basis. In making this determination, the director may consider an actual daily count of individuals, sales receipts, seating capacity or the issued certificate or certificates of occupancy as in the case of a building as defined by section 3781.06 of the Revised Code, or any other information deemed reliable regarding the potential population served.

(i) "Nontransient noncommunity water system" or "NTNCWS" means a public water system that regularly serves at least twenty-five of the same persons over six months per year and is not a CWS.

(ii) "Transient noncommunity water system" or "TNCWS" means a noncommunity public water system that does not regularly serve at least twenty-five of the same persons over six months per year and is not a CWS or a NTNCWS. Examples of TNCWS may include, but are not limited to, systems serving gas stations, taverns, motels, restaurants, churches, campgrounds and parks.

(Q) [Reserved.]

(R)

(1) "Radiation equivalent man" or "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.

(2) "Raw water" means source water before any treatment.

(3) "Representative distribution sample" means a sample or set of samples that are collected at a location or set of locations in the distribution system of a public water system such that the results of the sample or set of samples accurately reflect the physical and chemical conditions throughout the water system’s entire distribution system.

(4) "Required CT" means the CT value that is considered sufficient disinfection treatment to consistently and reliably achieve at least 99.9 per cent (3 log) inactivation or removal of Giardia lamblia cysts and at least 99.99 per cent (4 log) inactivation or removal of viruses as determined in accordance with rule 3745-81-72 of the Administrative Code.

(5) "Residual disinfectant concentration" ("C" in CT calculations) means the

concentration of disinfectant measured in milligrams per liter in a representative sample of water.

(S)

(1) "Safe Drinking Water Act" or "SDWA" means the Safe Drinking Water Act, 88 Stat. 1660 (1974), 42 U.S.C. 300(f) and regulations adopted thereunder.

(2) "Sampling point" means the following:

(a) For groundwater systems, each entry point to the distribution system which is representative of each well after treatment.

(b) For surface water systems, each entry point to the distribution system after any application of treatment or in the distribution system at points representative of each source.

(3) "Sanitary survey" means an onsite review to evaluate the adequacy of the water source, treatment, distribution system, finished water storage, pumps, pump facilities and controls, monitoring, reporting and data verification, system management and operation, and to review operator compliance with state requirements.

(4) "Seasonal system" means a noncommunity water system that has distinct seasonal fluctuations in its operations and population served during the course of a year such that all or some of the system is not operated on a year-round basis.

(5) "Sedimentation" means a process for removal of solids before filtration.

(6) "Service connection," for the purposes of this chapter, is the active or inactive pipe, gooseneck, pigtail and any other fitting that connects or has the potential to connect each individual house, apartment unit, condominium, mobile home or any structure with human consumption available to the public water system regardless of whether the water usage is metered.

(7) "Service line sample" means a one-liter sample of water, collected in accordance with paragraph (B)(3) of rule 3745-81-86 of the Administrative Code, that has been standing for at least six hours in a service line.

(8) "Significant deficiency," means a defect in design, operation, maintenance, administration, or a failure or malfunction in a system component, including sources, treatment, storage or distribution system that does any of the following:

(a) May provide a pathway of entry for microbial or other contamination into the distribution system or that is indicative of a failure in a barrier that is already in place.

(b) Causes, or has the potential to cause, an unacceptable risk to health or that could affect the reliable delivery of safe drinking water, as determined by the director.

(9) "Single family structure," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

(10) "Slow sand filtration" means a process of passing raw water through a porous granular medium, at a rate of less than one hundred fifty gallons per day per square foot of sand area, with substantial removal of particles by physical and biological mechanisms.

(11) "Small water system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means a public water system that serves three thousand three hundred persons or fewer.

(12) "Source" means the site or area from which water is obtained for the purpose of supplying water to a public water system. Sources include, but are not limited to, aquifers, wells, lakes, rivers, streams and reservoirs.

(13) "Source water at the entry point to the distribution system," for the purpose of rules 3745-81-80 to 3745-81-90 of the Administrative Code, means finished water (as defined in this rule) or 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 necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).

(14) "Split sample" means a single grab sample that is separated into at least two parts such that each part is a representative of the original sample.

(15) "Stabilization" means adjusting the pH, hardness, and alkalinity of treated water so that the water is in equilibrium, neither dissolving nor depositing precipitates.

(16) "State primary drinking water rules" means rules of Chapter 3745-81 of the Administrative Code.

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

(18) "Surface water" means either of the following:

(a) All water which is open to the atmosphere and subject to surface runoff.

(b) A source which has been designated by the director as surface water in accordance with rule 3745-81-76 of the Administrative Code.

(19) "Surface water system" means a public water system which uses surface water, in whole or in part, as its source of water.

(20) "SUVA" means specific ultraviolet absorption at two hundred fifty-four nanometers. It is calculated by dividing a sample's ultraviolet absorption at a wavelength of two hundred fifty-four nanometers (UV_{254}) [in reciprocal meters (M^{-1})] by its concentration of dissolved organic carbon (DOC) [in milligrams per liter (mg/L)].

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

(T)

(1) "Third party" means a team of persons conducting a comprehensive performance evaluation who are not employees of the public water system owner and who are independent of the public water system.

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

(3) "Treatment technique" means a method for treating water to achieve acceptable levels of the contaminants in lieu of establishing a maximum contaminant level.

(4) "Treatment technique requirement" means a requirement of the state primary drinking water rules which specifies for a contaminant a specific treatment technique or techniques known to the director which leads to a reduction in the level of such a contaminant sufficient to comply with the requirements of this chapter.

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

(6) "Total organic carbon" or "TOC" means total organic carbon in milligrams per liter (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.

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

(U) [Reserved.]

(V)

(1) "Virus" means a virus which is infectious to humans by waterborne transmission.

(2) "Volatile organic chemicals" or "VOCs" are the chemicals identified in paragraph (D) of rule 3745-81-12 of the Administrative Code.

(W)

(1) "Waterborne disease outbreak" means the significant occurrence of acute or chronic infectious illness, epidemiologically associated with the ingestion of water from a public water system.

(2) "Wholesale system" means a public water system that treats source water as

necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

(X) [Reserved.]

(Y) [Reserved.]

(Z) [Reserved.]

[Comment: The 40 CFR 141.2 refers to the "Code of Federal Regulations" published on July 1, 2017. A copy of this code may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or https://www.gpo.gov/fdsys, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. department of commerce. Copies of this document are available from the national technical information service, NTIS ADA 280 282, U.S. department of commerce, 5285 Port Royal road, Springfield, Virginia 22161. Copies may be inspected at EPA's "Drinking Water Docket," 401 M street, SW., Washington, DC 20460; or at the national archives and records administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.]

Effective: 8/29/2022

Five Year Review (FYR) Dates: 4/8/2022 and 08/29/2027

CERTIFIED ELECTRONICALLY

Certification

08/17/2022

Date

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Statutory Authority: 6109.04
Rule Amplifies: 6109.04, 6109.13
Prior Effective Dates: 12/27/1978, 08/24/1981, 05/22/1989, 12/31/1990, 09/13/1993, 01/01/2002, 08/03/2004, 08/01/2005, 07/24/2009, 01/01/2010, 10/31/2010, 06/19/2014, 04/01/2016, 05/01/2018

3745-81-02 **Coverage.**

This chapter shall apply to each public water system, unless the public 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 this chapter applies.

(C) Does not sell water to any person as determined by the director.

(D) Is not a carrier which conveys passengers in interstate commerce.

Nothing herein limits the director's authority set forth in sections 6109.02 and 6109.05 of the Revised Code.

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Five Year Review (FYR) Dates:	8/23/2018 and 11/08/2023

CERTIFIED ELECTRONICALLY

Certification

10/29/2018

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Prior Effective Dates:	12/27/1978

3745-81-03. Siting requirements.

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the director and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(A) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(B) Except for intake structures, is within the floodplain of a one- hundred-year flood or is lower than any recorded high tide where appropriate records exist.

Effective: December 27,1978

Promulgated under: Section 3, Am. Sub. S.B. 445, 112th General Assembly
Rule amplifies: RC Section 6109.04

3745-81-04 Administrative penalties.

(A) Pursuant to section 6109.23 of the Revised Code, the director may assess and collect administrative penalties from any person who owns or operates a public water system and violates Chapter 6109. of the Revised Code or the administrative rules adopted thereunder. Administrative penalties for a public water system shall be calculated according to this rule in the following manner:

(1) Each violation of the public water system shall be assigned a value of one thousand dollars. This amount represents the threat to public health caused by the public water system's failure to comply with the applicable regulations.

(2) The value is then multiplied by a number, expressed as a decimal, which represents the public water system's size, in accordance with the following list in order to determine the penalty amount for each day of each violation:

System Size (number of people served)	Number
At least 15 service connections or 25 to 3,300	0.25
3,301 to 6,700	0.50
6,701 to 10,000	0.75
10,001 or more	1.00

(B) Lead and copper rule administrative penalties. Pursuant to section 6109.121 of the Revised Code, the director shall assess and collect administrative penalties from any person who owns or operates a community or nontransient noncommunity water system and violates paragraphs (A)(1) and (C)(1) of rule 3745-81-85 of the Administrative Code. Administrative penalties shall be assessed in accordance with the following tables:

Violation of paragraph (A)(1) of rule 3745-81-85 of the Administrative Code (consumer notification)

Population Served	Penalty Assessed (dollars per day per notification)
25 - 3,300	$25.00
3,301 - 10,000	$50.00
10,001 - 25,000	$75.00
25,001 or more	$100.00

Violation of paragraph (C)(1) of rule 3745-81-85 of the Administrative Code (lead public notification)

Population Served	Penalty Assessed (dollars per day per notification)
25 - 3,300	$250.00
3,301 - 10,000	$500.00
10,001 - 25,000	$750.00
25,001 or more	$1,000.00

Replaces:	3745-81-04
Effective:	5/1/2018
Five Year Review (FYR) Dates:	05/01/2023

Promulgated Under:	119.03
Statutory Authority:	6109.23, 6109.121, 6109.04
Rule Amplifies:	6109.04, 6109.23, 6109.121
Prior Effective Dates:	10/1/1999, 10/17/03

3745-81-10 **Maximum residual disinfectant levels.**

(A) Community and nontransient noncommunity public water systems that supply water treated with chlorine and/or chloramines shall comply with the total chlorine MRDL.

(B) Public water systems that treat their water with chlorine dioxide shall comply with the chlorine dioxide MRDL.

(C) Maximum residual disinfectant levels (MRDLs) are as follows:

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Disinfectant residual	MRDL (mg/l)
Total chlorine	4.0 (as Cl_2).
.....	
Chlorine dioxide	0.8 (as ClO_2).
.....	

(D) The director identifies the following as the best available technology for achieving compliance with the MRDLs identified in paragraph (C) of this rule: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

Effective: 01/01/2010

R.C. 119.032 review dates: 01/01/2015 and 1/29/2020

Promulgated Under: 119.03
Statutory Authority: 6109.03, 6109.04
Rule Amplifies: 6109.04
Prior Effective Dates: 1/1/02

3745-81-11 **Maximum contaminant levels and best available technologies for inorganic contaminants.**

(A) The following maximum contaminant levels (MCLs) for inorganic contaminants apply to all public water systems.

Contaminant	MCL in milligrams per liter
Nitrate (as nitrogen)	10
Nitrite (as nitrogen)	1
Total nitrate and nitrite (as nitrogen)	10

(B) The following MCLs for inorganic contaminants apply to all community and nontransient noncommunity public water systems.

Contaminant	MCL in milligrams per liter
Antimony	0.006
Arsenic	0.010
Asbestos	7_a
Barium	2
Beryllium	0.004
Cadmium	0.005
Chromium	0.1
Cyanide (as free cyanide)	0.2
Fluoride	4.0
Mercury	0.002
Selenium	0.05
Thallium	0.002
a. In units of millions of fibers per liter, where only fibers longer than ten micrometers are counted.	

(C) The following MCL for bromate applies to all community and nontransient noncommunity public water systems that treat their water with ozone.

Contaminant	MCL in milligrams per liter
Bromate	0.010

(D) The following MCL for chlorite applies to all community and nontransient noncommunity public water systems that treat their water with chlorine dioxide.

Contaminant	MCL in milligrams per liter
Chlorite	1.0

(E) The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its MCL. The director identifies the following as the best available technologies (BATs) for removal of the following inorganic contaminants from water.

Contaminant	BATs
Antimony	2,7
Arsenic[a]	1, 2, 5, 6, 7, 9, 12[b]
Asbestos	2, 3, 8
Barium	5, 6, 7, 9
Beryllium	1, 2, 5, 6, 7
Bromate	14
Cadmium	2, 5, 6, 7
Chlorite	15
Chromium	2, 5, 6[c],
Cyanide	5, 7, 13
Mercury	2[d], 4, 6[d], 7[d]
Nitrate	5, 7, 9
Nitrite	5, 7
Selenium	1, 2[e], 6, 7, 9
Thallium	1, 5
a. BATs for arsenic (V). Pre-oxidation may be required to convert arsenic (III) to arsenic (V)	
b. To obtain high removals the iron to arsenic ratio must be at least 20:1	
c. BAT for chromium (III) only	
d. BAT only for mercury concentrations of ten micrograms per liter or less	
e. BAT for selenium (IV) only	
Key to BATs in table:	
1 = Activated alumina	
2 = Coagulation/filtration (not BAT for systems ‹ 500 service connections)	
3 = Direct filtration	
4 = Granular activated carbon	
5 = Ion exchange	
6 = Lime softening (not BAT for systems ‹ 500 service connections)	
7 = Reverse osmosis	
8 = Corrosion control	
9 = Electrodialysis	
10 = Chlorine	
11 = Ultraviolet	
12 = Oxidation/filtration	

13 = Alkaline chlorination (pH >8.5)
14 = Control of ozone treatment process to reduce production of bromate
15 = Control of treatment processes to reduce disinfectant demand and control of disinfectant treatment processes to reduce disinfectant levels

Effective: 02/22/2010

R.C. 119.032 review dates: 02/22/2015 and 01/29/2020

Promulgated Under: 119.03
Statutory Authority: 6109.03, 6109.04
Rule Amplifies: 6109.04
Prior Effective Dates: 12/27/78, 03/01/88, 09/13/93, 01/01/02, 08/01/05

3745-81-12 **Maximum contaminant levels and best available technologies for organic contaminants.**

(A) The director may determine that a public water system shall apply the following best available technology (BAT), for achieving compliance with the maximum contaminant levels (MCLs) for organic disinfection byproducts identified in this table:

Contaminant	MCL (mg/L)	BAT
Total trihalomethanes	0.080	Enhanced coagulation or enhanced softening plus GAC10; or nanofiltration with a molecular weight of less than or equal to 1000 Daltons; or GAC20
Haloacetic acids (five)	0.060	Enhanced coagulation or enhanced softening plus GAC10; or nanofiltration with a molecular weight of less than or equal to 1000 Daltons; or GAC20

(B) The director may determine that a public water system shall apply the following best technology, treatment techniques or other means available for achieving compliance with the MCLs for TTHM and HAA5 identified in this rule for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

Contaminant	MCL (mg/L)	BAT
Total trihalomethanes	0.080	Systems serving greater than or equal to 10,000: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance. Systems serving less than 10,000: Improved distribution system and storage tank management to reduce residence time.

Haloacetic acids (five)	0.060	Systems serving greater than or equal to 10,000: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance. Systems serving less than 10,000: Improved distribution system and storage tank management to reduce residence time.

(C) The following maximum contaminant levels (MCLs) apply to community public water systems and nontransient noncommunity public water systems. The associated BATs, designated as GAC for granular activated carbon and PTA for packed-tower aeration, identify the best technology, treatment techniques or other means available for achieving compliance with the stated MCLs. The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below the contaminant's MCL.

Contaminant	CAS number	MCL (mg/L)	BAT
Vinyl chloride	75-01-4	0.002	PTA
Benzene	71-43-2	0.005	GAC PTA
Carbon tetrachloride	56-23-5	0.005	GAC PTA
p-Dichlorobenzene	106-46-7	0.075	GAC PTA
1,2-Dichloroethane	107-06-2	0.005	GAC PTA
1,1-Dichloroethylene	75-35-4	0.007	GAC PTA
Trichloroethylene	79-01-6	0.005	GAC PTA
1,1,1-Trichloroethane	71-55-6	0.2	GAC PTA
o-Dichlorobenzene	95-50-1	0.6	GAC PTA
cis-1,2-Dichloroethylene	156-59-2	0.07	GAC PTA
trans-1,2-Dichloroethylene	156-60-5	0.1	GAC PTA

1,2-Dichloropropane	78-87-5	0.005	GAC PTA
Dichloromethane	75-09-2	0.005	PTA
Ethylbenzene	100-41-4	0.7	GAC PTA
Monochlorobenzene	108-90-7	0.1	GAC PTA
Styrene	100-42-5	0.1	GAC PTA
Tetrachloroethylene	127-18-4	0.005	GAC PTA
Toluene	108-88-3	1	GAC PTA
1,2,4-Trichlorobenzene	120-82-1	0.07	GAC PTA
1,1,2-Trichloroethane	79-00-5	0.005	GAC PTA
Xylenes (total)	1330-20-7	10	GAC PTA

(D) The following maximum contaminant levels apply to community public water systems and nontransient noncommunity water systems. The associated BATs, designated as GAC for granular activated carbon, PTA for packed-tower aeration, and OX for oxidation with chlorine or ozone, identify the best technology, treatment technique or other means available for achieving compliance with the stated MCLs. The director may determine that a public water system shall apply BAT in order to reduce the level of a contaminant to below the contaminant's MCL.

Contaminant	CAS number	MCL (mg/L)	BAT
Alachlor	15972-60-8	0.002	GAC
Atrazine	1912-24-9	0.003	GAC
Benzo[a]pyrene	50-32-8	0.0002	GAC
Carbofuran	1563-66-2	0.04	GAC
Chlordane	57-74-9	0.002	GAC
2,4-D	94-75-7	0.07	GAC
Dalapon	75-99-0	0.2	GAC
Dibromochloropropane (DBCP)	96-12-8	0.0002	GAC PTA
Di(2-ethylhexyl) adipate	103-23-1	0.4	GAC

Di(2-ethylhexyl) phthalate	117-81-7	0.006	GAC
Dinoseb	88-85-7	0.007	GAC
Diquat	85-00-7	0.02	GAC
Endothall	145-73-3	0.1	GAC
Endrin	72-20-8	0.002	GAC
Ethylene dibromide (EDB)	106-93-4	0.00005	GAC PTA
Glyphosate	1071-53-6	0.7	OX
Heptachlor	76-44-8	0.0004	GAC
Heptachlor epoxide	1024-57-3	0.0002	GAC
Hexachlorobenzene	118-74-1	0.001	GAC
Hexachlorocyclopentadiene	77-47-4	0.05	GAC PTA
Lindane	58-89-9	0.0002	GAC
Methoxychlor	72-43-5	0.04	GAC
Oxamyl (Vydate)	23135-22-0	0.2	GAC
Picloram	1918-02-1	0.5	GAC
Polychlorinated biphenyls (PCBs)	1336-36-3	0.0005	GAC
Pentachlorophenol	87-86-5	0.001	GAC
Simazine	122-34-9	0.004	GAC
2,3,7,8-TCDD (Dioxin)	1745-01-6	3×10^{-8}	GAC
Toxaphene	8001-35-2	0.003	GAC
2,4,5-TP (Silvex)	93-72-1	0.05	GAC

Effective: 2/6/2023

Five Year Review (FYR) Dates: 10/26/2022 and 02/06/2028

CERTIFIED ELECTRONICALLY

Certification

01/25/2023

Date

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3745-81-15 **Maximum contaminant levels and best available technologies for radionuclide contaminants.**

(A) Combined radium-226 and radium-228: the maximum contaminant level (MCL) for combined radium-226 and radium-228 is five picocuries per liter (pCi/L). The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

(B) Gross alpha particle activity: the MCL for gross alpha particle activity (including radium-226 but excluding radon and uranium) is fifteen pCi/L. The gross alpha particle activity value may be adjusted by subtracting the result of the analysis for uranium. If the result for uranium is reported as a mass measurement in micrograms per liter (µg/L), the activity value in pCi/L shall be obtained by multiplying the result with a conversion factor of 0.67 pCi/µg.

(C) Beta particle and photon radioactivity:

(1) The MCL for beta particle and photon radioactivity from man-made radionuclides is an annual dose equivalent of four millirem/year (mrem/yr) to the total body or any internal organ. The annual dose equivalent is determined by converting the running annual average concentration for the radionuclide from pCi/L to mrem/yr (running annual average concentration divided by the dose equivalent for the radionuclide). If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed four mrem/yr.

(2) The annual dose equivalent for radionuclides may be determined using the conversion table below. For radionuclides not listed, the concentration causing four mrem/yr total body or organ dose equivalents may be obtained from appendix I of the "Implementation Guidance for Radionuclides" dated March 2002 and designated EPA 816-F-00-002.

[Comment: This rule references the U.S. EPA "Implementation Guidance for Radionuclides" and "Implementation Guidance for Radionuclides Appendices A - J," issued March 2002. This document is available from the "U.S. EPA Office of Ground Water and Drinking Water, Ariel Rios Building, 1200 Pennsylvania Ave., N.W., Washington, D.C. 20460-0003, (202) 564-3750, www.epa.gov/safewater." A copy may also be obtained by contacting "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

Dose Equivalents Assumed to Produce a Total Body or Organ Dose of four mrem/yr

Radionuclide	Critical Organ	pCi/L
Tritium	Total body	20,000
Strontium-89	Bone marrow	20
Strontium-90	Bone marrow	8
Iodine-131	Thyroid	3
Cesium-134	Total body	80

(D) Uranium: the MCL for uranium is thirty µg/L (activity level of twenty pCi/L). If the result for uranium is reported as an activity measurement in pCi/L, the mass in µg/L shall be obtained by multiplying the result with a conversion factor of 1.49 µg/pCi.

(E) The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its MCL. The director hereby identifies the following technologies, treatment techniques, or other means as the best available technologies (BATs) for removal of the following radionuclide contaminants from water.

Contaminant	BATs
Combined radium-226 and radium-228	1[a], 2[b], 3[c], 4[d], 5[e], 6, 7[f]
Gross alpha particle activity (excluding Radon and Uranium)	2[b]
Beta particle and photon radioactivity	1[a], 2[b]
Uranium	1[a], 2[b], 3[c], 8[a,g], 9[h]

Key to BATs in table:

1 = Ion exchange

2 = Reverse Osmosis

3 = Lime softening

4 = Green sand filtration

5 = Co-precipitation with barium sulfate

6 = Electrodialysis/electrodialysis reversal

7 = Pre-formed hydrous manganese oxide filtration

8 = Activated alumina

9 = Enhanced coagulation/filtration

Limitations footnotes:

a) The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

b) Reject water disposal options and other reverse osmosis limitations should be carefully considered before choosing this technology.

c) This technology should not be used for public water systems serving a population of five hundred or less.

d) Removal efficiencies can vary depending on water quality.

e) 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 the systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

f) This technology is most applicable to small systems that already have filtration in place.

g) Competing anion concentrations may affect regeneration frequency. Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

h) Assumes modification to a coagulation/filtration process already in place.

Effective: 02/23/2015
R.C. 106.03 review dates: 11/17/2014 and 11/17/2019

Promulgated Under: 106.03
Statutory Authority: 6109.04
Rule Amplifies: 6109.04
Prior Effective Dates: 12/27/78, 09/15/04,

3745-81-17 Treatment techniques.

(A) This rule establishes treatment techniques in lieu of maximum contaminant levels for specified contaminants.

(B) Treatment techniques for acrylamide and epichlorohydrin. Each public water system utilizing polymers containing acrylamide or epichlorohydrin shall certify annually in writing to the director (using third-party or manufacturer's certification) that when polymers containing acrylamide or epichlorohydrin are used in the drinking water system, the combination (or product) of dose and monomer level does not exceed either of the levels specified as follows:

Acrylamide monomer level of 0.05 per cent in polymers added to water at 1 part per million (or equivalent), or

Epichlorohydrin monomer level of 0.01 per cent in polymers added to water at 20 parts per million (or equivalent).

Certifications can rely on manufacturers or third parties, as approved by the director.

Effective: September 13, 1993

Promulgated under: RC Chapter 119
Rule amplifies: RC Section 6109.04

3745-81-19 **Use of bottled water and point-of-use or point-of-entry treatment devices.**

(A) Public water systems shall not use bottled water to achieve compliance with the requirements of this chapter. Upon approval of the director, bottled water may be used on a temporary basis to avoid an increased risk to health from contaminant levels exceeding the maximum contaminant level (MCL). The bottled water shall be of a quality acceptable to the director.

(B) Except as provided below, a public water system may not use point-of-use or point-of-entry treatment devices to achieve compliance with a MCL. A nontransient noncommunity public water system may use a point-of-use or point-of-entry treatment device to achieve compliance with the MCL for arsenic if the following conditions are met:

(1) Point-of-use and point-of-entry treatment devices shall be owned, controlled, and maintained by the public water system, or by a person under contract with the public water system, to ensure proper operation and maintenance and compliance with the arsenic maximum contaminant level.

(2) Before any new point-of-use or point-of-entry treatment devices are installed for compliance with the arsenic MCL, or any existing point-of-use or point-of-entry treatment devices are used for compliance with the arsenic MCL, the public water system shall obtain approval of detail plans in accordance with Chapter 3745-91 of the Administrative Code. Chemical and microbiological analyses for constituents that may affect the performance or maintenance of the proposed point-of-entry or point-of-use device must be performed on water entering the treatment device and reported in the detail plans. Results of samples collected more than twelve months prior to plan submittal may not be accepted. Detail plans shall include data from an acceptable demonstration study and a monitoring plan which ensures that the treatment devices provide health protection equivalent to that provided by central water treatment. "Equivalent" means that the water would meet all primary drinking water regulations and would be of acceptable quality similar to water distributed by a well operated central treatment plant. Detail plans shall describe how the system design shall ensure that water of increased corrosivity shall not be released to the drinking water distribution system. The monitoring plan shall include at least the following parts:

(a) Description of and schedule for the recording of physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(b) An explanation of how consumers will be educated as to which taps are suitable for ingestion.

(c) The location of treatment devices and sampling points, and the frequency of sample collection for arsenic analysis. At least one treatment device (or a minimum of twenty-five per cent of treatment devices) shall be sampled for arsenic each quarter unless otherwise approved by the director. Each treatment device shall be sampled at least once annually.

(d) A schedule to collect any additional data required by the director to demonstrate consistency of treatment performance of the point-of-use or point-of-entry treatment device.

(3) The public water system must apply effective technology under a plan approved by the director. The microbiological safety of the water must be maintained at all times.

(4) The design and application of any point-of-entry or point-of-use treatment device shall consider the potential for increase in bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and bacteria monitoring to ensure the microbiological safety of the water is not compromised.

(5) The public water system shall ensure that all buildings connected to the system have sufficient point-of-use or point-of-entry treatment devices that are properly installed, maintained, and monitored such that all consumers will be protected. Public water systems using point-of-use technology must install devices at every tap where common practice is to obtain water for ingestion.

(6) All point-of-use and point-of-entry treatment devices shall be equipped with mechanical warnings that automatically alert consumers of operational problems.

(7) The point-of-entry or point-of-use treatment device shall be certified by an accredited "American National Standards Institute" (ANSI) certification program for drinking water treatment units in accordance with one of the following "American National Standards Institute/National Sanitation Foundation" (ANSI/NSF) standards: standard 58 "Reverse Osmosis Drinking Water Treatment Systems 58-2007 (October 22, 2007)"; standard 62 "Drinking Water Distillation Systems 62-2004 (March 16, 2004)"; or standard 53 "Drinking Water Treatment Units-Health Effects 53-2007a (July 10, 2007)".

(8) Maintenance of the treatment device shall occur according to manufacturers suggestions, or at an interval determined during a demonstration period, whichever time period is shorter.

(9) Upon failure of the point-of-entry or point-of-use treatment device, all repairs or replacements must be completed as soon as practical, but no later than fourteen days after the failure.

(10) The point-of-entry or point-of-use treatment device must be operational at all times to provide water that meets the arsenic standard at required taps.

(a) Under temporary circumstances during required maintenance of the point-of-entry or point-of-use treatment device or equipment failure, bottled water may be required to be provided as specified in paragraph (A) of this rule for a period not to exceed fourteen days.

(b) At any time a point-of-use or point-of-entry treatment device is not operating due to maintenance or failure of the device, a notice shall be posted at any tap served by that device. The notice shall inform consumers that the water from that tap is not suitable for ingestion due to elevated arsenic concentration and direct them to alternative taps or sources that are suitable for ingestion.

(11) Maintenance records of all treatment devices must be maintained for three years and available for review during a sanitary survey.

[Comment: This rule adopts the ANSI/NSF standards 53, 58, and 62 by reference. Copies may be obtained from "NSF International, 789 Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48113-0140, (734) 769-8010", www.nsf.org. These documents are available for review at the "Ohio EPA Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215".]

[Comment: This rule references the ANSI accreditation program for third party certification of drinking water units. A list of ANSI accredited third party product certification programs may be obtained from the "American National Standards Institute, 25 West 43rd Street, New York, NY 10036, (212) 642-4900" or www.ansi.org.]

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R.C. 119.032 review dates: 02/22/2015 and 01/29/2020

Promulgated Under: 119.03
Statutory Authority: 6109.03, 6109.04
Rule Amplifies: 6109.04
Prior Effective Dates: 08/01/05

3745-81-23 **Inorganic chemical monitoring requirements.**

All public water systems shall monitor as described in paragraphs (B) and (C) of this rule to determine compliance with the maximum contaminant levels (MCLs) for nitrate and nitrite. In addition, all community water systems and all nontransient noncommunity water systems shall monitor as described in paragraphs (D) and (E) of this rule for the inorganic contaminants with MCLs listed in paragraph (B) of rule 3745-81-11 of the Administrative Code. Public water systems shall monitor inorganic chemicals according to a schedule provided by the director.

(A) Monitoring for inorganic chemicals with MCLs shall be conducted as follows:

(1) Groundwater systems and surface water systems shall monitor with a minimum of one sample at each sampling point. After the initial set of samples, the system shall take each repeat sample at the same sampling point as used before unless conditions make another sampling point more representative of a source or treatment plant.

(2) If a public water system draws water from more than one source and the sources are combined before distribution, the system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, a schedule prepared by the public water system shall be followed so that the next monitoring sample at this sampling point for the same inorganic chemicals will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same inorganic chemicals shall sample water supplied from different sources until all of the sources supplying that sampling point have been monitored. Note that when inorganic chemicals have different monitoring periods, the chemicals require separate monitoring schedules.

(B) All public water systems shall monitor to determine compliance with the MCL for nitrate in rule 3745-81-11 of the Administrative Code as follows:

(1) All public water systems which are groundwater systems shall monitor for nitrate annually.

(2) All public water systems which are surface water systems shall monitor for nitrate monthly.

(3) The repeat monitoring frequency for nitrate for public groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is at least fifty per cent of the MCL. The director may reduce

the monitoring frequency of a groundwater system to annually after four consecutive quarterly samples are less than eighty per cent of the MCL. If a groundwater system consistently operates less than four quarters per year, then the director may reduce the monitoring frequency to annually after samples collected during each of the system's operating quarters are less than eighty per cent of the MCL.

(4) After the initial round of quarterly repeat monitoring for nitrate is completed, each groundwater system which is monitoring annually shall take subsequent samples during the quarters which previously resulted in the highest analytical result.

(C) All public water systems shall monitor to determine compliance with the maximum contaminant level for nitrite in rule 3745-81-11 of the Administrative Code as follows:

(1) All public water systems shall monitor initially for nitrite with one sample at each sampling point.

(2) After the initial sample, public water systems where an analytical result for nitrite is less than fifty per cent of the MCL shall monitor at the frequency specified by the director.

(3) The repeat monitoring frequency for nitrite for public water systems shall be quarterly for at least one year following any one sample in which the concentration is at least fifty per cent of the MCL. The director may reduce the monitoring frequency to annually after a determination that the nitrite concentration for a public water system is less than eighty per cent of the MCL. If a groundwater system consistently operates less than four quarters per year, then the director may reduce the monitoring frequency to annually after samples collected during each of the public water system's operating quarters are less than eighty per cent of the MCL.

(4) After the initial round of quarterly repeat monitoring for nitrite is completed, each public water system which is monitoring annually shall take each subsequent sample during the quarters which previously resulted in the highest analytical result.

(D) The frequency of monitoring conducted by community water systems and nontransient noncommunity water systems to determine compliance with the MCL for asbestos specified in rule 3745-81-11 of the Administrative Code shall be as follows:

(1) Each community and nontransient noncommunity water system shall monitor for asbestos during the first three-year compliance period for each nine-year compliance cycle, except when a waiver is granted.

(2) A public water 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.

(3) A public water system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provisions of paragraph (A) of this rule.

(4) A public water 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.

(5) A public water system which exceeds eighty per cent of the MCL for asbestos as determined in paragraph (H) of this rule shall monitor quarterly beginning in the next quarter after the violation occurred.

(6) The director may decrease the quarterly monitoring requirement for asbestos to the frequency specified in paragraph (D)(1) of this rule provided the director has determined that the asbestos concentration for a public water system does not exceed eighty per cent of the MCL. In no case can the director make this determination unless a groundwater system takes a minimum of two quarterly samples or a surface water system takes a minimum of four quarterly samples.

(E) The frequency of monitoring conducted by community water systems and nontransient noncommunity water systems for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium to determine compliance with the MCLs in rule 3745-81-11 of the Administrative Code shall be as follows:

(1) Ground water systems shall take and analyze one sample at each sampling point during each compliance period. Surface water systems shall take and analyze one sample annually at each sampling point.

(2) Arsenic sampling results shall be reported to the nearest 0.001 mg/L.

(3) The director may grant a waiver from the monitoring frequencies specified in paragraph (E)(1) of this rule for all of the contaminants listed in paragraph (E) of this rule except fluoride; no waivers shall be granted for fluoride. Waivers for cyanide monitoring may be granted only when the director determines that the public water system is not vulnerable due to any industrial source of cyanide.

(4) Waivers granted under this rule shall require that the public water system monitor with at least one sample while the waiver is in effect. The term during which a waiver is in effect shall not exceed one compliance cycle (i.e., nine years).

(5) Waivers may be granted under this rule only to surface water systems which have monitored annually for at least three years and to groundwater systems which have conducted at least three rounds of monitoring, with at least one monitoring using samples taken after January 1, 1990. Both surface and groundwater systems shall demonstrate that all previous analytical results were less than the MCLs. New public water systems that use a new water source are not eligible for a waiver until three rounds of monitoring of water from the new source have been completed.

(6) In determining the appropriate reduced monitoring frequency, the director shall consider the following:

(a) Reported concentrations from all previous monitoring.

(b) The degree of variation in reported concentrations.

(c) 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.

(7) A decision by the director to grant a waiver shall be made in writing and shall set forth the basis for the determination. The director shall review, and, where appropriate, revise the director's 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.

(8) A public water system, which exceeds eighty per cent of a MCL as calculated in paragraph (H) of this rule, shall monitor quarterly for that contaminant beginning in the next quarter after the result was reported.

(9) A public water system that uses a new source of water or begins operation shall monitor initially for each contaminant listed in paragraph (E) of this rule in the first quarter of the next calendar year after operation of the new source or public water system begins. New public water systems shall sample at each sampling point. Existing public water systems with a new source of water shall sample at the sampling point related to the new source.

(10) If, during the initial sampling required in paragraph (E)(9) of this rule, the analytical result for any inorganic contaminant does not exceed eighty per cent of the MCL in rule 3745-81-11 of the Administrative Code, then the public water system shall monitor for that inorganic contaminant according to the frequency specified in paragraph (E)(1) of this rule, or at a frequency determined by the director.

(11) If, during the initial sampling required in paragraph (E)(9) of this rule, any contaminant is reported as a concentration above eighty per cent of the MCLs listed in rule 3745-81-11 of the Administrative Code, at any sampling point, the public water system shall monitor quarterly for that contaminant at that sampling point beginning in the next quarter after the result is reported.

(12) The director may decrease the quarterly monitoring requirement for one or more inorganic contaminants to the frequency specified in paragraph (E)(1) of this rule, or to a frequency determined by the director, provided the director has determined that the system does not exceed eighty per cent of the MCL. In no case may the director 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. The director may also require additional data demonstrating consistency of treatment performance.

(13) Monitoring for arsenic at nontransient noncommunity public water systems which have installed approved point-of-use or point-of-entry treatment devices for arsenic removal in accordance with rule 3745-81-19 of the Administrative Code shall be conducted at sampling points specified in a monitoring plan approval by the director and in accordance with a schedule provided by the director.

(F) Confirmation samples:

(1) Where nitrate or nitrite monitoring indicates an exceedance of the MCL, the director may require the public water system to monitor with a confirmation sample within twenty-four hours of the public water system's receipt of

notification of the analytical results of the first sample. Public water systems unable to comply with the twenty-four hour sampling requirement shall immediately notify the consumers in the area served by the public water system in accordance with rule 3745-81-32 of the Administrative Code. Public water systems giving immediate notification shall monitor with a confirmation sample within two weeks of notification of the analytical results of the first sample.

(2) Where the results of monitoring for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium indicate an exceedance of a MCL, the director may require that a confirmation sample be collected at the same sampling point as soon as possible (but not to exceed two weeks) after notification of the initial monitoring result.

(3) With confirmation samples required under paragraphs (F)(1) and (F)(2) of this rule, the results of analysis of the initial and confirmation samples shall be averaged. The resulting average shall be used to determine the water system's compliance in accordance with paragraph (H) of this rule.

(4) If a public water system fails to collect the number of samples required in paragraph (F) of this rule, compliance (average concentration) will be based on the total number of samples collected.

(G) The director may require more frequent monitoring than specified in paragraphs (B), (C), (D), and (E) of this rule or may require confirmation samples for positive and negative results at the director's discretion. The director has discretion to delete results of obvious sampling or analytical errors.

(H) Compliance with rule 3745-81-11 of the Administrative Code shall be determined based on the analytical results obtained at each sampling point.

(1) Compliance with the MCLs for nitrate and nitrite is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate or nitrite exceed the MCLs in the initial sample, and a confirmation sample is required in accordance with paragraph (F)(1) of this rule, compliance shall be determined based on the average of the initial and confirmation samples. Failure to take a confirmation sample shall result in an MCL violation based on the level of the initial sample.

(2) For public water 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, selenium, and thallium is determined by a running annual average at each sampling point. The public water system shall not be considered in violation of the MCL until the public water system has completed one year of quarterly sampling. If, however, any one sample result would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. If one sampling point is in violation of the MCL, the system is in violation of the MCL. If a public water system fails to collect the required number of samples, compliance with the MCL (average concentration) shall be based on the total number of samples collected. Any sample result below the following method detection limit (MDL) shall be calculated as zero for the purpose of determining the running annual average.

(3) Method detection limits for inorganic contaminants.

Method Detection Limits for Inorganic Contaminants			
Contaminant	Analytical Method Type	Analytical Method Number(s) [1]	Method Detection Limit (Milligram/Liter)
Antimony	AA, furnace	3113 B	0.003
	AA, platform	200.9	0.0008[7]
	AA, gaseous hydride	D-3697-92	0.001
	ICP-MS	200.8	0.0004
Arsenic	AA, furnace	3113 B	0.001
	AA, platform stabilized temp	200.9	0.0005[2]
	AA, gaseous hydride	3114 B	0.001
	ICP-MS	200.8	0.0014[3]
Asbestos	Transmission electron microscopy	100.1	0.01 MFL[4]

Barium	AA, furnace	3113 B	0.002
	AA, direct aspiration	3111 D	0.1
	ICP	200.7, 3120 B	0.002 (0.001)
	ICP-MS	200.8	0.0008
Beryllium	AA, furnace	3113 B	0.0002
	AA, platform	200.9	0.00002[7]
	ICP	200.7, 3120 B	0.0003
	ICP-MS	200.8	0.0003
Cadmium	AA, furnace	3113 B	0.0001
	ICP	200.7	0.001
	ICP-MS	200.8	0.0005
Chromium	AA, furnace	3113 B	0.001
	ICP	200.7, 3120 B	0.007 (0.001)
	ICP-MS	200.8	0.0009
Cyanide	Distillation spectrophotometric[5]	4500-CN E	0.02
	Distillation, amenable, spectrophotometric[6]	4500-CN G	0.02
	Distillation, automated, spectrophotometric[5]	335.4	0.005
	UV, distillation, spectrophotometric[8]	Kelada-01	0.0005
Fluoride	Ion chromatography	300.0, 300.1, 4110 B, 4110 B-00	0.5

	Manual electrode	4500-F-C	0.5
	Automated electrode	Technicon 380-75 WE	0.5
Mercury	Manual cold vapor	245.1, 3112 B	0.0002
	Automated cold vapor	245.2	0.0002
Nickel	AA, furnace	3113	0.001
	AA, platform	200.9	0.0006[7]
	ICP	200.7[9], 3120 B	0.005
	ICP-MS	200.8	0.0005
Nitrate	Ion chromatography	300.0, 300.1, 4110 B, 4110 B-00, Waters B-1011	0.01
	Automated cadmium reduction	353.2, 4500-NO3-F, 4500-NO3-F-00	0.05
	Ion selective electrode	4500-NO3-D, 4500-NO3-D-00	0.25
	Manual cadmium reduction	4500-NO3-E, 4500-NO3-E-00	0.01
Nitrite	Ion chromatography	300.0, 300.1, 4110 B, 4110 B-00, Waters B-1011	0.004
	Automated cadmium reduction	353.2, 4500-NO3-F, 4500-NO3-F-00	0.05
	Spectrophotometric	4500-NO2-B, 4500-NO2-B-00	0.01
	Manual cadmium reduction	4500-NO3-E, 4500-NO3-E-00	0.01

Selenium	AA, furnace	3113 B	0.002
	AA, gaseous hydride	3114 B	0.002
	ICP-MS	200.8	0.0079
Thallium	AA, platform	200.9	0.0007[7]
	ICP-MS	200.8	0.0003

[1] Analytical method numbers, names, and references are identified in paragraph (A) of rule 3745-81-27 of the Administrative Code. Type labels include AA for atomic absorption, ICP for inductively coupled plasma, and MS for mass spectrometry.

[2] Using multiple depositions, EMSL94 method 200.9 is capable of obtaining a MDL of 0.0001 mg/L. Because MDLs reported in EPA Method 200.9 was determined using a 2X preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (i.e., no sample digestion) will be higher. Using multiple depositions, EPA 200.9 is capable of obtaining MDL of 0.0001 mg/L.

[3] Using selective ion monitoring, EMSL94 method 200.8 (May 1994) is capable of obtaining a MDL of 0.0001 mg/L.

[4] MFL means "million fibers longer than ten micrometers per liter of water".

[5] Screening method for total cyanides.

[6] Measures "free" cyanides.

[7] Lower MDLs are reported using stabilized temperature graphite furnace atomic adsorption.

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

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

(4) For public water systems which are monitoring annually, or less frequently, for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium, when the average of a sample collected pursuant to paragraph (E) of this rule and a confirmation

sample exceeds eighty per cent of the MCL, the public water system shall begin quarterly sampling at that sampling point. If a confirmation sample was not collected the public water system shall begin quarterly monitoring based on the level of the initial sample. If a public water system has been granted a reduction from quarterly monitoring by the director in accordance with paragraph (E)(12) of this rule, the public water system is not required to return to quarterly monitoring unless the sample result exceeds the MCL.

(I) Each public water system shall monitor at the time designated by the director during each compliance period.

(J) Sample collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this rule shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the following table:

Contaminant	Preservative [1]	Container [2]	Time [3]
Antimony	HNO_3 to pH <2	P or G	6 months
Arsenic	HNO_3 to pH <2	P or G	6 months
Asbestos	Cool, 4°c	P or G	48 hours[4]
Barium	HNO_3 to pH <2	P or G	6 months
Beryllium	HNO_3 to pH <2	P or G	6 months
Cadmium	HNO_3 to pH <2	P or G	6 months
Chromium	HNO_3 to pH <2	P or G	6 months
Cyanide	Cool, 4°c, NaOH to pH >12[3]	P or G	14 days
Fluoride	None	P or G	1 month[5]
Mercury	HNO_3 to pH <2	P or G	28 days
Nickel	HNO_3 to pH <2	P or G	6 months
Nitrate	Cool, 4°c	P or G	48 hours[6]
Nitrate+Nitrite[7]	H_2SO_4 to pH <2	P or G	28 days
Nitrite	Cool, 4°c	P or G	48 hours

Selenium	HNO_3 to pH <2	P or G	6 months
Thallium	HNO_3 to pH <2	P or G	6 months

[1] For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time of collection. When chilling is indicated the samples must be shipped and stored at four degrees Celsius or less. Acidification of nitrate or metals samples may be with a concentrated acid or a dilute (fifty per cent by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EMSL94 Methods 200.7, 200.8, or 200.9 (May 1994) are followed. EMSL94 methods 200.7, 200.8, and 200.9 are specified in paragraph (A) of rule 3745-81-27 of the Administrative Code.

[2] P means plastic, hard or soft; G means glass.

[3] In all cases, samples should be analyzed as soon after collection as possible. Follow any additional information on preservation, containers, or holding times specified in the method.

[4] Instructions for containers, preservation, procedures, and holding time as specified in "Technical Notes" Method 100.2 (October 1994) must be adhered to for all compliance analyses including those conducted with "Technical Notes" Method 100.1 (October 1994). "Technical Notes" methods 100.1 and 100.2 are specified in paragraph (A) of rule 3745-81-27 of the Administrative Code.

[5] This is the maximum holding time for analytical purposes. For public water systems that add fluoride to the water supply, a shorter sample turnaround time is required in accordance with rule 3745-83-01 of the Administrative Code for operational purposes.

[6] If the sample is chlorinated, the holding time for an unacidified sample kept at four degrees Celsius or less may be extended to fourteen days.

[7] Nitrate+Nitrite refers to a measurement of total nitrate.

(K) Analyses conducted to determine compliance with rule 3745-81-11 of the Administrative Code shall be performed in accordance with methods listed in paragraph (A) of rule 3745-81-27 of the Administrative Code and shall be performed in laboratories approved in accordance with Chapter 3745-89 of the Administrative Code.

(L) All community and nontransient noncommunity public water systems that treat the water with ozone shall monitor to determine compliance with the maximum

contaminant level for bromate in rule 3745-81-11 of the Administrative Code.

(1) Each public water system required to monitor for bromate shall develop and implement a monitoring plan. This plan shall be maintained and made available for inspection by the director and the general public. All public water systems using surface water as a source and serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water system shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for bromate, and how the public water system will calculate compliance with the MCL for bromate. If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system, under the provisions of rule 3745-81-29 of the Administrative Code, its sampling plan must reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.

(2) Public water systems shall take all bromate samples during normal operating conditions.

(3) Routine monitoring for bromate shall be one sample per month for each treatment plant in the system using ozone. The sample shall be taken at the entrance to the distribution system while the ozonation system is operating under normal conditions.

(4) Public water systems may use data collected under the provisions of this rule to qualify for reduced monitoring. Public water systems may use another data set to qualify for reduced monitoring, provided the data set has been approved by the director.

(5) 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 paragraph (L)(3) of this rule for the most recent four quarters, with samples analyzed in accordance with methods listed in paragraph (A) of rule 3745-81-27 of the Administrative Code. If a system has qualified for reduced bromate monitoring under this paragraph prior to April 1, 2009, 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 in accordance with methods listed in

paragraph (A) of rule 3745-81-27 of the Administrative Code. If the running annual average bromate concentration is greater than 0.0025 mg/L, the system must resume routine monitoring required by paragraph (L)(3) of this rule.

(6) Compliance with the MCL for bromate shall be based on a running annual arithmetic average, computed quarterly, of monthly samples. For months in which the public water system takes more than one sample, the average of all samples taken during the month shall be used to compute the monthly average. These samples shall be collected as prescribed by paragraphs (L)(3) and (L)(5) of this rule.

(7) If the average of samples covering any consecutive four-quarter period exceeds the MCL, the public water system is in violation of the MCL and must notify the public according to rule 3745-81-32 of the Administrative Code. Public notification is in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

(8) All samples taken and analyzed under the provisions of paragraphs (L)(3) and (L)(5) of this rule shall be included in determining compliance, even if that number is greater than the minimum required.

(9) If, during the first year of monitoring under paragraph (L)(3) or (L)(5) of this rule, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the public water system is in violation at the end of that quarter.

(10) Failure to complete the required monitoring is a monitoring violation. The public water system will be in violation for the entire period covered by the running annual average. If a public water system fails to complete twelve consecutive months of monitoring, compliance with the MCL for the last four-quarter compliance period shall be based on an average of the available data.

(M) All community and nontransient noncommunity public water systems that treat their water with chlorine dioxide shall monitor to determine compliance with the maximum contaminant level for chlorite in rule 3745-81-11 of the Administrative Code.

(1) Each public water system required to monitor for chlorite shall develop and implement a monitoring plan. This plan shall be maintained and made available for inspection by the director and the general public. All public

water systems using surface water as a source and serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water systems shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for chlorite, and how the public water system will calculate compliance with the MCL for chlorite. If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system, under the provisions of rule 3745-81-29 of the Administrative Code, their sampling plan must reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.

(2) Public water systems shall take all chlorite samples during normal operating conditions.

(3) Routine daily monitoring: public water systems shall take daily chlorite samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system shall take additional samples in the distribution system the following day at the locations required by paragraph (M)(5) of this rule, in addition to the sample required at the entrance to the distribution system.

(4) Routine monthly monitoring: public water systems shall take a three-sample set each month in the distribution system. The system shall take one sample for chlorite at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time of the water in the distribution system. Any additional distribution system sampling shall 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 paragraph (M)(5) of this rule to meet the requirement for monitoring in this paragraph.

(5) Additional monitoring: on each day following a daily sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the public water system is required to take three samples for chlorite in the distribution system. Samples shall be taken at the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system.

(6) Chlorite monitoring at the entrance to the distribution system required by

paragraph (M)(3) of this rule may not be reduced.

(7) Public water systems may use data collected under the provisions of this rule to qualify for reduced chlorite monitoring in the distribution system. Public water systems may use another data set to qualify for reduced distribution system monitoring, provided it has been approved by the director.

(8) Chlorite monitoring in the distribution system required by paragraph (M)(4) of this rule 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 paragraph (M)(4) of this rule has exceeded the chlorite MCL and the system has not been required to conduct monitoring under paragraph (M)(5) of this rule.

(9) The public water system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under paragraph (M)(8) of this rule exceeds the chlorite MCL or the system is required to conduct monitoring under paragraph (M)(5) of this rule, at which time the system must revert to routine monitoring.

(10) Compliance with the MCL for chlorite shall be based on an arithmetic average of each three-sample set taken in the distribution system as prescribed by paragraphs (M)(4) and (M)(5) of this rule. All samples taken and analyzed under the provisions of paragraphs (M)(4) and (M)(5) of this rule shall be included in determining compliance, even if that number is greater than the minimum required. 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 according to rule 3745-81-32 of the Administrative Code, in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

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3745-81-24 Organic chemical monitoring requirements.

Monitoring requirements for organic chemical contaminants of drinking water are stated in this rule. Analytical procedures which are acceptable for monitoring for organic contaminants in drinking water are listed in rule 3745-81-27 of the Administrative Code. Analyses under this rule shall only be conducted by laboratories that are certified for these analyses under Chapter 3745-89 of the Administrative Code. Community public water systems and nontransient noncommunity public water systems shall monitor for organic chemicals according to a schedule provided by the director.

(A) Monitoring for volatile organic chemicals with maximum contaminant levels (MCLs) listed in paragraph (C) of rule 3745-81-12 of the Administrative Code shall be conducted by community public water systems and nontransient noncommunity public water systems as follows:

(1) Groundwater systems shall monitor with a minimum of one sample at each respective sampling point during each compliance period. Surface water systems shall monitor with a minimum of one sample annually at each sampling point. After the first set of samples, each repeat sample shall be taken at the same sampling point as used before unless conditions make another sampling point more representative of a source, treatment plant, or part of the distribution system.

(2) If a public water system draws water from more than one source and the sources are combined before distribution, the public water system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, the public water system shall prepare and follow a schedule such that the next monitoring sample at this sampling point for the same volatile organic chemicals will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same volatile organic chemicals shall sample water supplied from different sources until all the sources supplying that sampling point have been monitored.

(3) Each new community and new nontransient noncommunity public water system and public water systems that use a new source of water shall monitor initially with four consecutive quarterly samples for each contaminant listed in paragraph (C) of rule 3745-81-12 of the Administrative Code beginning in the first quarter of the next calendar year after operation of the new source of system begins. New public water systems shall sample at each sampling point; systems with a new source of water shall sample at the sampling point related to the new source.

(4) If the initial monitoring for the contaminants listed in paragraph (C) of rule 3745-81-12 of the Administrative Code has been completed and the public water system did not detect any contaminant listed in paragraph (C) of rule 3745-81-12 of the Administrative Code, then the public water system shall monitor with one sample annually. For any contaminant detected during the initial monitoring, the public water system shall continue quarterly monitoring until eligible for a reduction

under paragraph (A)(6)(b) of this rule.

(5) The director may, after a minimum of three years of annual monitoring with no detection of any contaminant listed in paragraph (C) of rule 3745-81-12 of the Administrative Code, reduce monitoring by a groundwater system to one sample during each compliance period.

(6) If a contaminant listed in paragraph (C) of rule 3745-81-12 of the Administrative Code is detected at a level exceeding 0.0005 milligram per liter in any sample, then:

(a) The public water system shall monitor quarterly at each sampling point which resulted in a detection. If a public water system is monitoring annually or less frequently for a previously detected contaminant, then the public water system does not have to return to quarterly monitoring for that contaminant unless the sample result exceeds eighty per cent of the MCL.

(b) The director may decrease the quarterly monitoring requirement specified in paragraph (A)(6)(a) of this rule to annual monitoring provided the director has determined that the public water system does not exceed eighty per cent of the MCL for that contaminant. In no case shall the director make this determination unless a groundwater system has monitored with a minimum of two consecutive quarterly samples and a surface water system has monitored with a minimum of four consecutive quarterly samples.

(c) Public water systems which monitor annually for a previously detected contaminant shall monitor during the quarters which previously yielded the highest analytical result.

(7) The director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the director, the result shall be averaged with the first sampling result and the average used for the compliance determination as specified by paragraph (A)(8) of this rule.

(8) Compliance with paragraph (C) of rule 3745-81-12 of the Administrative Code shall be determined based on the analytical results obtained at each sampling point.

(a) For public water systems which are conducting monitoring at a frequency greater than annually, compliance is determined by a running annual average of all samples taken at each sampling point. If the running annual average of any sampling point is greater than the MCL, then the public water system is out of compliance. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling. If, however, the initial sample or a subsequent sample would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. Any samples below the detection limit shall be counted as zero for purposes of determining the running annual average.

(b) For public water systems monitoring annually or less frequently, when the average of a result and a required confirmation sample exceeds eighty per cent

of the MCL, the public water system shall begin quarterly monitoring at that sample point. If a confirmation sample was not collected, the public water system shall begin quarterly monitoring if the level of the initial sample exceeds eighty per cent of the MCL. Compliance with a MCL will be determined by a running annual average as stated in paragraph (A)(8)(a) of this rule. If one sampling point is in violation of the MCL, the system is in violation of the MCL.

(c) If a public water system fails to collect the required number of samples, compliance will be based on the total number of samples collected.

(9) Analysis for the contaminants listed in paragraph (C) of rule 3745-81-12 of the Administrative Code shall be conducted using the methods in rule 3745-81-27 of the Administrative Code.

(10) Analysis under this rule shall only be conducted by laboratories that are approved under Chapter 3745-89 of the Administrative Code.

(11) The director has discretion to delete results of obvious sampling or analytical errors.

(12) The director may increase required monitoring where necessary to detect variations within the public water system.

(13) Each approved laboratory shall determine the method detection limit (MDL), as defined in the appendix to rule 3745-89-03 of the Administrative Code, at which it is capable of detecting volatile organic chemicals. The acceptable MDL is 0.0005 milligram per liter. This concentration is the detection concentration for purposes of this rule.

(B) Monitoring of the organic chemical contaminants with maximum contaminant levels listed in paragraph (D) of rule 3745-81-12 of the Administrative Code shall be conducted by community public water systems and nontransient noncommunity public water systems as follows:

(1) Groundwater systems and surface water systems shall monitor with a minimum of one sample at each sampling point each time monitoring is required in paragraph (B) of this rule. After the initial set of samples, each sample shall be taken at the same sampling point as used before unless conditions make another sampling point more representative of a source or treatment plant.

(2) If the public water system draws water from more than one source and the sources are combined before distribution, the public water system shall monitor at each sampling point during periods of normal operating conditions and shall keep a record of and report the sources providing water for each sample. When a sample does not contain water from all the sources which serve the sampling point, a schedule prepared by the public water system shall be followed so that the next monitoring sample at this sampling point for the same organic chemicals will include water from sources not included in the previous sample or samples. Thus, successive samples from the same sampling point for the same organic chemicals

shall sample water supplied from different sources until all the sources supplying that sampling point have been monitored.

(3) Monitoring frequency:

(a) Each community public water system and nontransient noncommunity public water system shall monitor with four consecutive quarterly samples at each sampling point for each organic chemical contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code during each compliance period.

(b) Public water systems serving more than three thousand three hundred persons which do not detect a contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code in their first compliance period may reduce the sampling frequency to a minimum of two quarterly samples in one year during each following compliance period.

(c) Public water systems serving fewer than three thousand three hundred one persons which do not detect a contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code in their first compliance period may reduce the sampling frequency to a minimum of one sample during each following compliance period.

(d) Public water systems that use a new source of water and new public water systems shall begin initial quarterly monitoring for each contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code in a quarter designated by the director during the next calendar year after operation of the new source or system begins. New public water systems shall sample at each sampling point. Public water systems with a new source of water shall sample at the sampling point related to the new source.

(4) The director may grant a waiver from one or more requirements of paragraphs (B)(3)(a) to (B)(3)(c) of this rule. Each waiver is valid for only one compliance period.

(5) The director may grant a waiver after evaluating the previous use (including transport, storage, or disposal) of a contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code within the watershed or zone of influence of the public water system. If a determination by the director reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If the contaminant has been used previously or if the previous use is unknown, then the following factors shall be used to determine whether a waiver is granted:

(a) Previous analytical results.

(b) The proximity of the public water system to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Nonpoint sources include the use of pesticides to control

insect and weed pests on agricultural areas, forest lands, homes and gardens, and other land application uses.

(c) The environmental persistence and transport of the organic chemicals listed in paragraph (D) of rule 3745-81-12 of the Administrative Code.

(d) How completely the water source is protected against contamination due to such factors as the depth of the well, the type of soil, and the integrity of the well casing.

(e) Elevated nitrate levels at the public water system source.

(f) Use of polychlorinated biphenyls in equipment used in the production, storage, or distribution of water (e.g., polychlorinated biphenyls used in pumps, transformers, etc.).

(6) If an organic chemical contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code is detected (as defined by paragraph (B)(14) of this rule) in any sample, then:

(a) Each public water system shall monitor quarterly at each sampling point which resulted in a detection. If a public water system is monitoring annually or less frequently for a previously detected contaminant, then the public water system does not have to return to quarterly monitoring unless the sample result exceeds eighty per cent of the MCL.

(b) The director may decrease the quarterly monitoring requirement specified in paragraph (B)(6)(a) of this rule to annual monitoring provided the director has determined that the public water system does not exceed eighty per cent of the MCL. In no case shall the director 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.

(c) Public water systems which monitor annually shall monitor during the quarter that previously yielded the highest analytical result.

(d) For public water systems which have three consecutive annual samples with no detection of a contaminant listed in paragraph (D) of rule 3745-81-12 of the Administrative Code, the director may grant a waiver as specified in paragraph (B)(4) of this rule.

(e) If monitoring results in detection of one or more of certain related contaminants (heptachlor, heptachlor epoxide), then subsequent monitoring shall analyze for all related contaminants.

(7) The director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the director, the result shall be averaged with the first monitoring result and the average used for the compliance determination as specified by paragraph (B)(8) of this rule.

(8) Compliance with paragraph (D) of rule 3745-81-12 of the Administrative Code shall be determined based on the analytical results obtained at each sampling point, as follows:

(a) For public water systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. The system will not be considered in violation of the MCL until it has completed one year of quarterly monitoring. If, however, the initial result or a subsequent result would cause the running annual average to exceed the MCL, then the public water system is out of compliance immediately. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected. If one sampling point is in violation of the MCL, the system is in violation of the MCL. Any results below the detection limit shall be calculated as zero for purposes of determining the running annual average.

(b) For public water systems monitoring annually or less frequently, when the average of a result and a confirmation sample exceeds eighty per cent of the MCL the public water system shall begin quarterly monitoring at that sample point. If a confirmation sample was not collected, the public water system shall begin quarterly monitoring if the level of the initial sample exceeds eighty percent of the MCL. Compliance with the MCL will then be determined by a running annual average as stated in paragraph (B)(8)(a) of this rule.

(9) Analysis for the organic chemical contaminants listed in paragraph (D) of rule 3745-81-12 of the Administrative Code shall be conducted by using methods set forth in rule 3745-81-27 of the Administrative Code.

(10) Analysis for polychlorinated biphenyls shall be conducted as follows:

(a) Each public water system which monitors for polychlorinated biphenyls shall analyze or have analyzed each sample using a technique set forth in rule 3745-81-27 of the Administrative Code.

(b) If polychlorinated biphenyls (as one of seven aroclors) are detected (as designated in this paragraph) in any sample analyzed using a technique set forth in rule 3745-81-27 of the Administrative Code, the sample shall be reanalyzed using a technique set forth in rule 3745-81-27 of the Administrative Code to quantitate polychlorinated biphenyls (as decachlorobiphenyl).

(c) Compliance with the MCL for polychlorinated biphenyls shall be determined based upon the quantitative results of analyses using a technique set forth in rule 3745-81-27 of the Administrative Code.

Aroclor	Detection limit (Milligrams per liter)
1016	0.00008

1221	0.02
1232	0.0005
1242	0.0003
1248	0.0001
1254	0.0001
1260	0.0002

(11) The director has discretion to delete results of obvious sampling or analytical errors.

(12) The director may increase the required monitoring frequency, where necessary, to detect variations within the public water system (e.g., fluctuations in concentration due to seasonal use, changes in water source).

(13) Each public water system shall monitor at the time designated by the director within each compliance period.

(14) Detection as used in this rule shall be defined as greater than or equal to the following concentration for each contaminant.

Contaminant	Detection limit (Milligrams per liter)
Alachlor	0.0002
Atrazine	0.0001
Benzo(A)pyrene	0.00002
Carbofuran	0.0009
Chlordane	0.0002
Dalapon	0.001
1,2-Dibromo-3-chloropropane (DBCP)	0.00002
Di(2-ethylhexyl) adipate	0.0006
Di(2-ethylhexyl) phthalate	0.0006
Dinoseb	0.0002
Diquat	0.0004
2,4-d	0.0001
Endothall	0.009
Endrin	0.00001
Ethylene dibromide (EDB)	0.00001
Glyphosate	0.006
Heptachlor	0.00004
Heptachlor epoxide	0.00002
Hexachlorobenzene	0.0001

Hexachlorocyclopentadiene	0.0001
Lindane	0.00002
Methoxychlor	0.0001
Oxamyl	0.002
Pentachlorophenol	0.00004
Picloram	0.0001
Pentachlorophenol	0.00004
Polychlorinated biphenyls (PCBs) (As decachlorobiphenyl)	0.0001
Simazine	0.00007
Toxaphene	0.001
2,3,7,8-TCDD (dioxin)	0.000000005
2,4,5-TP (silvex)	0.0002

(C) Monitoring for total trihalomethanes (TTHM) and haloacetic acids five (HAA5).

(1) Community public water systems and nontransient noncommunity public water systems that treat their water with any combination of primary or residual disinfectant, other than ultraviolet light, or delivers water that has been treated with any combination of primary or residual disinfectant, other than ultraviolet light, shall monitor for TTHM and HAA5 according to paragraph (C) of this rule. The director will determine compliance with MCLs for TTHMs and HAA5.

(2) For public water systems required to conduct quarterly monitoring, compliance with MCLs for TTHMs and HAA5 shall be based on a locational running annual arithmetic average at each monitoring location, calculated quarterly, at the end of the fourth calendar quarter following 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). For public water systems monitoring quarterly, if the system fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four quarter compliance period shall be based on the average of the available data from the most recent four quarters.

(3) If the public water system is required to conduct monitoring at a frequency that is less than quarterly, compliance with MCLs shall be based on the LRAA calculations beginning with the first compliance sample taken after the compliance date. If any sample result exceeds the MCL, the public water system shall comply with the requirements of paragraphs (C)(18) to (C)(20) of this rule. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.

(4) If a public water system takes more than one sample per quarter at a monitoring location, the average of all samples taken in the quarter at that location shall be used to determine a quarterly average to be used in the LRAA calculation.

(5) If the public water system fails to monitor according to the sample monitoring plan, the system will be in violation for the entire period covered by the locational running annual average. Public water systems shall take all samples during normal operating conditions.

(6) Routine monitoring for TTHMs and HAA5: Public water systems are required to begin monitoring at the locations and the time period identified in the sample monitoring plan developed under paragraph (C)(9) of this rule. Public water systems specified in paragraph (C)(1) of this rule shall monitor at the frequency indicated and at no fewer than the number of locations identified in the following table:

Source water type	Population size category	Monitoring frequency[1]	Sample Type[2]	Distribution system monitoring location total per monitoring period[2]
Surface water	<500	Per year	Individual samples	2
	500-3,300	Every 90 days	Individual samples	2
Surface water	3,301-9,999	Every 90 days	Dual sample set	2
	10,000-49,999	Every 90 days	Dual sample set	4
Surface water	50,000- 249,999	Every 90 days	Dual sample set	8
	250,000- 999,999	Every 90 days	Dual sample set	12
Surface water	1,000,000- 4,999,999	Every 90 days	Dual sample set	16
	> or = 5,000,000	Every 90 days	Dual sample set	20
Ground water	<500	Per year	Individual samples	2
	500-9,999	Per year	Dual sample set	2
Ground water	10,000-99,999	Every 90 days	Dual sample set	4
	100,000- 499,999	Every 90 days	Dual sample set	6
Ground water	> or = 5,000,000	Every 90 days	Dual sample set	8
[1] All systems shall monitor during month of highest DBP concentrations.				
[2] Systems on quarterly monitoring shall take dual sample sets every 90 days at each monitoring location except for surface water systems serving 500-3,300. Ground water systems serving 500-9,999 on annual monitoring shall take dual sample sets at each				

monitoring location. All other systems on annual monitoring and surface water systems serving 500-3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

(7) Systems on quarterly monitoring are required to monitor every ninety days. The ninety day monitoring frequency may be extended or reduced by five days to allow for unplanned circumstances that prevent monitoring precisely ninety days apart, as long as the samples are collected during each calendar quarter.

(8)) If a system that does not disinfect begins using a disinfectant other than UV light, the system shall consult with the director to identify compliance monitoring locations and develop a monitoring plan under paragraph (C)(9) of this rule that includes those monitoring locations.

(9) Each public water system required to monitor for TTHM and HAA5 shall develop and implement a sample monitoring plan. The public water system shall maintain the plan and make it available for inspection by the director and the general public. The monitoring plan shall contain the following elements: monitoring locations (including both a location address and sample monitoring point code); monitoring dates; and alternate monitoring locations (in the event access to a primary location is not available). The director will determine compliance with MCLs for TTHMs and HAA5.

(10) Monitoring locations shall be chosen by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. Public water systems shall also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If a public water system has more monitoring locations than required for compliance monitoring according to paragraph (C) of this rule, systems shall identify which locations will be used for compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified.

(11) All surface water systems shall submit a copy of the monitoring plan to the director. The director may require new community and non-transient noncommunity water systems that treat their water with any combination of primary or residual disinfectant, other than ultraviolet light, or deliver water that has been treated with any combination of primary or residual disinfectant, other than ultraviolet light to develop and submit a sample monitoring plan within twelve months of becoming active.

(12) A public water system may revise the monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for director approved reasons, after consultation with the director regarding the need for changes and the

appropriateness of changes. If a system changes monitoring locations, the locations shall replace existing compliance monitoring locations with the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The director may also require modifications in the monitoring plan. Surface water systems shall submit a copy of the modified monitoring plan to the director prior to the date required to comply with the revised monitoring plan.

(13) Reduced monitoring for TTHMs and HAA5: Public water systems may reduce monitoring to the level specified in the following table 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. Systems may only use data collected under the provisions of paragraph (C) of this rule to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, shall be less than or equal to 4.0 mg/L at each treatment plant treating surface water, based on monitoring conducted under rule 3745-81-77 of the Administrative Code.

Source water type	Population size category	Monitoring frequency[1]	Distribution system monitoring location total per monitoring period
Surface Water:	<500	NA	Monitoring may not be reduced
	500-3,300	Per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
Surface Water:	3,301-9,999	Per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement.
	10,000-49,999	Every 90 days	2 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs.
Surface Water:	50,000-249,999	Every 90 days	4 dual sample sets-at the locations with the two highest TTHM and two highest HAA5 LRAAs.
	250,000-999,999	Every 90 days	6 dual sample sets-at the locations with the three highest TTHM and three highest HAA5 LRAAs.
Surface Water:	1,000,000-4,999,999	Every 90 days	8 dual sample sets-at the locations with the four highest TTHM and four highest HAA5 LRAAs.

	> or = 5,000,000	Every 90 days	10 dual sample sets-at the locations with the five highest TTHM and five highest HAA5 LRAAs.
Ground Water	<500	Every third year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	500-9,999	Per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
Ground Water	10,000-99,999	Per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement.
	100,000-499,999	Every 90 days	2 dual sample sets; at the locations with the highest TTHM and highest HAA5 LRAAs.
Ground Water	> or = 5,000,000	Every 90 days	4 dual sample sets at the locations with the two highest TTHM and two highest HAA5 LRAAs.
[1] Systems on quarterly monitoring shall take dual sample sets every 90 days.			

(14) Public water systems 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, shall be less than or equal to 4.0 mg/L at each treatment plant treating surface water, based on monitoring conducted under rule 3745-81-77 of the Administrative Code.

(15) 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, greater than 4.0 mg/L at any treatment plant treating surface water, the

system shall resume routine monitoring under paragraph (C)(6) of this rule or begin increased monitoring if paragraph (C)(18) of this rule applies.

(16) The director may return a public water system to routine monitoring at the director's discretion, for reasons including but not limited to: treatment change, significant distribution changes, or disinfectant changes.

(17) Consecutive systems that do not add a disinfectant but deliver water that has been treated with a primary or residual disinfectant other than ultraviolet light, shall comply with analytical, monitoring, and compliance requirements for chlorine and chloramines in rules 3745-81-27 and 3745-81-70 of the Administrative Code and report monitoring results under paragraph (G)(4) of rule 3745-81-75 of the Administrative Code.

(18) If a public water system is required to monitor at a particular location annually or less frequently than annually under paragraph (C)(6) or (C)(13) of this rule, the system shall increase monitoring to dual sample sets once per quarter (taken every ninety 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.

(19) A public water system is in violation of the MCL when the LRAA exceeds the MCLs in rule 3745-81-12 of the Administrative Code, calculated based on four consecutive quarters of monitoring (or the LRAA calculated based on fewer than four quarters of data if the system fails to complete four consecutive quarters of monitoring, or if the MCL would be exceeded regardless of the monitoring results of subsequent quarters). The system is in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if the system fails to monitor.

(20) Public water systems may return to routine monitoring once increased monitoring has been conducted 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.

(21) Operational evaluation levels: A public water 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 four to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by four to determine an average, exceeds 0.060 mg/L.

(a) If a public water system exceeds the operational evaluation level, the system shall conduct an operational evaluation and submit a written report of the evaluation to the director no later than ninety days after being notified by the director of the analytical result that causes the system to exceed the operational evaluation level. The written report shall be made available to the public upon request.

(b) The public water system's operational evaluation shall 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 actions the PWS will take and when these actions will be implemented to minimize future exceedances. If the system exceeding the OEL is a consecutive water system, a master meter monitoring location shall be submitted to the director for approval at each master meter, or as close as possible, supplying water to each monitoring location that exceeds the OEL.

(c) A public water system may request and the director may allow the system to limit the scope of the evaluation if the system is able to identify the cause of the operational evaluation level exceedance.

(d) A request from the system to limit the scope of the evaluation does not extend the schedule in paragraph (C)(21)(a) of this rule for submitting the written report. The director shall approve this limited scope of evaluation in writing and the system shall keep that approval with the completed report.

(22) If a consecutive water system exceeds the operational evaluation level or the TTHM LRAA or HAA5 LRAA is in exceedance of the MCL for two quarters within a twelve month period and the current individual compliance monitoring period's results are greater than the TTHM or HAA5 MCL, the following apply:

(a) Beginning the quarter following the second OEL or MCL exceedance, the consecutive water system shall monitor quarterly for disinfection byproducts at the mater meter monitoring locations acceptable to the director. The master meter monitoring shall be conducted with routine TTHM and HAA5 compliance monitoring. The mater meter monitoring shall be conducted for a miniumum of four consecutive quaters unless otherwise specified by the director.

(b) If any master meter monitoring results collected by the consecutive water system pursuant to paragraph (C)(22)(a) of this rule are greater than the TTHM or HAA5 MCL, beginning the next calendar quarter the wholesale system delivering water to the consecutive water system shall begin quarterly monitoring at or near the respective master meter monitoring locations for a minimum of four consecutive quarters unless otherwise specified by the director. The wholesaler's master meter monitoring locations shall be submitted to the director for approval. The wholesaler shall conduct monitoring at the master meter monitoring locations concurrently with the consecutive water system in accordance with a schedule determined by the director. If a master meter location is the same location for both the consecutive and wholesale system, and the wholesale system and consecutive system agree to sample from this master meter location to comply with this rule, both systems may jointly request that the Director approve the agreed upon master meter location.

(c) If the consecutive waster system or wholesale system has a sample result at any master meter monitoring location greater than the TTHM or HAA5 MCL, after

the first quarter of wholesaler monitoring, an OEL resport shall be completed by the consecutive water system and the wholesale system. The OEL reports shall be completed and submitted to the director in accordance with paragraph (C)(21) of this rule on a form accpetable to the director. An OEL report shall be completed and submitted for each quarter when the individual quarterly sample result at the master meter monitoring locations is greater than the TTHM or HAA5 MCL.

(d) Master meter monitoring locations determined to have an LRAA that exceeds either the TTHM or HAA5 MCL shall become additional compliance monitoing locations for the wholesale system and be subject to paragraph (C) of this rule unless otherwise specified by the director. Upon directors approval, the wholesale system may replace a current monitoring location with a master meter location if the current monitoring location has not exceeded the OEL or had an LRAA exceed an MCL for a time period determined by the director as appropriate.

(e) Public water systems required to monitor at master meter locations under this rule may reduce or stop monitoring upon directors approval at these locations if the issue causing the elevated concentrations of DBPs has been resolved and monitoring results at these locations are consistently below the MCL.

(f) The director may require additional public water systems involved with the conveyance of water to a consecutive public water system to comply with the requirements of this rule.

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3745-81-26 **Radionuclide monitoring requirements.**

Community public water systems shall monitor as described in this rule to determine compliance with the maximum contaminant levels (MCLs) for radionuclides listed in rule 3745-81-15 of the Administrative Code. Analytical procedures which are acceptable for monitoring of radionuclide contaminants in drinking water are listed in rule 3745-81-27 of the Administrative Code. Community public water systems shall monitor for radionuclide contaminants according to a schedule provided by the director.

(A) Monitoring requirements for gross alpha particle activity, radium-226, radium-228, and uranium.

(1) 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 paragraph (D) of this rule.

(2) All existing community public water systems shall sample at every sampling point that is representative of all sources being used under normal operating conditions for that sampling point. The system shall take each sample at the same sampling point unless the director determines that conditions make another sampling location more representative of each source.

(3) All new community public water systems or community public water systems that use a new source of water shall begin initial monitoring within the first quarter after initiating use of the source.

(4) Initial monitoring. Systems shall conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

(a) Systems shall collect four consecutive quarterly samples at all sampling points.

(b) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the director may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.

(5) If the average of the initial monitoring results for a sampling point is above the maximum contaminant level (MCL), the community public water system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.

(6) Reduced monitoring. The director may allow community public water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria:

(a) 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 paragraph (D) of this rule, the community public system shall collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

(b) 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 fifty per cent of the MCL, the community public water system shall collect and analyze for that contaminant using at least one sample at that sampling point every six years.

For combined radium-226 and radium-228, the analytical results shall 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 fifty per cent of the MCL, the community public water system shall collect and analyze for the contaminant(s) using at least one sample at that sample point every six years.

(c) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

For combined radium-226 and radium-228, the analytical results shall be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

(d) Community public water systems shall use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above fifty per cent of MCL but at or below the MCL, then the next monitoring period for that sampling point is at least one sample every three years.)

(e) If a community public water system has a monitoring result that exceeds the MCL while on reduced monitoring, the system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.

(7) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed five 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 fifteen pCi/L. The gross alpha measurement shall have a confidence interval of ninety-five per cent (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a community public water system uses a gross alpha particle activity measurement in lieu of 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, fifty per cent of the detection limit will be used to determine compliance and the future monitoring frequency.

(B) Monitoring requirements for beta particle and photon radioactivity.

(1) The director may designate a community public water system as vulnerable to beta particle and photon radioactivity contamination based on identified potential radioactive sources within the drinking water source protection area delineated or endorsed by the agency under Ohio's wellhead protection and source water assessment and protection programs. Community public water systems designated by the director as vulnerable shall sample for beta particle and photon radioactivity to determine compliance with the maximum contaminant levels listed in rule 3745-81-15 as follows:

(a) Community public water systems shall collect quarterly samples for beta emitters and annual samples for tritium and strotium-90 at each sampling point, beginning within one quarter after being notified by the director. Systems designated as vulnerable shall continue to sample until the director removes the designation.

(b) If the gross beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to fifty pCi/L (screening level) and the combined monitoring results for all measured contaminants (i.e. tritium. strontium-90, and any other contaminants for beta particle and photon radioactivity as specified

by rule 3745-81-15 of the Administrative Code) are at or below the MCL, the director may reduce the frequency of monitoring at that sampling point to once every three years. Systems shall collect all samples required in paragraph (B)(1)(a) of this rule during the reduced monitoring period.

(2) Community public water systems designated by the director as utilizing waters contaminated by effluents from nuclear facilities shall sample for beta particle and photon radioactivity to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code as follows:

(a) Community public water systems shall collect monthly samples for gross beta particle activity and quarterly samples for iodine-131, tritium, and strontium-90 at each sampling point, beginning within one quarter after being notified in writing by the director. For iodine-131, five consecutive daily samples shall be analyzed once each quarter. As ordered by the director, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water. Systems designated by the director as using waters contaminated by effluents from nuclear facilities shall continue to sample until the director removes the designation.

(b) If the gross beta particle activity at a sampling point has a running average (computed quarterly) less than or equal to fifteen pCi/L (screening level) and the combined monitoring results are at or below the MCL for all measured contaminants (i.e., iodine-131, tritium, strontium-90, etc.), the director may reduce the frequency of monitoring at that sampling point to every three years. Community public water systems shall collect all samples required in paragraph (B)(2)(a) of this rule during the reduced monitoring period.

(3) A waiver from the monitoring frequencies specified in paragraph (B)(1) or (B)(2) of this rule shall not be granted to community public water systems designated by the director as vulnerable to beta particle and photon radioactivity contamination.

(4) Community public water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for gross beta particle activity analysis. Systems may subtract the potassium-40 beta particle activity value from the total gross beta activity. The potassium-40 beta particle activity shall be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82 picocuries of potassium-40 per milligram of potassium.

(5) If the gross beta particle activity (minus the naturally occurring potassium-40 beta particle activity) exceeds the appropriate screening level, an

analysis of the sample shall be performed to identify the major applicable radioactive constituents present in the sample and the appropriate doses shall be calculated and summed to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code. Doses shall also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(6) Community public water systems shall monitor monthly at the sampling point(s) which exceed the MCLs as determined in rule 3745-81-15 of the Administrative Code beginning the month after the exceedance occurs. Systems shall continue monthly monitoring until the system has established, by a running average of three monthly samples, that the MCL is being met. Systems who establish that the MCL is being met shall return to quarterly monitoring until they meet the requirements set forth in paragraph (B)(1)(b) or (B)(2)(b) of this rule.

(7) For community public water systems in the vicinity of a nuclear facility or other facility that is a radioactive source, the director may allow the systems to utilize environmental surveillance data collected by the nuclear facility (i.e., raw water data for locations within the vicinity of the systems) in lieu of monitoring at the system's sampling point(s), where the director determines that data is applicable to a particular water system. In the event that there is a release from a nuclear facility, community public water systems which are using surveillance data shall begin monitoring at the system's sampling point(s) in accordance with paragraph (B)(1) or (B)(2) of this rule.

(C) General monitoring and compliance requirements for radionuclides.

(1) The director may require more frequent monitoring than specified in paragraphs (A) and (B) of this rule, or may require confirmation samples. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

(2) To determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(3) Compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code will be determined based on the analytical result(s) obtained at each sampling point. If the average of any sampling point is greater than the MCL, then the community public water system is in violation of the MCL.

(a) For community public water systems monitoring more than once per year, compliance with the MCL is determined quarterly 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 in violation of the MCL.

(b) For community public water systems monitoring more than once per year, if any sample result will cause the running annual average to exceed to MCL at any sampling point, the system is out of compliance with the MCL immediately.

(c) Community public water systems shall include all samples taken and analyzed under the provisions of this rule in determining compliance, even if that number is greater than the minimum required.

(d) If a community public water system does not collect all required samples when compliance is based on a running annual average, compliance will be based on the running average of the total number of samples collected.

(e) If a sample result is less than the detection limit, zero will be used to calculate the running annual average, unless a gross alpha particle activity result is being used in lieu of radium-226 or uranium. If the gross alpha particle activity result is less than detection, fifty per cent of the detection limit will be used to calculate the running annual average for radium-226 and/or uranium.

(4) The director has the discretion to delete results of obvious sampling or analytical errors.

(5) If a MCL set forth in rule 3745-81-15 of the Administrative Code is exceeded, the owner or operator of a community water system shall give notice to the director pursuant to rule 3745-81-31 of the Administrative Code and to the public as required by rule 3745-81-32 of the Administrative Code.

(D) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit.

(1) The detection limit shall be that concentration which can be counted with a precision of plus or minus one hundred per cent at the ninety-five per cent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample).

(2) To determine compliance with rule 3745-81-15 of the Administrative Code, the detection limits shall not exceed the concentrations listed in the following table:

Radionuclide	Detection limit
Cesium-134	10 pCi/L
Iodine-131	1 pCi/L
Gross alpha	3 pCi/L
Gross beta	4 pCi/L
Radium-226	1 pCi/L
Radium-228	1 pCi/L
Strontium-89	10 pCi/L
Strontium-90	2 pCi/L
Tritium	1,000 pCi/L
Uranium	1 µg/L
Other beta/photon emitters	1/10 of the MCL (dose equivalent in pCi/L)

Effective: 02/22/2010

R.C. 119.032 review dates: 11/24/2009 and 02/22/2015

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Statutory Authority: 6109.03, 6109.04
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3745-81-26 **Radionuclide monitoring requirements.**

Community public water systems shall monitor as described in this rule to determine compliance with the maximum contaminant levels (MCLs) for radionuclides listed in rule 3745-81-15 of the Administrative Code. Analytical procedures which are acceptable for monitoring of radionuclide contaminants in drinking water are listed in rule 3745-81-27 of the Administrative Code. Community public water systems shall monitor for radionuclide contaminants according to a schedule provided by the director.

(A) Monitoring requirements for gross alpha particle activity, radium-226, radium-228, and uranium.

(1) 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 paragraph (D) of this rule.

(2) All existing community public water systems shall sample at every sampling point that is representative of all sources being used under normal operating conditions for that sampling point. The system shall take each sample at the same sampling point unless the director determines that conditions make another sampling location more representative of each source.

(3) All new community public water systems or community public water systems that use a new source of water shall begin initial monitoring within the first quarter after initiating use of the source.

(4) Initial monitoring. Systems shall conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

(a) Systems shall collect four consecutive quarterly samples at all sampling points.

(b) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the director may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.

(5) If the average of the initial monitoring results for a sampling point is above the maximum contaminant level (MCL), the community public water system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.

(6) Reduced monitoring. The director may allow community public water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria:

(a) 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 paragraph (D) of this rule, the community public system shall collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

(b) 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 fifty per cent of the MCL, the community public water system shall collect and analyze for that contaminant using at least one sample at that sampling point every six years.

For combined radium-226 and radium-228, the analytical results shall 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 fifty per cent of the MCL, the community public water system shall collect and analyze for the contaminant(s) using at least one sample at that sample point every six years.

(c) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

For combined radium-226 and radium-228, the analytical results shall be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above fifty per cent of the MCL but at or below the MCL, the community public water system shall collect and analyze at least one sample at that sampling point every three years.

(d) Community public water systems shall use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above fifty per cent of MCL but at or below the MCL, then the next monitoring period for that sampling point is at least one sample every three years.)

(e) If a community public water system has a monitoring result that exceeds the MCL while on reduced monitoring, the system shall collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL.

(7) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed five 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 fifteen pCi/L. The gross alpha measurement shall have a confidence interval of ninety-five per cent (1.96 sigma where sigma is the standard deviation of

the net counting rate of the sample) for radium-226 and uranium. When a community public water system uses a gross alpha particle activity measurement in lieu of 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, fifty per cent of the detection limit will be used to determine compliance and the future monitoring frequency.

(B) Monitoring requirements for beta particle and photon radioactivity.

(1) The director may designate a community public water system as vulnerable to beta particle and photon radioactivity contamination based on identified potential radioactive sources within the drinking water source protection area delineated or endorsed by the agency under Ohio's wellhead protection and source water assessment and protection programs. Community public water systems designated by the director as vulnerable shall sample for beta particle and photon radioactivity to determine compliance with the maximum contaminant levels listed in rule 3745-81-15 as follows:

(a) Community public water systems shall collect quarterly samples for beta emitters and annual samples for tritium and strotium-90 at each sampling point, beginning within one quarter after being notified by the director. Systems designated as vulnerable shall continue to sample until the director removes the designation.

(b) If the gross beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to fifty pCi/L (screening level) and the combined monitoring results for all measured contaminants (i.e. tritium. strontium-90, and any other contaminants for beta particle and photon radioactivity as specified by rule 3745-81-15 of the Administrative Code) are at or below the MCL, the director may reduce the frequency of monitoring at that sampling point to once every three years. Systems shall collect all samples required in paragraph (B)(1)(a) of this rule during the reduced monitoring period.

(2) Community public water systems designated by the director as utilizing waters contaminated by effluents from nuclear facilities shall sample for beta particle and photon radioactivity to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code as follows:

(a) Community public water systems shall collect monthly samples for gross beta particle activity and quarterly samples for iodine-131, tritium, and strontium-90 at each sampling point, beginning within one quarter after being notified in writing by the director. For iodine-131, five consecutive daily samples shall be analyzed once each quarter. As ordered by the director, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water. Systems designated by the director as using waters contaminated by effluents from nuclear facilities shall

continue to sample until the director removes the designation.

(b) If the gross beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to fifteen pCi/L (screening level) and the combined monitoring results are at or below the MCL for all measured contaminants (i.e., iodine-131, tritium, strontium-90, etc.), the director may reduce the frequency of monitoring at that sampling point to every three years. Community public water systems shall collect all samples required in paragraph (B)(2)(a) of this rule during the reduced monitoring period.

(3) A waiver from the monitoring frequencies specified in paragraph (B)(1) or (B)(2) of this rule shall not be granted to community public water systems designated by the director as vulnerable to beta particle and photon radioactivity contamination.

(4) Community public water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for gross beta particle activity analysis. Systems may subtract the potassium-40 beta particle activity value from the total gross beta activity. The potassium-40 beta particle activity shall be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82 picocuries of potassium-40 per milligram of potassium.

(5) If the gross beta particle activity (minus the naturally occurring potassium-40 beta particle activity) exceeds the appropriate screening level, an analysis of the sample shall be performed to identify the major applicable radioactive constituents present in the sample and the appropriate doses shall be calculated and summed to determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code. Doses shall also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(6) Community public water systems shall monitor monthly at the sampling point(s) which exceed the MCLs as determined in rule 3745-81-15 of the Administrative Code beginning the month after the exceedance occurs. Systems shall continue monthly monitoring until the system has established, by a running average of three monthly samples, that the MCL is being met. Systems who establish that the MCL is being met shall return to quarterly monitoring until they meet the requirements set forth in paragraph (B)(1)(b) or (B)(2)(b) of this rule.

(7) For community public water systems in the vicinity of a nuclear facility or other facility that is a radioactive source, the director may allow the systems to utilize environmental surveillance data collected by the nuclear facility (i.e., raw water data for locations within the vicinity of the systems) in lieu of monitoring at the system's sampling point(s), where the director determines that data is applicable to a particular water system. In the event that there is a

release from a nuclear facility, community public water systems which are using surveillance data shall begin monitoring at the system's sampling point(s) in accordance with paragraph (B)(1) or (B)(2) of this rule.

(C) General monitoring and compliance requirements for radionuclides.

(1) The director may require more frequent monitoring than specified in paragraphs (A) and (B) of this rule, or may require confirmation samples. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

(2) To determine compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

(3) Compliance with the MCLs listed in rule 3745-81-15 of the Administrative Code will be determined based on the analytical result(s) obtained at each sampling point. If the average of any sampling point is greater than the MCL, then the community public water system is in violation of the MCL.

(a) For community public water systems monitoring more than once per year, compliance with the MCL is determined quarterly 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 in violation of the MCL.

(b) For community public water systems monitoring more than once per year, 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.

(c) Community public water systems shall include all samples taken and analyzed under the provisions of this rule in determining compliance, even if that number is greater than the minimum required.

(d) If a community public water system does not collect all required samples when compliance is based on a running annual average, compliance will be based on the running average of the total number of samples collected.

(e) If a sample result is less than the detection limit, zero will be used to calculate the running annual average, unless a gross alpha particle activity result is being used in lieu of radium-226 or uranium. If the gross alpha particle activity result is less than detection, fifty per cent of the detection limit will be used to calculate the running annual average for radium-226 and/or uranium.

(4) The director has the discretion to delete results of obvious sampling or analytical errors.

(5) If a MCL set forth in rule 3745-81-15 of the Administrative Code is exceeded, the owner or operator of a community water system shall give notice to the director pursuant to rule 3745-81-31 of the Administrative Code and to the public as required by rule 3745-81-32 of the Administrative Code.

(D) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit.

(1) The detection limit shall be that concentration which can be counted with a precision of plus or minus one hundred per cent at the ninety-five per cent confidence level (1.96 sigma where sigma is the standard deviation of the net counting rate of the sample).

(2) To determine compliance with rule 3745-81-15 of the Administrative Code, the detection limits shall not exceed the concentrations listed in the following table:

Radionuclide	Detection limit
Cesium-134	10 pCi/L
Iodine-131	1 pCi/L
Gross alpha	3 pCi/L
Gross beta	4 pCi/L
Radium-226	1 pCi/L
Radium-228	1 pCi/L
Strontium-89	10 pCi/L
Strontium-90	2 pCi/L
Tritium	1,000 pCi/L
Uranium	1 µg/L
Other beta/photon emitters	1/10 of the MCL (dose equivalent in pCi/L)

Effective: 02/23/2015
R.C. 106.03 review dates: 11/17/2014 and 11/17/2019

Promulgated Under 106.03
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Rule Amplifies: 6109.04
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3745-81-27 Analytical techniques.

Analyte analyses conducted to determine compliance with Chapters 3745-81, 3745-82, and 3745-83 of the Administrative Code shall be performed by a laboratory certified by the director pursuant to Chapter 3745-89 of the Administrative Code unless otherwise specified and shall be made in accordance with methods listed in the 40 Code of Federal Regulations (C.F.R.) parts 141, including Appendix A (Alternative Testing Methods Approved for Analyses under the Safe Drinking Water Act) to Subpart C (Monitoring and Analytical Requirements) of part 141, and 143 for the analytes referenced in this rule.

(A) Methods which have been determined to be equivalent to an approved method, by "USEPA Alternative Test Procedure (ATP) program at the Office of Ground Water and Drinking Water's Technical Support Center (OGWDW/TSC)," may be used for compliance monitoring. Equivalent methods will be referenced in the C.F.R. part 141 Appendix A (Alternative Testing Methods Approved for Analyses under the Safe Drinking Water Act) to Subpart C (Monitoring and Analytical Requirements) The letter of equivalence issued by USEPA's ATP program at OGWDW/TSC must be maintained by the certified laboratory and be available for verification.

(B) Inorganic chemical analyses for analytes identified in rules 3745- 81-11, 3745-81-23, 3745-81-80 to 3745-81-86, 3745-81-88, and 3745-83-01 of the Administrative Code.

(C) Organic chemical analyses for analytes identified in rules 3745-81-12 and 3745-81-24 of the Administrative Code.

(D) Residual disinfection analyses for analytes identified in rules 3745-81-10, 3745-81-43, 3745-81-70 to 3745-81-74 and 3745-83-01 of the Administrative Code. Residual disinfectant concentrations for free chlorine, total chlorine, combined chlorine and chlorine dioxide shall be measured by persons acceptable to the director.

(E) Treatment techniques analyses and operational requirements (or plant control tests) analyses for analytes identified in rules 3745-81-77 and 3745-83-01 of the Administrative Code, respectively. Turbidity shall be measured by a person designated on a valid certificate of approval as required under rule 3745-89-03 of the Administrative Code.

(F) Microbiological analyses for analytes identified in rules 3745-81-14, 3745-81-21, 3745-81-42, 3745-81-43, and 3745-81-50 to 3745-81-55 of the Administrative Code.

(G) Radioactivity analyses for analytes identified in rules 3745-81-15 and 3745-81-26 of the Administrative Code.

(H) Source water monitoring analyses for analytes identified in rules 3745-81-64 to 3745-81-69 of the Administrative Code. Analyses for analytes conducted to determine compliance with rules 3745-81-64 to 3745-81-69 of the Administrative Code shall be performed by a laboratory certified by the director pursuant to Chapter 3745-89 of the Administrative Code unless otherwise specified, and shall be made in accordance with

methods listed in the 40 C.F.R. part 136 and 141 for the analytes referenced in these rules.

(I) Ground water assessment analyses for analytes identified in rule 3745-81-42 of the Administrative Code.

(J) Control of lead and copper analyses for analytes identified in rule 3745-81-89 of the Administrative Code.

(K) Harmful Algal Blooms analyses for analytes identified in rule 3745-90-04 of the Administrative Code.

(L) Well Development and Pumping Test analyses for analytes identified in rule 3745-9-09 of the Administrative Code.

(M) Water quality parameter analyses for analytes identified in rule 3745-81-87 of the Administrative Code -shall be analyzed in accordance with methods referenced in this rule but are exempt from being analyzed at laboratories meeting requirements of rule 3745-89-02 of the Administrative Code.

Replaces: 3745-81-27

Effective: 10/26/2020

Five Year Review (FYR) Dates: 10/26/2025

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3745-81-28 Acceptability of analytical results.

Analytical results for the purpose of determining compliance with this chapter may be considered only if they have been determined and reported by a laboratory certified by or otherwise acceptable to the director under Chapter 3745-89 of the Administrative Code, except that measurements for free chlorine, total chlorine, combined chlorine and chlorine dioxide may be performed by any person acceptable to the director and reported to the director by the public water system.

Effective: 10/26/2020

Five Year Review (FYR) Dates: 10/26/2025

Promulgated Under:	119.03
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3745-81-29. Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the director may modify the monitoring requirements imposed by this chapter 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 director and concurred in by the administrator of the U.S. environmental protection agency.

Effective: December 27, 1978

Promulgated under: Section 3, Am. Sub. S.B. 445 112th General Assembly
Rule amplifies: RC Section 6109.04

3745-81-31 **Reporting requirements for public water systems.**

(A) Except where a different reporting period is specified in this chapter, the public water system is responsible for ensuring that the results of a test, measurement, or analysis required to be made by this chapter are reported to the director within the first ten days following the month in which the result is received for that test, measurement, or analysis or within the first ten days following the end of the required monitoring period as specified by the director, whichever occurs first.

(B) The director may invalidate sample results that do not contain complete and accurate sample location information, as well as results of obvious sampling or analytical error.

(C) The public water system shall report to the director within forty-eight hours the failure to comply with any requirement of state primary drinking water rules, unless otherwise stated in this chapter that the director will determine compliance.

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3745-81-32 **Public notification.**

(A) General requirements for public notification by public water systems.

(1) The owner or operator of a public water system shall provide public notice to persons served by that public water system in accordance with this rule. 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 in accordance with this rule to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice in accordance with this rule to the persons it serves.

(2) If a community 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 as described in the emergency contingency plan required by Chapter 3745-85 of the Administrative Code, the director may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission for limited distribution may be granted in writing by the director.

(3) The public water system, within ten days of completing the public notification requirements under this rule for the initial public notice and any repeat notices, shall submit to the director a completed verification form indicating that the system has fully complied with the public notification regulations. The public water system shall include with this certification a representative copy of each type of notice distributed, published, posted and made available to the persons served by the system and to the media.

(B) Tier 1 public notification requirements.

(1) The owner or operator of a public water system with any of the following violations or situations that may pose an acute risk to human health, shall notify the persons served by the public water system in accordance with paragraph (B)(3) of this rule:

(a) Any violation or situation specified by the director as posing an acute risk to human health including, but not limited to, situations revealed through a level one assessment or level two assessment conducted pursuant to rule 3745-81-53 of the Administrative Code.

(b) Violation of the maximum contaminant level (MCL) for nitrate and nitrite as established in rule 3745-81-11 of the Administrative Code and determined according to rule 3745-81-23 of the Administrative Code.

(c) Violation of the maximum contaminant level for Escherichia coli (E. coli), as specified in paragraph (A) of rule 3745-81-54 of the Administrative Code. The Tier 1 notice shall remain in effect until a set of three repeat samples collected from the distribution system is total coliform-negative. The repeat samples shall be monitored in accordance with rule 3745-81-52 and paragraphs (B)(5) and (F) of rule 3745-81-50 of the Administrative Code.

(d) Occurrence of a waterborne disease outbreak in a public water system, as defined in rule 3745-81-01 of the Administrative Code, or waterborne emergency as specified by the director.

(e) Violation of the maximum residual disinfectant level (MRDL) for chlorine dioxide as defined in rule 3745-81-10 of the Administrative Code and determined according to rule 3745-81-70 of the Administrative Code.

(f) Exceedance of the turbidity level in representative samples of filtered water as specified in paragraph (E) of rule 3745-81-75 of the Administrative Code and one or more of the following occurs:

(i) The public water system fails to consult with the director within twenty-four hours after learning of the violation.

(ii) Any failure in an individual treatment process where the treatment process does not operate as designed and approved.

(iii) The director determines after consultation that a Tier 1 notice is required.

(g) Public water systems with an E. coli-positive ground water source sample collected under paragraph (A) or (B) of rule 3745-81-42 of the Administrative Code. This requirement also applies to consecutive systems supplied by the ground water source. The Tier 1 public notice shall remain in effect until all corrective action has been completed to eliminate the cause of the E. coli contamination.

(2) The owner or operator of a public water system with a physical or operational disruption shall notify the persons served in the affected area of the public water system in accordance with paragraph (B)(3) of this rule when any sample (including special purpose samples) taken after minimum pressure falls below twenty pounds per square inch gauge at ground level and within the affected area of disruption is determined to be E. coli positive.

(a) Tier 1 notice is not required if the system issued a precautionary notice as approved by the director through the public water system's contingency plan required by Chapter 3745-85 of the Administrative Code and a follow-up notice identifying the E. coli results are issued to persons who received the preliminary notice.

(b) The Tier 1 notice shall remain in effect until total coliforms are not detected in consecutive samples collected twenty-four hours apart. The number of samples to be collected each day shall be representative of the affected area but not be less than two samples per day.

(3) Public water systems shall do all of the following:

(a) Provide a public notice as soon as practical but no later than twenty-four hours after the system learns of the violation or situation, using one or more of the following forms of delivery in order to reach all persons served:

(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.

(iv) Another delivery method approved in writing by the director.

(b) Initiate consultation with the director as soon as practical, but no later than twenty-four hours after the public water system learns of the violation or situation, to determine additional public notice requirements.

(c) Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the director. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.

(C) Tier 2 public notification requirements.

(1) The owner or operator of a public water system with any of the following violations or situations shall notify the persons served by the public water system in accordance with paragraph (C)(2) of this rule:

(a) All violations of the MCL, MRDL, and treatment technique requirements pursuant to this chapter, except those specified in paragraph (B)(1) of this rule.

(b) Failure to collect any three months or more of source water monitoring as specified in paragraph (C) of rule 3745-81-65 of the Administrative Code for the "Long Term 2 Enhanced Surface Water Treatment Rule."

(c) Failure to determine and report bin classification or mean Cryptosporidium level required by paragraphs (A) to (D) of rule 3745-81-65 of the Administrative Code for the "Long Term 2 Enhanced Surface Water Treatment Rule."

(d) Any other violation or situation specified by the director.

(2) Public water systems shall do all of the following:

(a) Provide a public notice as soon as practical, but no later than thirty days after the system learns of the violation or situation.

(i) Community public water systems shall provide notice using the following forms of delivery in order to reach all persons served:

(a) At least, 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.

(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)(2)(a)(i)(a) of this rule. 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. If the public notice is posted, the notice shall remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved.

(ii) Noncommunity public water systems shall provide notice using the following forms of delivery in order to reach all persons served:

(a) At least, 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). If the public notice is posted, the notice shall remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved.

(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)(2)(a)(ii)(a) of this rule. 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. When the persons served are children, such as in schools, their parents or legal guardians shall be notified. Other methods may include: publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students and parents or legal guardians; or delivery of multiple copies in central locations (e.g., community centers).

(b) The public water system shall repeat the notice every three months as long as the violation or situation persists, unless the director determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstances may the repeat notice be given less frequently than once per year. Less frequent repeat public notices shall not be allowed for an MCL or treatment technique violation under rule 3745-81-54 of the Administrative Code or a treatment technique violation under rules 3745-81-61 and 3745-81-64 to 3745-81-74 of the Administrative Code. Permission to issue repeat notices less frequently than once every three months shall be granted in writing by the director.

(c) For turbidity violations specified in paragraph (E) of rule 3745-81-75 of the Administrative Code, public water systems shall consult with the director as soon as practical but no later than twenty-four hours after the public water system learns of the violation. When the director determines after consultation that a Tier 1 notice is required, or when consultation does not take place within the twenty-four hour period, the water system shall distribute notice of the violation within the next twenty-four hours (i.e., no later than forty-eight hours after the system learns of the violation) in accordance with paragraph (B) of this rule.

(D) Tier 3 public notification requirements.

(1) The owner or operator of a public water system with any of the following violations or situations shall notify the persons served by the public water system in accordance with paragraphs (D)(2) and (D)(3) of this rule:

(a) Violations of the monitoring and testing procedure requirements pursuant to this chapter.

(b) Exceedance of the fluoride secondary maximum contaminant level (SMCL) as specified in Chapter 3745-82 of the Administrative Code.

(c) Availability of unregulated contaminant monitoring results, as required by 40 C.F.R. Section 141.207.

(d) Reporting and recordkeeping violations under rules 3745-81-50 to 3745-81-55 of the Administrative Code.

(e) Any other violation or situation specified by the director.

(2) Community public water systems shall provide notice as soon as practical, but no later than one year after the public water system learns of the violation or situation. The following forms of delivery shall be used in order to reach all persons served:

(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.

(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 (D)(2)(a) of this rule. 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. If the public notice is posted, the notice shall remain in place for as long as the violation or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).

(c) The consumer confidence report (CCR) required under Chapter 3745-96 of the Administrative Code may be used as a vehicle for the initial public notice and all required repeat notices, as long as all of the following is met:

(i) The CCR is provided to persons served within the time frames specified in paragraph (D)(2) of this rule.

(ii) The notice contained in the CCR follows the content requirements under this rule.

(iii) The CCR is distributed following the delivery requirements in this rule.

(3) Noncommunity water systems shall provide notice as soon as practical, but no later than thirty days after the public water system learns of the violation or situation. The following forms of delivery shall be used in order to reach all persons served:

(a) Posting the notice in conspicuous locations through the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known). If the public notice is posted, the notice shall remain in place for as long as the violation or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).

(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 (D)(3)(a) of this rule. Such persons may include

those who may not see a posted notice because the notice is not in a location they routinely pass by. When the persons served are children, such as in schools, their parents or legal guardians shall be notified. Other methods may include: publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students and parents or legal guardians; or, delivery of multiple copies in central locations (e.g., community centers).

(4) For methods other than posting, the public water system shall repeat the notice annually for as long as the violation or other situation persists.

(5) For violations of the fluoride SMCL, the public water system shall send a copy of the notice to the local health department and the "Ohio Department of Health, Bureau of Oral Health Services."

(E) Content of public notices.

(1) Each public notice, except the public notice required in paragraphs (C)(1)(b) and (C)(1)(c) of this rule, shall include all of the following elements:

(a) A description of the violation or situation, including the contaminant of concern, the MCL, and (as applicable) the contaminant level.

(b) When the violation or situation occurred.

(c) Any potential adverse health effects from the violation or situation, including one or both of the following:

(i) Standard health effects language specified in table 1 of this rule, including the language necessary to fill in the blanks, for MCL, MRDL, treatment technique or fluoride SMCL exceedances.

(ii) Standard language for monitoring and testing procedure violations, including the language necessary to fill in the blanks: "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."

(d) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water.

(e) Whether alternative water supplies should be used.

(f) What actions consumers should take, including when they should seek medical help, if known.

(g) What the system is doing to correct the violation or situation.

(h) When the water system expects to return to compliance or resolve the situation.

(i) 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.

(j) A statement to encourage the notice recipient to distribute the public notice to other persons served, using the following standard language: "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."

(2) Each public notice required by paragraphs (C)(1)(b) and (C)(1)(c) of this rule shall include all of the following elements:

(a) The public notice for repeated failure to conduct monitoring as specified in paragraph (C)(1)(b) of this rule shall 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, shall 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 [contact name] of [public water system name] at [phone number]."

(b) The public notice for failure to determine bin classification or mean Cryptosporidium level as specified in paragraph (C)(1)(c) of this rule shall 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 [public water system 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 [contact name] of [public water system name] at [phone number]."

(c) Each public notice shall 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.

(3) Presentation of the public notice.

(a) Each public notice required by this section shall meet all of the following:

(i) Be displayed in a conspicuous way when printed or posted.

(ii) Not contain overly technical language or very small print.

(iii) Not be formatted in a way that defeats the purpose of the notice.

(iv) Not contain language which nullifies the purpose of the notice.

(b) For public water systems serving a large proportion of non-English speaking consumers, defined as ten per cent or more of the residents speaking the same non-English language, the public notice shall contain information in the appropriate language 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.

(4) Notice to new billing units or new customers.

(a) Community water systems shall give a copy of the most recent public notice for any continuing violation, 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) Noncommunity water systems shall continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation or other situation requiring a public notice for as long as the violation or other situation persists.

(F) The director may give the notice required by this rule when the owner or operator of a public water system fails or refuses to comply with this rule. However, the owner or operator of a public water system remains responsible for ensuring that this rule is satisfied.

Table 1: Standard Health Effects Language for Public Notification	
Contaminant	Standard Health Effects Language or Public Notification
A. Microbiological Contaminants	
1c. Ground Water Rule (GWR): E. coli,	E. coli are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1d. GWR, Treatment Technique Violations	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.
1e. Revised Total Coliform Rule (RTCR), Coliform Assessment and Corrective Action Violations	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating

	the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that were found. [The system shall use the following applicable sentences.] We failed to conduct the required assessment. We failed to correct all identified significant deficiencies that were found during the assessment.
1f. RTCR, E. coli Assessment and/or Corrective Action Violations	E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We violated the standard for E. coli, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct a detailed assessment to identify problems and to correct any problems that are found. [The system shall use the following applicable sentences.] We failed to conduct the required assessment. We failed to correct all identified significant deficiencies that were found during the assessment that we conducted.
1g. E. coli	E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems.
1h. RTCR, Seasonal System TT Violations	When this violation includes the failure to monitor for total coliforms or E. coli prior to serving water to the public, the standard language found in paragraph (E)(1)(c)(ii) of this rule shall be used. When this violation includes failure to complete other actions, the appropriate elements found in paragraph (E)(1) of this rule to describe the violation shall be used.
2. Turbidity	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[1], Interim Enhanced Surface Water Treatment Rule [2], Long Term 1 Enhanced Surface Water Treatment Rule[3], and Filter Backwash Recycling Rule[4]Violations.	
3. Giardia lamblia[5]	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[5]	
5. Heterotrophic plate count (HPC) bacteria[6]	
6. Legionella[5]	
7. Cryptosporidium[5]	
C. Inorganic Chemicals (IOCs)	
8. Antimony	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9. Arsenic	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)	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	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	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	Some people who drink water containing cadmium in

	excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
15. Cyanide (as free cyanide)	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.
16a. Fluoride (MCL)	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 or pitting of the teeth, and occurs only in developing teeth, before they erupt from the gums.
16b. Fluoride (Secondary MCL)	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 public 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 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.
17. Mercury (inorganic)	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	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	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	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	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	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	
23. Lead	Exposure to lead in drinking water can cause serious

	health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.
24. Copper	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	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5-TP (Silvex)	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	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	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)	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	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	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	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
33. Di (2-ethylhexyl) adipate	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties.
34. Di (2-ethylhexyl) phthalate	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	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)	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an ncreased risk of getting cancer.
38. Diquat	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	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	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	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	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	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	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	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
46. Hexachlorocyclopentadiene	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
47. Lindane	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	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.

50. Pentachlorophenol	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	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)	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	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	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	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	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)	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	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	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	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	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	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	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	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	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	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	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	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	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	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	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	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	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	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)	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	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
77. Alpha emitters (Gross alpha)	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 &	Some people who drink water containing radium 226

228)	or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
79. Uranium	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).	
80. Total trihalomethanes (TTHMs)	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
81. Haloacetic Acids (HAA)	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	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	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.
84. Chlorine	Some people who use drinking water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
85. Chloramines	Some people who use drinking water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience

	stomach discomfort or anemia.
86a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL	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. 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 distribution system samples are above the MRDL	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
87. Control of DBP precursors (TOC)	Total organic carbon (TOC) has not health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
I. Other Treatment Techniques	
88. Acrylamide	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	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

[1]U.S. EPA Surface Water Treatment Rule (SWTR), 54 Fed Reg 27486 (June 29, 1989).

[2]U.S. EPA Interim Enhanced Surface Water Treatment Rule (IESWTR), 63 Fed Reg 69478 (December 16, 1998).

[3]U.S. EPA Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), 67 Fed Reg 1812 (January 14, 2002).

[4]U.S. EPA Filter Backwash Recycling Rule (FBRR), 66 Fed Reg 31103 (June 8, 2001).

[5]SWTR, IESWTR, LT1EWSTR and FBRR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.

[6]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.

[Comment: The 40 C.F.R. 141.207 refers to the "Code of Federal Regulations" published on May 4, 2000. A copy of this code may be obtained from the "U.S. Government Bookstore" toll-free at (866) 512-1800 or https://www.gpo.gov/fdsys, or from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752. The code is available for review at, "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."

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3745-81-33 **Record maintenance.**

Any owner or operator of a public water system subject to the provisions of this chapter shall retain on its premises or at a convenient location near its premises the following records:

(A) Records of microbiological and turbidity analyses made pursuant to this chapter shall be kept for not less than five years unless otherwise specified. Records of chemical analyses made pursuant to this chapter 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:

(1) The date, place, and time of sampling, and the name of the person who collected the sample.

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample.

(3) Date of analysis.

(4) Laboratory and person responsible for performing analysis.

(5) The analytical technique/method used.

(6) The results of the analysis.

(B) Records of action taken by the system to correct violations of state primary drinking water rules shall be kept for a period not less than three years after the last action taken with respect to the particular violation involved.

(C) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, state or federal agency, shall be kept for a period not less than ten years after completion of the sanitary survey involved.

(D) Copies of public notices issued pursuant to rule 3745-81-32 of the Administrative Code and certifications submitted to the director pursuant to paragraph (A)(3) of rule 3745-81-32 of the Administrative Code must be kept for a minimum of three years after issuance.

(E) Copies of any decisions, reports, monitoring plans or certifications developed by the system or an agent of the system shall be kept for a minimum of five years for microbiological and turbidity records and a minimum of ten years for chemical records.

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3745-81-41 **Ground water rule - general requirements and applicability.**

Applicability. This rule applies to all public water systems that use ground water except those 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 rule 3745-81-71 of the Administrative Code. For the purpose of rules 3745-81-41 to 3745-81-45 of the Administrative Code, "ground water system" is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.

(A) Systems subject to this rule shall comply with the following:

(1) Inspection and response requirements for all ground water systems as described in rule 3745-81-60 of the Administrative Code.

(2) Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 per cent (4-log) treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in rule 3745-81-42 of the Administrative Code.

(3) Treatment technique requirements, described in rule 3745-81-61 of the Administrative Code, that apply to ground water systems that have E.coli contaminated source waters as determined by source water monitoring conducted under rule 3745-81-42 of the Administrative Code, or that have significant deficiencies that are identified by the director through the sanitary survey process, or through a level one or level two assessment conducted in accordance with rule 3745-81-53 of the Administrative Code. A ground water system with E. coli contaminated source water or with significant deficiencies subject to the treatment technique requirements of this rule shall implement one or more of the following corrective action options: correct all significant deficiencies; provide an alternate source of water; eliminate the source of contamination; or provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer.

(4) Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in rule 3745-81-43 of the Administrative Code.

(5) If requested by the director, ground water systems shall provide any existing information that will enable the director to perform a hydrogeologic

sensitivity assessment.

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3745-81-42 **Ground water rule - ground water source microbial monitoring and analytical methods.**

(A) Triggered source water monitoring.

(1) A ground water system shall conduct triggered source water monitoring if the conditions identified in paragraphs (A)(1)(a) and (A)(1)(b) of this rule exist.

(a) The system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source.

(b) The system is notified that a sample collected under rule 3745-81-51 of the Administrative Code is total coliform-positive and the sample is not invalidated in accordance with paragraph (D) of rule 3745-81-50 of the Administrative Code.

(2) A ground water system shall collect, within twenty-four 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 rule 3745-81-51 of the Administrative Code. The ground water source sample shall be analyzed for E. coli as described in paragraph (C) of this rule.

(a) Upon a request from a public water system, the director may extend the twenty-four hour time limit on a case-by-case basis if the system logistically cannot collect the ground water source samples within twenty-four hours due to circumstances beyond the system's control. When an extension is granted, the director shall specify how much time the system has to collect the ground water source samples.

(b) If acceptable to the director, public water systems with more than one ground water source may meet the requirements of paragraph (A)(2) of this rule by collecting a representative sample from a location acceptable to the director. If required, public water systems shall submit a triggered source water monitoring plan acceptable to the director that identifies one or more sampling locations that are representative of each monitoring site in the system's sample siting plan under rule 3745-81-50 of the Administrative Code, and that the system intends to use for representative sampling under this paragraph.

(c) A noncommunity ground water system serving one thousand people or fewer that has minimal treatment for a single ground water source, as

defined in rule 3745-81-01 of the Administrative Code, may use a repeat sample taken in accordance with rule 3745-81-52 of the Administrative Code to also satisfy the monitoring requirements of paragraph (A)(2) of this rule for that ground water source. If any repeat sample collected from the ground water source is E. coli-positive, the system shall comply with paragraph (A)(3) of this rule.

(3) If the director does not require corrective action in accordance with rule 3745-81-61 of the Administrative Code for an E. coli positive source water sample collected under paragraph (A)(2) of this rule that is not invalidated under paragraph (D) of this rule, a system shall collect a minimum of five additional source water samples within twenty-four hours of being notified of an E. coli positive sample. At least one sample shall be collected from each well that was in operation at the time of the first positive routine sample. If the system does not have records that indicate which wells were in operation at the time of the first positive routine sample, then samples shall be collected from all active wells in the system. If there are less than five wells in the system, additional samples shall be distributed as evenly as possible among sampled wells to assure that at least five samples are collected.

(4) Consecutive and wholesale systems.

(a) In addition to the other requirements of paragraph (A) of this rule, a consecutive ground water system that has a total coliform-positive sample collected under rule 3745-81-51 of the Administrative Code, shall notify the wholesale system within twenty-four hours of being notified of the total coliform-positive sample.

(b) In addition to the other requirements of paragraph (A) of this rule, a wholesale ground water system shall comply with the following:

(i) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under rule 3745-81-51 of the Administrative Code, is total coliform-positive shall, within twenty-four hours of being notified, collect a sample from its ground water sources under paragraph (A)(2) of this rule and analyze it for E. coli under paragraph (C) of this rule.

(ii) If the sample collected under paragraph (A)(4)(b)(i) of this rule is E. coli positive, the wholesale ground water system shall notify all consecutive systems served by that ground water source of the E. coli positive result within twenty-four hours of being notified of

the ground water source sample monitoring result and shall comply with paragraph (A)(3) of this rule.

(5) A ground water system is not required to comply with the source water monitoring requirements of paragraph (A) of this rule if either of the following conditions exists:

(a) The director determines, and documents in writing, that the total coliform-positive sample collected under rule 3745-81-51 of the Administrative Code, is caused by a distribution system deficiency.

(b) The total coliform-positive sample collected under rule 3745-81-51 of the Administrative Code is collected at a location that meets the director's criteria for distribution system conditions that will cause total coliform-positive samples.

(B) Assessment source water monitoring.

If directed, ground water systems shall conduct assessment source water monitoring that meets director-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under paragraph (A)(2) of this rule to meet paragraph (B) of this rule. Director-determined assessment source water monitoring requirements may include the following:

(1) A hydrogeologic sensitivity assessment in accordance with paragraph (A)(5) of rule 3745-81-41 of the Administrative Code.

(2) Collection of a standard sample volume of at least one hundred milliliters for E. coli listed in rule 3745-81-27 of the Administrative Code for the presence of E. coli.

(3) Collection of ground water source samples in accordance with a sampling schedule determined by the director.

(4) Analysis of all ground water source samples, using one of the analytical methods listed in rule 3745-81-27 of the Administrative Code or as determined by the director, for the presence of E. coli.

(5) Collection of ground water source samples at a location prior to any treatment of the ground water source unless the director accepts a sampling location

after treatment.

(6) Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the director accepts an alternate sampling location that is representative of the water quality of that well.

(C) Analytical methods.

(1) A ground water system subject to the source water monitoring requirements of paragraph (A) of this rule shall collect a standard sample volume of at least one hundred milliliters for E. coli analysis regardless of the analytical method used.

(2) A ground water system shall analyze all ground water source samples collected in accordance with paragraph (A) of this rule, using one of the analytical methods listed in rule 3745-81-27 of the Administrative Code or as determined by the director, for the presence of E. coli.

(D) Invalidation of an E.coli positive ground water source sample.

(1) A ground water system may obtain director invalidation of an E. coli positive ground water source sample collected under paragraph (A) of this rule only under either of the following conditions:

(a) The system provides the director with written notice from the laboratory that improper sample analysis occurred.

(b) The director determines, and documents in writing, that there is substantial evidence that an E. coli positive ground water source sample is not related to source water quality.

(2) If the director invalidates an E. coli positive ground water source sample, the ground water system shall collect another source water sample under paragraph (A) of this rule within twenty-four hours of being notified of the sample invalidation and have the source water sample analyzed for E. coli using the analytical methods in paragraph (C) of this rule. The director may extend the twenty-four hour time limit on a case-by-case basis if the system cannot collect the source water sample within twenty-four hours due to circumstances beyond the system's control. In the case of an extension, the director shall specify how much time the system has to collect the sample.

(E) Sampling location.

(1) Any ground water source sample required under paragraph (A) of this rule shall be collected at a location prior to any treatment of the ground water source unless the director accepts a sampling location after treatment.

(2) If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a director-accepted location to meet paragraph (A) of this rule if the sample is representative of the water quality of that well.

(3) A ground water system with minimal treatment, as defined in rule 3745-81-01 of the Administrative Code, may collect a sample at a location acceptable to the director.

(F) If required by the director, a ground water system that places a new ground water source into service, shall conduct assessment source water monitoring under paragraph (B) of this rule. If required by the director, the system shall begin monitoring before the ground water source is used to provide water to the public.

(G) A ground water system with a ground water source sample collected under paragraph (A) or (B) of this rule that is E. coli positive and that is not invalidated under paragraph (D) of this rule, including consecutive systems served by the ground water source, shall conduct public notification in accordance with paragraph (B)(1)(i) of rule 3745-81-32 of the Administrative Code.

(H) Failure to meet paragraphs (A) to (F) of this rule is a monitoring violation and requires the ground water system to provide public notification under paragraph (D)(1)(a) of rule 3745-81-32 of the Administrative Code.

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3745-81-43 **Ground water rule - compliance monitoring requirements for ground water systems.**

(A) Compliance monitoring.

(1) A ground water system that is not required to meet the source water monitoring requirements of rule 3745-81-42 of the Administrative Code because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source shall comply with the following requirements:

(a) The system shall notify the director in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the director shall include engineering, operational, or other information that the director requests to evaluate the submission. The notification may also require a complete plan approval application in accordance with Chapter 3745-91 of the Administrative Code.

(b) The system shall obtain acceptance or approval from the director for 4-log treatment of viruses.

(c) The system shall conduct compliance monitoring as required in paragraph (A)(2) of this rule within thirty days of placing the source in service or receiving director approval for 4-log treatment of viruses.

(d) The system shall conduct ground water source monitoring in accordance with rule 3745-81-42 of the Administrative Code if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(2) Monitoring requirements. A ground water system subject to the requirements of paragraph (A)(1) of this rule or requirements in rule 3745-81-61 of the Administrative Code, shall monitor the effectiveness and reliability of treatment for that ground water source before or at the first customer as follows:

(a) Chemical disinfection.

(i) For a system providing disinfection treatment only, the disinfection treatment shall be considered sufficient if the total treatment processes of that public water system would consistently and reliably achieve at least 99.99 per cent (4-log) inactivation of viruses, as determined from tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code.

(ii) Treatment technique requirements are used to ensure control of viruses in drinking water. Tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code shall be used to determine the sufficiency of disinfection for this rule.

(iii) The level of disinfection being provided by the system is determined by measuring actual CT values. Actual CT values are obtained by multiplying the residual disinfectant, C, by the disinfection contact time, T, giving the resultant, CT. The value of C in milligrams per liter is determined at a point before or at the first customer. The value of T in minutes is based on the time available for the disinfectant to work from the point at which it is added to the water until the point at which C is measured. Values of T are determined based on the approved effective volume factor of the clearwell or contact tank including T for the conduit before the first customer. It may be appropriate to determine the value of C at more than one point of the water treatment flow, with the T associated with each C being estimated from the previous measurement point or the previous addition of disinfectant, whichever is closer. If more than one disinfectant concentration point is used, the products of each C and its associated T are added and the sum of these products is the actual CT value to compare with the appropriate value of the required minimum CT values for specified conditions and levels of inactivation. Note that any disinfection after the last determination of C is not included in the actual CT value. Minimum required CT values for inactivation of viruses by disinfection in relation to the disinfectant, the extent of inactivation, the lowest disinfectant concentration, the pH, and the water temperature are found in tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code.

(iv) In tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code, the required CT between the indicated temperatures, pH or residual disinfectant concentrations may be determined by linear interpolation. If no interpolation is used,

then the required CT shall be determined at the lower temperature, and at the higher pH. If no interpolation is used, for virus inactivation at a pH greater than nine, the required CT shall be the same as the required CT at a pH equal to ten.

(v) On each day when the actual CT value meets or exceeds the required minimum CT value in or linearly interpolated from tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code, then the water treatment plant is considered to be satisfying this rule's treatment technique requirements for disinfection of ground water sources. On each day when the actual CT value does not meet or exceed the required minimum CT value from tables B-7, B-9, B-11 and B-13 of rule 3745-81-72 of the Administrative Code, then the water treatment plant is in violation of paragraph (A)(2)(a)(i) of this rule if the CT value is not restored within four hours.

(vi) For each clearwell, or contact tank, the approved effective volume factor shall be determined by the director based upon its design characteristics including: the average flow path length to channel width ratio; baffling; and the proximity of the outlet to the inlet using figures B-1 and B-2 of rule 3745-81-72 of the Administrative Code. The approved effective volume factor shall be the preliminary effective volume factor obtained from figure B-1 multiplied by the reduction factor obtained from figure B-2, rounded down to the nearest 0.05. A public water system may request that the director approve an effective volume factor that was determined by tracer studies, hydraulic analysis or modeling, or an equivalent demonstration. For a tracer study to be acceptable, the net advection of the tracer shall be within ten per cent of the change in the tracer chemical storage within the clearwell system. Net advection means the amount of tracer convected out of the clearwell system minus the amount of tracer convected into the clearwell system over the duration of the tracer study.

(vii) Public water systems serving greater than three thousand three hundred people shall continuously monitor the residual disinfectant concentration of the water at a location approved by the director and the lowest value shall be recorded each day. If there is a failure in the continuous disinfectant monitoring equipment, the public water system shall conduct grab sampling every four hours in lieu of continuous monitoring until the

continuous monitoring equipment is repaired and returned to service. A public water system has no more than five days after failure of the equipment to repair the continuous monitoring equipment and return it to service.

(viii) Public water systems serving three thousand three hundred or fewer people shall monitor the residual disinfectant concentration at a location approved by the director, and record the residual disinfection concentration each day that water from the ground water source is served to the public. The public water system shall take a daily grab sample during the hour of peak flow or at another time specified by the director. If the actual residual disinfectant concentration value falls below the required minimum specified by the director, the ground water system shall take follow-up samples every four hours until the actual disinfectant residual is restored to the director-determined minimum value. Alternatively, a ground water system that serves three thousand three hundred or fewer people may monitor continuously and meet the requirements of paragraph (A)(2)(a)(vii) of this rule.

(ix) Other parameters necessary to determine the sufficiency of disinfection prior to the first customer shall be measured and recorded.

(b) Membrane filtration. A ground water system that uses membrane filtration to meet the requirements of this subpart shall monitor the membrane filtration process in accordance with all director-specified monitoring requirements and shall operate the membrane filtration in accordance with all director-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when the following conditions exist:

(i) 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.

(ii) The membrane process is operated in accordance with director-specified compliance requirements.

(iii) The integrity of the membrane is intact.

(c) Alternative treatment. A ground water system that uses a director-approved alternative treatment to meet the requirements of this rule by providing at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer shall comply with the following:

(i) Monitor the alternative treatment in accordance with all director-specified monitoring requirements.

(ii) Operate the alternative treatment in accordance with all compliance requirements that the director determines to be necessary to achieve at least 4-log treatment of viruses.

(B) Discontinuing treatment. A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the director determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring and analytical methods requirements in rule 3745-81-42 of the Administrative Code.

(C) Failure to meet the monitoring requirements of paragraph (A) of this rule is a monitoring violation and requires the ground water system to provide public notification in accordance with rule 3745-81-32 of the Administrative Code.

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3745-81-44 **Ground water rule - treatment technique violations for ground water systems.**

(A) A ground water system with a significant deficiency is in violation of the treatment technique requirement if the system does not comply with the corrective action requirements and schedule established under rule 3745-81-61 of the Administrative Code.

(B) Unless the director invalidates an E. coli positive ground water source sample in accordance with paragraph (D) of rule 3745-81-42 of the Administrative Code, a ground water system is in violation of the treatment technique requirement if the system does not comply with the corrective action requirements and schedule established under rule 3745-81-61 of the Administrative Code.

(C) A ground water system subject to paragraph (A)(2) of rule 3745-81-43 of the Administrative Code that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.

(D) A ground water system must give public notification in accordance with paragraph (C)(1)(a) of rule 3745-81-32 of the Administrative Code for the treatment technique violations specified in paragraphs (A) to (C) of this rule.

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3745-81-45 **Ground water rule - reporting and recordkeeping for ground water systems.**

(A) Reporting. In addition to the requirements in rule 3745-81-31 of the Administrative Code, a ground water system regulated under rules 3745-81-41 to 3745-81-45 and rule 3745-81-60 or 3745-81-61 of the Administrative Code shall provide the following information to the director:

(1) A ground water system conducting compliance monitoring in paragraph (A) of rule 3745-81-43 of the Administrative Code shall report monthly to the director the information specified in rule 3745-83-01 of the Administrative Code. These ground water systems shall also notify the director any time the system fails to meet any director-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system shall notify the director as soon as possible, but in no case later than the end of the next business day.

(2) After completing any corrective action under rule 3745-81-61 of the Administrative Code, a ground water system shall notify the director within thirty days of completion of the corrective action.

(3) If a ground water system subject to paragraph (A) of rule 3745-81-42 of the Administrative Code does not conduct source water monitoring in accordance with paragraph (A)(5)(b) of rule 3745-81-42 of the Administrative Code, the system shall provide documentation within thirty days of the total coliform positive sample that the system met appropriate criteria as acceptable to the director.

(B) Recordkeeping. In addition to rule 3745-81-33 of the Administrative Code, a ground water system regulated under this rule shall maintain the following records:

(1) Documentation of corrective actions. Documentation shall be kept for a period of not less than ten years.

(2) Documentation of notice to the public as required in paragraph (E) of rule 3745-81-61 of the Administrative Code. Documentation shall be kept for a period of not less than three years.

(3) Records of decisions in paragraph (A)(5)(b) of rule 3745-81-42 of the Administrative Code and records of invalidation of E. coli positive ground water source samples in paragraph (D) of rule 3745-81-42 of the Administrative Code. Documentation shall be kept for a period of not less

than five years.

(4) For consecutive systems, documentation of notification to the wholesale system of total coliform positive samples that are not invalidated under rule 3745-81-50 of the Administrative Code. Documentation shall be kept for a period of not less than five years.

(5) The following apply to systems, including wholesale systems, that are required to perform compliance monitoring in paragraph (A) of rule 3745-81-43 of the Administrative Code:

(a) Records of the director-specified minimum disinfectant residual. Documentation shall be kept for a period of not less than ten years.

(b) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the director-prescribed minimum residual disinfectant concentration for a period of more than four hours. Documentation shall be kept for a period of not less than five years.

(c) Records of compliance requirements for membrane filtration and of parameters specified by the director for appropriate approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation shall be kept for a period of not less than five years.

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

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3745-81-50 **Revised total coliform rule - general monitoring requirements.**

(A) The director may determine that a public water system shall apply best available technology in order to reduce the level of a contaminant to below its maximum contaminant level (MCL). The director identifies the following as the best available technology for achieving compliance with the MCL for Escherichia coli (total coliforms and E. coli) as set forth in this rule:

(1) Protection of wells from E. coli contamination by appropriate placement and construction in accordance with Chapter 3745-9 of the Administrative Code.

(2) Maintenance of a disinfectant residual throughout the distribution system in accordance with rule 3745-81-72 of the Administrative Code and paragraph (C) of rule 3745-83-01 of the Administrative Code.

(3) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, continual maintenance of positive water pressure in all parts of the distribution system and backflow prevention as described in Chapter 3745-95 of the Administrative Code.

(4) Filtration or disinfection by public water systems using surface water, in whole or in part, as required by rules 3745-81-64 to 3745-81-69 and 3745-81-71 to 3745-81-75 of the Administrative Code, or disinfection of ground water, as required by rules 3745-81-41 to 3745-81-45 of the Administrative Code, using strong oxidants such as chlorine, chlorine dioxide or ozone.

(5) Where appropriate, the development and implementation of a source water assessment and protection program approved by the director.

(B) Sample siting plans:

(1) Each public water system shall develop a written sample siting plan that identifies a sample collection schedule and sampling sites that are representative of water throughout the distribution system. Such plans are subject to review and revision by the director. A public water system shall collect total coliform samples according to the written sample siting plan. Monitoring required in rules 3745-81-51 and 3745-81-52 of the Administrative Code shall take place at a designated compliance sampling location. Routine and repeat sample sites and any sampling points necessary to meet rules 3745-81-41 to 3745-81-45 of the Administrative Code shall be included in the sample siting plan. Seasonal systems monitoring on a quarterly schedule shall designate the time period for monitoring based on site-specific considerations, such as periods of highest demand or highest

vulnerability to contamination.

(2) Each public water system shall monitor with routine samples taken at regular time intervals throughout the month in accordance with the system's sample siting plan, except that systems using only ground water and serving four thousand nine hundred or fewer people may collect all required samples on a single day if taken from different sites.

(3) Every public water system shall take at least the minimum number of required samples even if the system has had an E.Coli MCL as set forth in rule 3745-81-54 of the Administrative Code or has exceeded the coliform treatment technique triggers as set forth in rule 3745-81-53 of the Administrative Code.

(4) A public water system may conduct more compliance monitoring than is required by this rule and rules 3745-81-51 to 3745-81-53 of the Administrative Code to investigate and discover potential problems in the distribution system. If the additional routine samples are taken in accordance with the existing sample siting plan and are representative of the water throughout the distribution system, the results of the samples must be included in calculating whether the coliform treatment technique trigger in paragraph (A)(1)(a) or (A)(1)(b) of rule 3745-81-53 of the Administrative Code has been exceeded.

(5) Each public water system shall identify repeat monitoring locations in the sample siting plan. Unless the provisions of the following paragraphs are met, the system shall monitor with at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one service connection away from the end of the distribution system, the system shall still take all required repeat samples; however, the director may allow an alternative sampling location in lieu of the requirement to monitor with at least one repeat sample upstream or downstream of the original sampling site. Except as provided for in paragraph (B)(5)(b) of this rule, each public water system required to conduct triggered source water monitoring as set forth in paragraph (A) of rule 3745-81-42 of the Administrative Code shall take a ground water source sample in addition to repeat samples required in this rule and rules 3745-81-51 to 3745-81-53 of the Administrative Code.

(a) A system may propose repeat monitoring locations to the director that the

system considers to be representative of a pathway for contamination of the distribution system. A system may elect to specify either alternative fixed locations or criteria for selecting repeat sampling sites on a situational basis in a standard operating procedure (SOP) in the system's sample siting plan. The system shall design the SOP to focus the repeat samples at locations that best verify and determine the extent of potential contamination of the distribution system area based on specific situations. The director may modify the SOP or require alternative monitoring locations as needed.

(b) Ground water systems serving one thousand people or fewer may propose repeat sampling locations to the director that differentiate potential source water and distribution system contamination (e.g., by sampling at entry points to the distribution system). If acceptable to the director, a ground water system with a single well required to conduct triggered source water monitoring may take one of the repeat samples at the monitoring location required for triggered source water monitoring as set forth in paragraph (A) of rule 3745-81-42 of the Administrative Code if the system demonstrates to the director that the sample siting plan remains representative of water quality in the distribution system.

(i) If a repeat sample taken at the monitoring location required for triggered source water monitoring is E. coli-positive, the public water system is in violation of the MCL for E. coli and shall conduct additional source water monitoring in accordance with paragraph (A)(3) of rule 3745-81-42 of the Administrative Code. If the system takes more than one repeat sample at the monitoring location required for triggered source water monitoring, the system may reduce the number of additional source water samples required in paragraph (A)(3) of rule 3745-81-42 of the Administrative Code by the number of repeat samples taken at that location that were not E. coli-positive.

(ii) If the system takes more than one repeat sample at the monitoring location for triggered source water monitoring in paragraph (A) of rule 3745-81-42 of the Administrative Code, and more than one repeat sample is E. coli-positive, the system has violated the MCL for E. coli and shall comply with rule 3745-81-61 of the Administrative Code.

(iii) If all repeat samples taken at the monitoring location required for triggered source water monitoring are E. coli-negative and a repeat sample taken at a monitoring location other than the one

required for triggered source water monitoring is E. coli-positive, the system has violated the MCL for E. coli, but is not required to conduct additional source water monitoring in accordance with paragraph (A)(3) of rule 3745-81-42 of the Administrative Code.

(6) The director may review, revise and accept, as appropriate, repeat sampling proposed by public water systems under paragraphs (B)(5)(a) and (B)(5)(b) of this rule. The system shall demonstrate that the sample siting plan remains representative of the water quality in the distribution system. The director may determine that monitoring at the entry point to the distribution system (especially for ground water systems having minimal treatment as defined in rule 3745-81-01 of the Administrative Code) is effective to differentiate between potential source water and distribution system problems.

(C) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement or repair, shall not be used to determine whether the coliform treatment technique trigger has been exceeded. Repeat samples taken in accordance with rule 3745-81-52 of the Administrative Code are not considered special purpose samples, and shall be used to determine whether the coliform treatment technique trigger has been exceeded.

(D) A routine or repeat total coliform sample must be invalidated (unless total coliforms are detected) if the sample exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filtration technique in accordance with the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014," Chapter 3745-89 of the Administrative Code and rule 3745-81-27 of the Administrative Code. A public water system shall monitor with a replacement sample within twenty-four hours of being notified of the invalid sample. Upon a request from a public water system, the director may extend the twenty-four hour limit on a case-by-case basis when the public water system has a logistical problem collecting the repeat samples within twenty-four hours which is beyond the control of the public water system. When an extension is granted, the time the public water system has to monitor with repeat samples shall be specified by the director.

(E) The director will invalidate a total coliform result if the total coliform analysis performed by a certified laboratory does not conform to the "Ohio EPA Laboratory Manual for the Microbiological Analyses of Public Drinking Water 2014."

[Comment: This rule incorporates the "Ohio EPA Laboratory manual for the Microbiological Analyses of Drinking Water 2014" by reference. Copies are available at https://epa.ohio.gov/wps/portal/gov/epa/divisions-and-offices/drinking-ground-and-waters/public-w

and at the "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215." Copies can also be obtained by contacting the laboratory certification office at (614) 644-4245.]

(F) All routine and repeat total coliform samples shall be collected under normal operating conditions. If the public water system does not collect these total coliform samples under normal operating conditions, the director may require additional monitoring.

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3745-81-51 **Revised total coliform rule - routine monitoring requirements.**

(A) All public water systems shall conduct routine total coliform monitoring in accordance with this rule.

(1) Following any total coliform-positive sample collected in accordance with paragraph (B), (C), (D) or (E) of this rule, public water systems shall comply with the repeat monitoring requirements and Escherichia coli (E. coli) analytical requirements in rule 3745-81-52 of the Administrative Code.

(2) Once all monitoring required by paragraph (B), (C), (D) or (E) of this rule and rule 3745-81-52 of the Administrative Code for a calendar month has been completed, public water systems shall determine whether any coliform treatment technique triggers have been exceeded in accordance with rule 3745-81-53 of the Administrative Code. If any triggers have been exceeded, public water systems shall complete the assessments as required in rule 3745-81-53 of the Administrative Code.

(B) Noncommunity public water systems using only source water designated as ground water in accordance with rule 3745-81-76 of the Administrative Code and serving not more than one thousand persons shall conduct routine total coliform monitoring as follows:

(1) Monitoring for total coliforms shall be conducted at a minimum frequency of one sample each calendar quarter that the system provides water to the public, except as required by paragraphs (B)(3) to (B)(6) of this rule.

(2) , The director shall perform a detailed monitoring evaluation during each sanitary survey to determine whether the system is on an appropriate routine total coliform monitoring schedule. The director shall consider system factors such as pertinent water quality and compliance history, the establishment and maintenance of contamination barriers, and other appropriate protections. Based on the findings of each monitoring evaluation, the director may modify the public water system’s routine total coliform monitoring schedule.

(3) Triggered increased routine monitoring. A public water system on quarterly monitoring that experiences any of the events identified in this paragraph shall begin monthly monitoring during the month following the event. The system shall continue monthly monitoring until the director reduces the monitoring frequency after the requirements of paragraph (B)(4) of this rule are met. A system on monthly monitoring for reasons other than those identified as follows, including seasonal systems, is not considered to be on increased monitoring for the purposes of paragraph (B)(4) of this rule.

(a) The system triggers a level two assessment or two level one assessments in a consecutive twelve-month period in accordance with rule 3745-81-53 of the Administrative Code.

(b) The system has an E. coli maximum contaminant level violation in accordance with paragraph (A) of rule 3745-81-54 of the Administrative Code.

(c) The system has a coliform treatment technique violation in accordance with paragraph (B) of rule 3745-81-54 of the Administrative Code.

(d) The system has two monitoring violations in accordance with paragraph (C) of rule 3745-81-54 of the Administrative Code, or has one monitoring violation in accordance with paragraph (C) of rule 3745-81-54 of the Administrative Code and one level one assessment in a consecutive twelve-month period.

(4) The director may reduce the monitoring frequency for a public water system on monthly monitoring triggered under paragraph (B)(3) of this rule to quarterly monitoring if the system meets all of the following:

(a) Had a sanitary survey, site visit or level two assessment conducted by a person approved by the director within the previous twelve months.

(b) Had a clean compliance history for a minimum of the previous twelve months.

(c) Is free of significant deficiencies.

(d) Has a protected water source.

(e) Holds a valid license to operate, unless the system is exempt from being required to obtain a license to operate under section 6109.21 of the Revised Code.

(f) Has no outstanding violations of any of the following:

(i) Nitrate or nitrite MCL or monitoring requirements under rule 3745-81-11 or rule 3745-81-23 of the Administrative Code, respectively.

(ii) Source water monitoring requirements under rule 3745-81-42 of the Administrative Code.

(iii) Treatment technique requirements under rule 3745-81-44 of the Administrative Code.

(iv) Operational requirements under 3745-83-01 of the Administrative Code with respect to disinfection and monthly operating reports.

(5) Seasonal system requirements.

(a) All seasonal public water systems, except for fully pressurized year-round seasonal systems, shall demonstrate completion of the start-up procedure in the appendix to this rule, which shall include start-up total coliform sampling prior to the first day of each operating season.

(b) The type of seasonal system will be determined by the director through a detailed monitoring evaluation performed during a sanitary survey or limited scope site visit. A depressurized seasonal system shall monitor for total coliforms with a minimum of one sample per month during the system's operating season.

(c) A partially-depressurized seasonal system shall monitor for total coliforms with a minimum of one sample per month during the system's operating season and a minimum of one sample per quarter during the system's off season. The director may reduce the monitoring frequency for partially- depresurized systems that meet specific criteria in a seasonal system monitoring evaluation in addition to demonstrating completion of the start-up procedure.

(d) A fully-pressurized year-round seasonal system shall monitor for total coliforms with a minimum of one sample per calendar quarter during the systems operating season. Monitoring must be conducted during the time period specified for monitoring in accordance with paragraph (B)(1) of rule 3745-81-50 of the Administrative Code. These systems shall adjust the monitoring frequency or complete elements of the start-up procedure in the appendix to this rule as required in writing by the director based on the findings of a sanitary survey or detailed monitoring evaluation. A simplified start-up procedure may be appropriate for these systems due to the potential for deteriorated water quality during extended periods of non-use.

(6) Public water systems collecting samples on a quarterly frequency shall monitor with at least three routine samples during the month following one or more total coliform-positive samples (with or without a level one treatment technique trigger). Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems shall use the results of additional routine samples in coliform treatment technique trigger calculations under paragraph (A) of rule 3745-81-53 of the Administrative Code.

(7) The director may postpone the requirement in paragraph (B)(6) of this rule for a system to monitor with at least three routine samples during the month following one or more total coliform positive samples if all of the following criteria are met:

(a) The system collected all required repeat samples.

(b) The director conducts a site visit of the system and has determined the source of the bacterial contamination within two weeks of receiving notification that the routine total coliform positive sample was collected.

(c) The system has submitted an approvable plan to eliminate the cause of the bacterial contamination, including all of the following:

(i) Details on how the source of bacterial contamination will be eliminated.

(ii) Who will perform the work.

(iii) A schedule for completing the work no later than ninety days from the date of the total coliform routine sample.

(d) An approvable plan for corrective action required by rule 3745-81-61 of the Administrative Code may also fulfill the requirements of paragraph (B)(7)(c) of this rule for a plan to eliminate the cause of the bacterial contamination.

(8) If the director approves a postponement of the requirements of paragraph (B)(6) of this rule, the public water system shall collect at least three routine total coliform samples during the month after the work to eliminate the source of

the bacterial contamination has been completed.

(C) Routine monitoring requirements for community water systems using only source water designated as ground water in accordance with rule 3745-81-76 of the Administrative Code and serving not more than one thousand persons.

(1) Monitoring for total coliforms shall be conducted at a minimum frequency of one sample each month that the system provides water to the public.

(2) The director shall perform a detailed monitoring evaluation during each sanitary survey to determine whether the system is on an appropriate routine total coliform monitoring schedule. The director shall consider system factors such as pertinent water quality and compliance history, the establishment and maintenance of contamination barriers, and other appropriate protections. Based on the findings of each monitoring evaluation, the director may modify the public water system's routine total coliform monitoring schedule.

(D) Routine monitoring requirements for public water systems using a surface water source, in whole or in part, and serving not more than four thousand one hundred persons.

(1) Monitoring for total coliforms shall be conducted at a minimum frequency of four samples, taken at regular intervals, during each month the system provides water to the public. Consecutive surface water systems serving not more than one thousand persons shall monitor at a minimum frequency of one sample per month that the system serves water to the public.

(2) Seasonal system start-up requirements.

(a) Seasonal public water systems subject to this paragraph, except fully-pressurized year-round seasonal systems, shall demonstrate completion of the start-up procedure in the appendix to this rule, which shall include start-up total coliform sampling prior to the first day of operating season.

(b) A fully-pressurized year-round seasonal system shall complete elements of the start-up procedure in the appendix to this rule as required in writing by the director based on the findings of a sanitary survey.

(E) Routine monitoring requirements for all other public water systems serving more than one thousand persons.

(1) Seasonal system start-up requirements.

(a) Seasonal public water systems subject to this paragraph, except fully-pressurized year-round seasonal systems, shall demonstrate completion of the start-up procedure in the appendix to this rule, which shall include start-up total coliform sampling prior to the first day of each operating season.

(b) A fully-pressurized year-round seasonal system shall complete elements of the start-up procedure in the appendix to this rule as required in writing by the director based on the findings of a sanitary survey.

(2) The monitoring frequency for total coliforms for ground water systems and consecutive surface water systems serving more than one thousand persons and surface water systems serving more than four thousand one hundred persons is based on the population served by the system, as follows:

Population served	Minimum number of samples per month
1,001 to 2,500 (ground water systems and consecutive surface water systems)	2
2,501 to 3,300 (ground water systems and consecutive surface water systems)	3
3,301 to 4,100 (ground water systems and consecutive surface water systems)	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

(3) Public water systems may not reduce monitoring, except for noncommunity public water systems using only ground water (and not ground water under the direct influence of surface water) and serving more than one thousand persons in any month. In months when more than one thousand persons are served, the systems shall monitor at the frequency specified in paragraph (E) of this rule. In months when no more than one thousand persons are served,

the director may reduce the monitoring frequency, in writing, to a frequency allowed under paragraph (B) of this rule.

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3745-81-52 **Revised total coliform rule - repeat monitoring and E. coli requirements.**

(A) Repeat monitoring.

(1) When a sample collected in accordance with rule 3745-81-51 of the Administrative Code is total coliform-positive, the public water system shall monitor with a set of three repeat samples within twenty-four hours of being notified of the positive result. The system must collect no fewer than three repeat samples for each total coliform-positive sample.

(a) The director shall not waive the requirement for a system to collect repeat samples in accordance with paragraphs (A)(1) to (A)(3) of this rule.

(b) The twenty-four hour time limit to collect repeat samples may be extended up to an additional seventy-two hours when one or more of the following conditions beyond the control of the public water system prevent it from complying:

(i) The certified laboratory that performs sample collection for the system is not available on a weekend or holiday.

(ii) Collection of samples within twenty-four hours would result in the holding time being exceeded before analysis is started due to limited delivery service or a laboratory not being open.

(iii) Sample bottles could not be obtained due to certified laboratories being closed on a weekend or holiday.

(iv) Extreme weather conditions create unsafe travel or on-site conditions for the person collecting the samples.

(c) A public water system using the time extension provisions of this paragraph shall record the reasons for the delay in collecting repeat samples on the sample submission form.

(d) Upon a request from a public water system, the director may extend the twenty-four-hour limit on a case-by-case basis when the public water system has a logistical problem collecting the repeat samples within twenty-four hours other than those specified in this paragraph or when one or more of the conditions in paragaph (A)(1)(b) of this rule create an unavoidable delay longer than an additional seventy-two hours. When an extension is granted by the director, the director shall specify

how much time the public water system has to monitor with repeat samples.

(2) Public water systems shall collect all total coliform repeat samples on the same day.

(3) When one or more repeat sample in the current set is total coliform-positive, the public water system shall continue to monitor with an additional set of repeat samples in the manner specified in paragraphs (A)(1) to (A)(3) of this rule until total coliforms are not detected in one complete set of repeat samples or the system determines that a coliform treatment technique trigger as set forth in paragraph (A) of rule 3745-81-53 of the Administrative Code has been exceeded as a result of a repeat sample being total coliform-positive and notifies the director no later than the end of the next business day after the public water system learns of the total coliform-positive result.

(4) When a trigger identified in rule 3745-81-53 of the Administrative Code is exceeded as a result of a routine sample being total coliform-positive, public water systems are required to monitor with only one set of repeat samples for each total coliform-positive routine sample.

(5) After a public water system monitors with a routine sample and before the public water system learns the results of the analysis of that sample, when the public water system collects one or more other routine sample from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the public water system may consider the subsequent samples as repeat samples instead of as routine samples.

(6) Results of all routine and repeat samples taken under rule 3745-81-51 and this rule of the Administrative Code not invalidated by the director shall be used to determine whether a coliform treatment technique trigger specified in rule 3745-81-53 of the Administrative Code has been exceeded.

(B) When any routine or repeat sample is total coliform-positive, the public water system shall have that total coliform-positive culture further analyzed to determine if Escherichia coli (E. coli) are present. When E. coli are present, the public water system shall notify the director 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 director's office is closed, in which case the system shall notify the director before the end of the next business day. All repeat sample results shall be submitted no later than the end of the next business day following analysis.

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3745-81-53 **Revised total coliform rule - coliform treatment technique triggers and assessment requirements.**

(A) Public water systems shall conduct assessments in accordance with paragraph (B) of this rule after exceeding any of the following treatment technique triggers:

(1) Level one treatment technique triggers.

(a) For a public water system which monitors with at least forty samples per month, the number of total coliform-positive samples exceeds 5.0 per cent of the total number of samples during a month.

(b) For a public water system which monitors with fewer than forty samples per month, the system has two or more total coliform-positive samples during the same month.

(c) The public water system fails to monitor with all required repeat samples following a total coliform-positive sample.

(2) Level two treatment technique triggers.

(a) An Escherichia coli (E. coli) maximum contaminant level violation (MCL) in accordance with paragraph (A) of rule 3745-81-54 of the Administrative Code.

(b) A second level one treatment technique trigger as defined in paragraph (A) (1) of this rule, within a consecutive twelve-month period, unless the director has determined that the public water system has corrected the likely cause of the total coliform-positive samples that triggered the first assessment.

(B) Assessments.

(1) Public water systems shall ensure that level one and level two assessments are conducted in order to identify the possible presence of significant deficiencies and deficiencies in distribution system coliform monitoring practices. Level two assessments shall be conducted by a person acceptable by the director.

(2) When conducting assessments, public water systems shall ensure that the assessor evaluates minimum elements that include review and identification of inadequacies in sample sites; sampling protocol; sample processing; atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality,

where appropriate (e.g., small ground water systems); and existing water quality monitoring data. The system shall conduct the assessment consistent with any directives of the director that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

(3) Level one assessments. A public water system shall conduct a level one assessment consistent with requirements set forth by the director if the system exceeds one of the treatment technique triggers in paragraph (A)(1) of this rule.

(a) The public water system shall complete a level one assessment as soon as practical after any trigger in paragraph (A)(1) of this rule. In the completed assessment form, the public water system shall describe significant deficiencies detected, corrective actions completed, and a proposed timetable in accordance with rule 3745-81-61 of the Administrative Code for any corrective actions not already completed. The assessment form may also note that no significant deficiencies were identified. The public water system shall submit the completed level one assessment form to the director within thirty days after the system learns that it exceeded a treatment technique trigger.

(b) The director shall review the completed level one assessment and determine whether the assessment is sufficient (including any proposed timetable for any corrective actions not already completed). The director shall consult with the public water system in accordance with rule 3745-81-61 of the Administrative Code. If the director requires revisions after consultation, the public water system shall submit a revised assessment form to the director on an agreed upon schedule not to exceed thirty days from the date of the consultation.

(c) Upon completion and submission of the assessment form by the public water system, the director shall determine if the system has identified a likely cause for the level one trigger and, if so, establish that the system has corrected the problem or has included a schedule acceptable to the director for correcting the problem.

(4) Level two assessments. A public water system shall ensure that a level two assessment is conducted if the system exceeds one of the treatment technique triggers in paragraph (A)(2) of this rule. The public water system shall comply with any expedited actions or additional actions required by the director in the case of an E. coli MCL.

(a) The public water system shall ensure that a level two assessment is completed as soon as practical after exceeding any treatment technique trigger in paragraph (A)(2) of this rule. The public water system shall submit a completed level two assessment form to the director within thirty days after the system learns that it has exceeded a trigger. The assessment form shall describe significant deficiencies detected, corrective actions completed, and a proposed timetable in accordance with rule 3745-81-61 of the Administrative Code for any corrective actions not already completed. The assessment form may also note that no significant deficiencies were identified.

(b) The director shall review the completed level two assessment and determine whether the assessment is sufficient (including any proposed timetable for any corrective actions not already completed). If the director finds that the assessment is not sufficient, the director shall consult with the public water system in accordance with rule 3745-81-61 of the Administrative Code. If the director requires revisions after consultation, the public water system shall submit a revised assessment form to the director on an agreed upon schedule not to exceed thirty days.

(c) Upon completion and submission of the assessment form by the public water system, the director shall determine if the system has identified a likely cause for the level two trigger and determine whether the system has corrected the problem or has included a schedule acceptable to the director for correcting the problem.

(C) Significant deficiencies found through either level one or level two assessments conducted in accordance with paragraph (B) of this rule shall be corrected by the public water system in accordance with rule 3745-81-61 of the Administrative Code.

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3745-81-54 **Revised total coliform rule - violations.**

(A) Maximum contaminant level (MCL) for Escherichia coli (E. coli). A public water system in violation of the MCL for E. coli as a result of any of the following conditions shall notify the public using tier 1 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:

(1) A public water system that has an E. coli-positive repeat sample following a total coliform-positive routine sample is in violation of the MCL for E. coli.

(2) A public water system that has a total coliform-positive repeat sample following an E. coli-positive routine sample is in violation of the MCL for E. coli.

(3) A system that fails to collect all required repeat samples following an E. coli-positive routine sample is in violation of the MCL for E. coli.

(4) A system that fails to test for E. coli when any repeat sample is total coliform-positive is in violation of the MCL for E. coli.

(B) Treatment technique violation. A public water system incurring either of the following treatment technique violations shall notify the public using tier 2 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:

(1) A treatment technique violation occurs when a public water system exceeds a treatment technique trigger in accordance with paragraph (A) of rule 3745-81-53 of the Administrative Code and fails to conduct the required assessment within the time frame specified in paragraphs (B) and (C) of rule 3745-81-53 of the Administrative Code or fails to perform corrective actions in accordance with rule 3745-81-61 of the Administrative Code.

(2) A treatment technique violation occurs when a seasonal public water system fails to complete a start-up procedure, in accordance with rule 3745-81-51 of the Administrative Code, prior to serving water to the public.

(C) Monitoring violations. A public water system incurring either of the following monitoring violations shall notify the public using tier 3 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:

(1) Failure to take required routine or additional routine samples in a compliance period is a monitoring violation.

(2) Failure to analyze for E. coli following a total coliform-positive routine sample is a monitoring violation.

(D) Reporting violations. A public water system incurring any of the following reporting violations shall notify the public using tier 3 notification requirements in accordance with rule 3745-81-32 of the Administrative Code:

(1) Failure to submit a monitoring report after a public water system properly conducts monitoring in accordance with rules 3745-81-50 to 3745-81-52 of the Administrative Code is a reporting violation.

(2) Failure to submit a completed assessment form after a system properly conducts an assessment in accordance with rule 3745-81-53 of the Administrative Code is a reporting violation.

(3) Failure to notify the director following an E. coli-positive sample in accordance with paragraph (B) of rule 3745-81-52 of the Administrative Code is a reporting violation.

(4) For a seasonal public water system, failure to submit certification of completion of a start-up procedure in accordance with rule 3745-81-51 of the Administrative Code is a reporting violation.

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3745-81-55 **Revised total coliform rule - reporting and recordkeeping.**

(A) Reporting.

(1) Escherichia coli (E. coli).

(a) A public water system shall notify the director by the end of the day when the system learns of an E. coli maximum contaminant level violation, unless the system learns of the violation after the director's office is closed, in which case the system shall notify the director before the end of the next business day and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

(b) A public water system shall notify the director by the end of the day when the system is notified of an E. coli-positive routine sample, unless the system is notified of the result after the director's office is closed, in which case the system shall notify the director before the end of the next business day.

(2) A public water system that has violated the treatment technique for coliforms in accordance with rule 3745-81-53 of the Administrative Code shall report the violation to the director no later than the end of the next business day after it learns of the violations and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

(3) A public water system required to conduct an assessment in accordance with rule 3745-81-53 of the Administrative Code shall submit the assessment report within thirty days. The public water system shall notify the director, in accordance with paragraph (C)(3) of rule 3745-81-61 of the Administrative Code, when each scheduled corrective action is completed subsequent to submission of the assessment form.

(4) A public water system that has failed to comply with a coliform monitoring requirement in accordance with rules 3745-81-50 to 3745-81-52 of the Administrative Code shall report the monitoring violation to the director within ten days after the system discovers the violation and notify the public in accordance with rule 3745-81-32 of the Administrative Code.

(5) A seasonal public water system shall certify, on or before the first day of the operating season, that the system has complied with the start-up procedure acceptable to the director.

(B) Recordkeeping.

(1) The public water system shall maintain any assessment form, regardless of who conducts the assessment, and documentation of corrective actions completed as a result of those assessments, or other available summary documentation of the significant deficiencies and corrective actions conducted in accordance with rules 3745-81-53 and 3745-81-61 of the Administrative Code for review by the director. This record shall be maintained by the public water system for a period not less than five years after completion of the assessment or corrective action.

(2) The public water system shall maintain a record of any repeat sample taken that meets the director's criteria for an extension of the twenty-four hour period for collecting repeat samples in accordance with paragraph (A)(1) of rule 3745-81-52 of the Administrative Code.

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3745-81-60 **Inspections and response requirements.**

(A) Community water systems must undergo a sanitary survey at least every three years. Noncommunity water systems must undergo a sanitary survey at least every five years. The director shall review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the public water system needs to undertake to improve drinking water quality.

(B) In conducting a sanitary survey at a public water system using ground water and having a drinking water source protection plan endorsed by the director, information on sources of contamination within the delineated drinking water source protection area that was collected in the course of developing and implementing the plan should be considered instead of collecting new information, if the information was collected since the last time the public water system was subject to a sanitary survey.

(C) Public water systems are responsible for ensuring that the required sanitary surveys are performed. If requested, public water systems shall provide any existing information that will enable a sanitary survey to be conducted. Sanitary surveys shall be performed in accordance with procedures endorsed by the director and will include, but not be limited to an evaluation of public water system components including the source; treatment; distribution system; finished water storage; pump, pump facilities, and controls; monitoring, reporting, and data verification; system management and operation; and operator compliance.

(D) A public water system shall respond to the director in writing, within thirty days following receipt of a sanitary survey letter, limited scope site visit report or any other inquiry from the director, unless a different response time frame is noted. The response shall indicate how and on what schedule the public water system will address any significant deficiencies and violations noted in the correspondence.

(E) A public water system shall correct significant deficiencies specified in the sanitary survey report, through source water monitoring or a system assessment and according to the schedule accepted by the director as described in rule 3745-81-61 of the Administrative Code. A public water system shall also correct violations specified in the sanitary survey or limited scope site visit report according to the schedule accepted by the director. Failure to correct significant deficiencies in accordance with the schedule accepted by the director is a treatment technique violation.

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3745-81-61 **Treatment technique requirements for significant deficiencies.**

A significant deficiency, as defined in rule 3745-81-01 of the Administrative Code, may be identified any time a qualifying condition exists at a public water system. The primary means for identifying significant deficiencies are a sanitary survey conducted in accordance with rule 3745-81-60 of the Administrative Code, source water monitoring conducted in accordance with rule 3745-81-42 of the Administrative Code and a level one or level two assessment conducted in accordance with rule 3745-81-53 of the Administrative Code. A public water system shall respond to a significant deficiency as required by this rule to ensure it is corrected in a timely manner and the public is appropriately notified. The director may require specific corrective action to correct an identified significant deficiency. The requirements of this rule are treatment technique requirements.

(A) Whenever feasible, a public water system shall correct a significant deficiency within thirty days of becoming aware of or being notified of the deficiency. Notification may occur through, but is not limited to, the following methods:

(1) Notification to a system using a ground water source in accordance with rule 3745-81-42 of the Administrative Code, including notification by a certified laboratory of E. coli contamination in a ground water source sample.

(2) Notification in accordance with rule 3745-81-60 or 3745-81-64 of the Administrative Code for significant deficiencies identified during a sanitary survey or limited scope site visit.

(3) Identification by the public water system as a result of conducting a level one assessment in accordance with rule 3745-81-53 of the Administrative Code, or notification of significant deficiencies identified during a level one or level two assessment conducted in accordance with rule 3745-81-53 of the Administrative Code.

(B) When a public water system is not able to complete a corrective action for a significant deficiency within thirty days of becoming aware of or being notified of the deficiency, the system shall comply with the following to establish an approved schedule for completing corrective actions:

(1) The public water system shall submit a plan with a schedule for completing corrective actions, which may be part of a level one or level two assessment report, within thirty days of becoming aware of or being notified of the deficiency. Consultation with the director prior to submitting a plan is encouraged.

(2) The director shall review the corrective action plan. If the director finds that the

proposed corrective actions or schedule are not acceptable, the director shall notify the public water system in writing and may consult with the system regarding necessary modifications. The director may specify interim measures for protection of public health. The director shall consider appropriate interim measures whenever the corrective actions cannot be completed within one hundred twenty days of the system becoming aware of or being notified of the significant deficiency. After consultation with the director, the public water system shall submit a modified plan for corrective actions and schedule that are acceptable to the director.

(C) Corrective actions.

(1) Ground water systems that have a significant deficiency identified under rule 3745-81-42 of the Administrative Code shall implement one or more of the following corrective action alternatives in accordance with paragraph (A) or (B) of this rule:

(a) Correct all significant deficiencies.

(b) Provide an alternate source of water.

(c) Eliminate the source of contamination.

(d) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a director-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(2) The public water system shall complete all corrective actions in accordance with paragraph (A) or (B) of this rule and in compliance with all applicable plan review processes.

(3) The public water system shall notify the director when each scheduled corrective action is completed.

(D) At any time during the assessment, plan review or corrective action phase, either the public water system or the director may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the director on all relevant information that may impact the system's ability to comply with rules 3745-81-41 to 3745-81-45, 3745-81-50 to 3745-81-55, 3745-81-60 or 3745-81-64, including the method of accomplishment, an appropriate time frame

and other relevant information.

(E) Special notice to the public of significant deficiencies or source water E. coli contamination.

(1) In addition to the applicable public notification requirements in paragraph (B)(1)(i) of rule 3745-81-32 of the Administrative Code, a community ground water system that receives notice from the director of a significant deficiency or notification of an E. coli positive ground water source sample that is not invalidated by the director under paragraph (D) of rule 3745-81-42 of the Administrative Code shall, in accordance with paragraph (F)(8) of rule 3745-96-02 of the Administrative Code, inform the public served by the water system of the E. coli positive source sample or of any significant deficiency that has not been corrected. The system shall continue to inform the public annually until the significant deficiency is corrected or the E. coli contamination in the ground water source is determined by the director to be corrected in accordance with paragraphs (A) and (B) of this rule.

(2) In addition to the applicable public notification requirements in paragraph (B)(1)(g) of rule 3745-81-32 of the Administrative Code, a noncommunity ground water system that receives notice from the director of a significant deficiency shall inform the public served by the water system in a manner acceptable to the director of any significant deficiency that has not been corrected within twelve months of being notified, or earlier if required by the director. The system shall continue to inform the public annually until the significant deficiency is corrected. The information shall include all of the following:

(a) The nature of the significant deficiency and the date the significant deficiency was identified.

(b) The director-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, defined as ten per cent or more of the residents speaking the same non-English language, information in the appropriate language 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.

(3) If required by the director, a noncommunity water system with significant deficiencies that have been corrected shall inform its customers of the significant deficiencies, how the deficiencies were corrected and the dates of correction in accordance with paragraph (E)(2) of this rule.

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3745-81-64 General requirements of the "Long Term 2 Enhanced Surface Water Treatment (LT2) Rule."

(A) The requirements of rules 3745-81-64 to 3745-81-69 of the Administrative Code are derived from national primary drinking water regulations. This rule establishes or extends treatment technique requirements in lieu of maximum contaminant levels for Cryptosporidium and are in addition to requirements for filtration and disinfection in rules 3745-81-71 to 3745-81-75 of the Administrative Code. These rule requirements apply to each public water system using a surface water source, in whole or in part. Wholesale systems must comply with the requirements of these rules based on the population of the largest system in the combined distribution system.

Consecutive systems are not exempt from the requirements of the LT2 rule. However, consecutive systems may receive water that a wholesale system has monitored and treated, if required, to comply with the LT2 rule. In this case, the consecutive system is not required to conduct additional monitoring or install additional treatment on that water under the requirements of the LT2 rule.

(B) Systems subject to this rule shall comply with the following requirements:

(1) Systems shall conduct an initial and a second round of source water monitoring for each plant that treats a surface water source, in whole or in part. This monitoring may include sampling for Cryptosporidium, E. coli, and turbidity as described in rule 3745-81-65 and paragraph (A) of rule 3745-81-66 of the Administrative Code, to determine what level, if any, of additional Cryptosporidium treatment that shall be provided.

(2) Systems that plan to make a significant change to their disinfection practice shall develop disinfection profiles and calculate disinfection benchmarks, as described in paragraph (E) of rule 3745-81-72 of the Administrative Code.

(3) Systems shall determine the appropriate Cryptosporidium treatment bin classification as described in paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code and provide additional treatment for Cryptosporidium, if required, as described in paragraph (E) of rule 3745-81-67 of the Administrative Code. Systems shall implement Cryptosporidium treatment in accordance with the schedule in paragraph (F) of rule 3745-81-67 of the Administrative Code.

(4) Systems required to provide additional treatment for Cryptosporidium shall implement microbial toolbox options that are designed and operated as described in rule 3745-81-68 of the Administrative Code.

(5) Systems shall comply with the applicable recordkeeping and reporting requirements described in rule 3745-81-69 of the Administrative Code.

(6) Systems shall address significant deficiencies identified in sanitary surveys performed by the Ohio environmental protection agency as required by rule 3745-81-60 of the Administrative Code.

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3745-81-65 **Source monitoring requirements.**

(A) Initial round of source water monitoring.

Systems shall conduct the following monitoring on the schedule in paragraph (C) of this rule unless they meet the monitoring exemption criteria in paragraph (D) of this rule.

(1) Systems serving at least ten thousand people shall sample their source water for Cryptosporidium, E. coli, and turbidity at least monthly for twenty-four months.

(2) Systems serving less than ten thousand people shall sample their source water for E. coli at least once every two weeks for twelve months.

(3) Systems serving less than ten thousand people may avoid E. coli monitoring if the system notifies the director that it will monitor for Cryptosporidium as described in paragraph (A)(4) of this rule. The system shall notify the primacy agency at the time of this requirement, no later than three months prior to the date the system is otherwise required to start E. coli monitoring under paragraph (C) of this rule.

(4) Systems serving less than ten thousand people shall sample their source water for Cryptosporidium at least twice per month for twelve months or at least monthly for twenty-four months if they meet one of the following, based on monitoring conducted under paragraph (A)(2) of this rule:

(a) For systems using lake/reservoir sources, the annual mean E. coli concentration is greater than ten E. coli per one hundred milliliters.

(b) For systems using flowing stream sources, the annual mean E. coli concentration is greater than fifty E. coli per one hundred milliliters.

(c) The system does not conduct E. coli monitoring as described in paragraph (A)(2) of this rule.

(d) Systems using a well designated as surface water in accordance with rule 3745-81-76 of the Administrative Code shall comply with the requirements of paragraph (A)(4) of this rule based on the E. coli level that applies to the nearest surface water body. If no surface water body is nearby, the system shall comply based on the requirements that apply to systems using lake/reservoir sources.

(5) For systems serving less than ten thousand people, the primacy agency at the time of this requirement may accept monitoring for an indicator other than E. coli under paragraph (A)(2) of this rule. The primacy agency also may accept an alternative to the E. coli concentration in paragraph (A)(4) of this rule to trigger Cryptosporidium monitoring. This acceptance by the primacy agency shall be provided to the system in writing and shall include the basis

for the primacy agency'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 paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code.

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

(B) Second round of source water monitoring.

Systems shall conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in paragraph (A) of this rule, unless they meet the monitoring exemption criteria in paragraph (D) of this rule. Systems shall conduct this monitoring in accordance with the schedule in paragraph (C) of this rule.

(C) Monitoring schedule.

Systems shall begin the monitoring required in paragraphs (A) and (B) of this rule no later than the month beginning with the date listed in this table:

Source Water Monitoring Starting Date Tables

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

* Applies to systems that meet the conditions of paragraph (A)(4) of this rule.

(D) Monitoring avoidance.

(1) Systems are not required to conduct source water monitoring under this rule 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 paragraph (E) of rule 3745-81-67 of the Administrative Code.

(2) If a system chooses to provide the level of treatment in paragraph (D)(1) of

this rule, as applicable, rather than start source water monitoring, the system shall notify the primacy agency at the time of this requirement, in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring in accordance with paragraph (I) of this rule. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the primacy agency in writing that it will provide this level of treatment. Systems shall install and operate technologies to provide this level of treatment by the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. The system shall obtain plan approval of the treatment process scheme which provides at least 5.5 log of treatment. The primacy agency may require additional performance monitoring and reporting.

(E) Plants operating only part of the year.

Systems that operate for only part of the year shall conduct source water monitoring in accordance with this rule with the following modifications:

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

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

(F) New sources.

Source water monitoring of new sources shall meet the requirements of this rule unless the system meets the monitoring avoidance requirements of paragraph (D) of this rule. The system shall also meet the bin classification and Cryptosporidium treatment requirements of paragraphs (A) to (E) of rule 3745-81-67 of the Administrative Code, as applicable, for the new source on a schedule the director approves.

(1) An existing system that begins using a new source of surface water after the system is required to begin monitoring in accordance with paragraph (C) of this rule, shall monitor the new source on a schedule the director approves.

(2) A new system that begins operation using a new source after the monitoring date applicable to the system's size in accordance with paragraph (C) of this rule shall monitor the new source on a schedule the director approves.

(3) The system shall begin a second round of source water monitoring no later than six years following initial bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code.

(G) Failure to collect any source water sample required under this rule in accordance

with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of paragraphs (I) to (K) of this rule, paragraphs (H) to (J) of rule 3745-81-27, rule 3745-89-11, and paragraph (A) of rule 3745-81-66 of the Administrative Code, is a monitoring violation.

(H) Grandfathering monitoring data.

Systems may use (grandfather) monitoring data collection prior to the applicable monitoring start date in paragraph (C) of this rule to meet the initial source water monitoring requirements in paragraph (A) of this rule. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph shall meet the requirements in paragraph (B) of rule 3745-81-66 of the Administrative Code.

(I) Sampling schedules.

(1) Systems required to conduct source water monitoring in accordance with paragraphs (A) to (H) of this rule shall submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

(a) Systems shall submit sampling schedules no later than three months prior to the applicable date listed in paragraph (C) of this rule for each round of required monitoring.

(b) Systems serving at least ten thousand people shall submit their sampling schedule for the initial round of source water monitoring in accordance with paragraph (A) of this rule to the primacy agency at the time of this requirement electronically. If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that the primacy agency approves.

(c) Systems serving less than ten thousand people shall submit their sampling schedules for the initial round of source water monitoring required by paragraph (A) of this rule to the primacy agency at the time of this requirement.

(d) Systems shall submit sampling schedules for the second round of source water monitoring required by paragraph (B) of this rule to the director.

(e) If the primacy agency at the time of this requirement does not respond to a system regarding its sampling schedule, the system shall sample at the reported schedule.

(2) Systems shall collect samples within two days before or two days after the dates indicated in their sampling schedule (e.g., within a five day period around the schedule date) unless one of the following conditions applies:

(a) 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 shall sample as close to the scheduled date as is feasible unless the primacy agency at the time of this requirement accepts an alternative sampling date. The system shall submit an explanation for the delayed sampling date to the primacy agency concurrent with the shipment of the sample to the laboratory.

(b) 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 paragraphs (H) to (J) of rule 3745-81-27 of the Administrative Code, or the failure of an approved laboratory to analyze the sample, then the system shall collect a replacement sample. The system shall collect the replacement sample not later than twenty-one days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the director accepts an alternative resampling date. The system shall submit an explanation for the delayed sampling date to the primacy agency at the time of this requirement, concurrent with the shipment of the sample to the laboratory.

(3) Systems that fail to meet the criteria of paragraphs (I)(2)(a) and (I)(2)(b) of this rule for any source water sample required by paragraphs (A) to (H) of this rule shall revise their sampling schedules to add dates for collecting all missed samples. Systems shall submit the revised schedule to the primacy agency at the time of this requirement, for acceptance prior to when the system begins collecting the missed samples.

(J) Sampling locations.

Systems required to conduct source water monitoring by paragraphs (A) to (H) of this rule shall collect samples for each plant that treats a surface water source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the primacy agency at the time of this requirement, may accept one set of monitoring results to be used to satisfy the requirements of paragraphs (A) to (H) of this rule for all plants.

(1) Systems shall collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of paragraph (J)(2) of this rule.

(2) The primacy agency at the time of this requirement may accept a system to collect a source water sample after chemical treatment. To grant this acceptance, the primacy agency shall determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical

treatment is unlikely to have a significant adverse effect on the analysis of the sample.

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

(4) Bank filtration.

(a) Systems that receive Cryptosporidium treatment credit for bank filtration in accordance with paragraph (C) of rule 3745-81-73 of the Administrative Code, as applicable, shall collect source water samples in the surface water prior to bank filtration.

(b) Systems that do not receive Cryptosporidium treatment credit for bank filtration in accordance with paragraph (C) of rule 3745-81-73 of the Administrative Code and that use bank filtration as pretreatment to a filtration plant and do not intend to receive Cryptosporidium treatment credit for bank filtration under paragraph (F) of rule 3745-81-68 of the Administrative Code shall collect source water samples from the well (e.g., after bank filtration). Use of bank filtration during monitoring shall be consistent with routine operational practice.

(5) Multiple sources.

Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, shall collect samples as specified in paragraph (J)(5)(a) or (J)(5)(b) of this rule. The use of multiple sources during monitoring shall be consistent with routine operational practice.

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

(b) If a sampling tap where the sources are combined prior to treatment is not available, systems shall collect samples at each source near the intake on the same day and shall do either of the following:

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

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

(K) Additional requirements.

Systems shall submit a description of their sampling location to the primacy agency at the time of this requirement, at the same time as the sampling schedule required by paragraph (I) of this rule. This description shall address the position of the sampling location in relation to the system’s water source and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the primacy agency does not respond to a system regarding sampling location, the system shall sample at the reported location.

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3745-81-66 **Source monitoring results and grandfathered data.**

(A) Reporting source water monitoring results.

(1) Systems shall report results from the source water monitoring required by paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code no later than ten days after the end of the first month following the month when the sample is collected.

(2) All systems serving at least ten thousand people shall report the results from the initial source water monitoring required by paragraph (A) of rule 3745-81-65 of the Administrative Code to the primacy agency at the time of this requirement electronically. If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that the primacy agency approves.

(3) Systems serving less than ten thousand people shall report results from the initial source water monitoring required by paragraph (A) of rule 3745-81-65 of the Administrative Code to the primacy agency at the time of this requirement.

(4) All systems shall report results from the second round of source water monitoring required by paragraph (B) of rule 3745-81-65 of the Administrative Code to the director.

(5) Systems shall report the following applicable information for the source water monitoring required by paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code:

(a) Systems shall report the following information for each Cryptosporidium analysis:

Public water system (PWS) ID;

Source treatment unit (STU) ID;

Sample collection date;

Sample type (field or matrix spike);

Sample volume filtered (L), to nearest 0.25 L;

Was one hundred per cent of filtered volume examined; and

Number of oocysts counted.

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

For samples in which less than ten liters is filtered or less than one hundred per cent of the sample volume is examined, systems shall also report the number of filters used and the packed pellet volume.

For samples in which less than one hundred per cent of sample volume is examined, systems shall also report the volume of re-suspended concentrate and volume of this re-suspension processed through immunomagnetic separation.

(b) Systems shall report the following information for each E. coli analysis:

PWS ID;

STU ID;

Sample collection date;

Analytical method number;

Method type;

Source type (e.g., flowing stream, lake/reservoir, well designated as surface water);

E. coli/one hundred milliliters;

Turbidity. (Systems serving less than ten thousand people that are not required to monitor for turbidity in accordance with paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code are not required to report turbidity with their E. coli results.)

(B) Grandfathering previously collected data.

Systems may comply with the initial source water monitoring requirements of paragraph (A) of rule 3745-81-65 of the Administrative Code 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 shall meet the following criteria and shall be accepted by the primacy agency at the time of this requirement:

(1) A system may grandfather Cryptosporidium samples to meet the requirements

of paragraph (A) of rule 3745-81-65 of the Administrative Code 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 in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code.

(2) E. coli sample analysis. The analysis of E. coli samples shall meet the analytical method and approved laboratory requirements of paragraphs (H) to (J) of rule 3745-81-27 and rule 3745-89-11 of the Administrative Code.

(3) Cryptosporidium sample analysis. The analysis of Cryptosporidium samples shall meet the following criteria:

(a) Laboratories analyzed Cryptosporidium samples using one of the following analytical methods:

(i) USEPA method 1623, "Cryptosporidium and Giardia in Water by Filtration/IMS/FA" United States environmental protection agency, 2005, EPA-815-R-05-002.

(ii) USEPA method 1622, "Cryptosporidium in Water by Filtration/IMS/FA" United States environmental protection agency, 2005, EPA-815-R-05-001.

(iii) USEPA method 1623, "Cryptosporidium and Giardia in Water by Filtration/IMS/FA" United States environmental protection agency, 2001, EPA-821-R-01-025.

(iv) USEPA method 1622, "Cryptosporidium in Water by Filtration/IMS/FA" United States environmental protection agency, 2001, EPA-821-R-01-026.

(v) USEPA method 1623, "Cryptosporidium and Giardia in Water by Filtration/IMS/FA" United States environmental protection agency, 1999, EPA-821-R-99-006.

(vi) USEPA method 1622, "Cryptosporidium in Water by Filtration/IMS/FA" United States environmental protection agency, 1999, EPA-821-R-99-001.

(b) For each Cryptosporidium sample, the laboratory analyzed at least ten liters of sample or at least two milliliters of packed pellet or as much volume as could be filtered by two filters that U.S. EPA approved for the methods listed in paragraph (B)(3)(a) of this rule.

(4) Sampling location. The sampling location shall meet the conditions of paragraph (J) of rule 3745-81-65 of the Administrative Code.

(5) Sampling frequency. Cryptosporidium samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in paragraphs (I)(2)(a) and (I)(2)(b) of rule 3745-81-65 of the Administrative Code if the system provides documentation of the condition when reporting monitoring results.

(a) The primacy agency at the time of this requirement may accept grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the primacy agency specifies to ensure that the data used to comply with the initial source water monitoring requirements of paragraph (A) of rule 3745-81-65 of the Administrative Code are seasonally representative and unbiased.

(b) Systems may grandfather previously collected data where the sampling frequency within each month varied. If the Cryptosporidium sampling frequency varied, systems shall follow the monthly averaging procedure in paragraph (A)(5) of rule 3745-81-67 of the Administrative Code, as applicable, when calculating the bin classification for systems.

(6) Reporting monitoring results for grandfathering. Systems that request to grandfather previously collected monitoring results shall report the following information by the applicable dates listed in this paragraph. Systems shall report this information to the primacy agency at the time of this requirement.

(a) Systems shall report that they intend to submit previously collected monitoring results for grandfathering. This report shall 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 paragraph (A) of rule 3745-81-65 of the Administrative Code. Systems shall report this information no later than the date the sampling schedule is required by paragraph (I) of rule 3745-81-65 of the

Administrative Code.

(b) No later than two months after the applicable date listed in paragraph (C) of rule 3745-81-65 of the Administrative Code, systems shall report previously collected monitoring results for grandfathering, along with the following associated documentation:

(i) For each sample result, systems shall report the applicable information in paragraph (A) of this rule.

(ii) Systems shall certify that the reported monitoring results include all results the system generated during the time period beginning with the first report result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring in rule 3745-81-65 of the Administrative Code, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in paragraph (B)(3)(a) of this rule.

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

(iv) For Cryptosporidium samples, the laboratory or laboratories that analyzed the samples shall provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (B)(3)(a) of this rule 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, "Initial Precision and Recovery (IPR)", "Ongoing Precision and Recovery (OPR)," and method blank sample associated with the reported results.

(7) If the director determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the director may determine not to accept the data. Alternatively, the primacy agency may accept the previously collected data if the system reports additional source water monitoring data, as determined by the primacy agency, to ensure that the data set used under

paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code represents average source water conditions for the system.

(8) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code and some of the data are rejected due to not meeting the requirements of this rule, systems shall conduct additional monitoring to replace rejected data on a schedule the primacy agency at the time of this requirement accepts. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

[The director of the Federal Register approves incorporation by reference in paragraphs (B)(3)(a)(i) to (B)(3)(a)(vi) of this rule in accordance with 5 U.S.C. 552(a) and 1 C.F.R. part 51. You may obtain a copy of these methods on-line from the United States environmental protection agency, office of ground water and drinking water, 1301 Constitution Avenue, NW Washington, DC 20460 (telephone: 800-426-4791). For information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.]

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Certification

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Bin Classification Table for Systems

For systems that are:	With a *Cryptosporidium* bin concentration of...[1]	The bin classification is
...required to monitor for [*Cryptosporidium*] as specified in paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code.	*Cryptosporidium* <0.075 oocyst/L...	Bin 1.
	0.075 oocysts/L ≤ *Cryptosporidium* ,< 1.0 oocysts/L	Bin 2.
	1.0 oocysts/L ≤ *Cryptosporidium* < 3.0 oocysts/L...	Bin 3.
	Cryptosporidium ≥ 3.0 oocysts/L...	Bin 4.
...serving less than 10,000 people and NOT required to monitor for *Cryptosporidium* under paragraph (A)(4) of rule 3745-81-65 of the Administrative Code.	Not applicable...	Bin 1.

[1] Based on calculations in paragraph (A) or (C) of this rule, as applicable.

Systems shall report their initial bin classification to the director for approval no later than six months after the system is required to complete initial source water monitoring based on the schedule in paragraph (C) of rule 3745-81-65 of the Administrative Code. The bin classification report to the director shall include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

For systems serving less than one hundred thousand within twelve months after the system is required to complete initial source water monitoring, the system shall submit a general plan to the director indicating the system's plan for complying with any additional Cryptosporidium inactivation and/or removal requirements. Systems serving at least one hundred thousand people shall submit a general plan by March 1, 2010. The general plan shall include at a minimum, a description of each toolbox option which may be used, and a schedule for submitting any required detail plans and/or protocols/pilot study results for the proposed toolbox option. The general plan shall be prepared and submitted by a professional engineer.

(C) Following completion of the second round of source water monitoring required in accordance with paragraph (B) of rule 3745-81-65 of the Administrative Code, systems shall recalculate their Cryptosporidium bin concentration using the Cryptosporidium results reported in accordance with paragraph (B) of rule 3745-81-65 of the Administrative Code and following

the procedures in paragraphs (A)(1) to (A)(4) of this rule. Systems shall then re-determine their bin classification using this bin concentration and the table in paragraph (B) of this rule. Systems shall report their bin classification to the director for approval no later than six months after the system is required to complete the second round of source water monitoring based on the schedule in paragraph (C) of rule 3745-81-65 of the Administrative Code. The bin classification report to the director shall include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

Within six months of receiving the director's approval of the bin classification, the system shall submit a general plan to the director indicating the system's plan for complying with any additional Cryptosporidium inactivation and/or removal requirements. The general plan shall include at a minimum, a description of each toolbox option which may be used, and a schedule for submitting any required detail plans and/or protocols/pilot study results for the proposed toolbox option.

(D) Failure to comply with the reporting requirements in paragraphs (B) and (C) of this rule is a violation of the treatment technique requirement.

(E) Additional Cryptosporidium treatment requirements based on bin classification.

(1) Systems shall provide the level of additional treatment for Cryptosporidium specified in this paragraph based on their bin classification as determined in accordance with paragraphs (A) to (D) of this rule and according to the schedule in paragraph (F) of this rule.

Additional Cryptosporidium treatment requirements based on bin classification.

If the system bin classification is...	And the system uses the following filtration treatment in full compliance with rules 3745-81-71 to 3745-81-76 of the Administrative Code (as applicable), then the additional *Cryptosporidium* treatment requirements are...			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1...	No additional treatment...	No additional treatment...	No additional treatment...	No additional treatment...
Bin 2...	1-log treatment...	1.5-log treatment...	1-log treatment...	(1)
Bin 3...	2-log treatment...	2.5-log treatment...	2-log treatment...	(2)
Bin 4...	2.5-log treatment...	3-log treatment...	2.5-log treatment...	(3)

(1) As determined by the director such that the total Cryptosporidium removal and inactivation is at least 4.0-log.

(2) As determined by the director such that the total Cryptosporidium removal and inactivation is at least 5.0-log.

(3)As determined by the director such that the total Cryptosporidium removal and inactivation is at least 5.5-log.

(2) Systems shall use one or more of the treatment and management options listed in paragraph (A) of rule 3745-81-68 of the Administrative Code, termed the microbial toolbox, to comply with the additional Cryptosporidium treatment required in paragraph (E)(1) of this rule.

(3) Systems classified in Bin 3 and Bin 4 shall achieve at least 1-log of the additional Cryptosporidium treatment required under paragraph (E)(1) of this rule using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in paragraphs (B) to (N) of rule 3745-81-68 of the Administrative Code.

(4) Failure by a system in any month to achieve treatment credit by meeting criteria in paragraphs (B) to (N) of rule 3745-81-68 of the Administrative Code for microbial toolbox options that is at least equal to the level of treatment required in paragraph (E)(1) of this rule is a violation of the treatment technique requirement.

(5) If the director determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted in accordance with paragraphs (A) or (B) of rule 3745-81-65 of the Administrative Code, significant changes occurred in the system's watershed that could lead to increased contamination of the source water by Cryptosporidium, the system shall take actions specified by the director to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox

options listed in paragraph (A) of rule 3745-81-68 of the Administrative Code.

(F) Schedule for compliance with Cryptosporidium treatment requirements.

(1) After the initial bin classification is determined, systems shall provide the level of treatment for Cryptosporidium required by paragraph (E) of this rule in accordance with the following schedule:

***Cryptosporidium* Treatment Compliance Dates Table**

Systems that serve	Shall comply with *Cryptosporidium* treatment requirements no later than ...*
(1) At least 100,000 people.	(1) April 1, 2012
(2) From 50,000 to 99,999 people.	(1) October 1, 2012
(3) From 10,000 to 49,999 people.	(1) October 1, 2013
(4) Fewer than 10,000 people.	(1) October 1, 2014
* Systems with a bin classification of Bin 3 or Bin 4 shall have an additional two years for complying with the treatment requirement if capital improvements will be made. The director may allow up to an additional two years for complying with the treatment requirement for systems in Bin 2 if capital improvements will be made.	

(2) If the bin classification for a system changes following the second round of source water monitoring, as determined in accordance with paragraph (C) of this rule, the system shall provide the level of treatment for Cryptosporidium required in accordance with paragraph (E) of this rule on a schedule the director approves.

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3745-81-68 Microbial toolbox options for meeting Cryptosporidium treatment requirements.

(A) Water systems shall obtain plan approval by the director for each microbial toolbox option prior to receiving treatment credit for the toolbox option. Systems receive the treatment credits listed in the following table by meeting the conditions for microbial toolbox options described in paragraphs (B) to (N) of this rule. Systems shall apply these treatment credits to meet the treatment required by paragraph (E) of rule 3745-81-67 of the Administrative Code. The following table summarizes options in the microbial toolbox:

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
(1) Watershed control program...	0.5-log credit for director-approved program comprising required elements, annual program status report to director, and regular watershed survey. Specific criteria are in paragraph (B) of this rule.
(2) Alternative source/intake management...	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in paragraph (C) of this rule.

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Pre Filtration Toolbox Options	
(3) Presedimentation basin with coagulation...	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative director-approved performance criteria. To be eligible, basins shall be operated continuously with coagulant addition and all plant flow shall pass through basins. Specific criteria are in paragraph (D) of this rule.
(4) Two-stage lime softening...	0.5-log credit for two-stage softening where chemical additional and hardness precipitation occur in both stages. All plant flow shall pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in paragraph (E) of this rule.
(5) Bank filtration...	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer shall be unconsolidated sand containing at least 10 per cent fines; average turbidity in wells shall be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring shall sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in paragraph (F) of this rule.

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Treatment Performance Toolbox Options	
(6) Combined filter performance...	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 per cent of measurements each month. Specific criteria are in paragraph (G) of this rule.
(7) Individual filter performance…	0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 per cent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in paragraph (H) of this rule.
(8) Demonstration of performance…	Credit awarded to unit process or treatment train based on a demonstration to the director with a director-accepted protocol. Specific criteria are in paragraph (I) of this rule.
Additional Filtration Toolbox Options	
(9) Bag or cartridge filters (individual filters)…	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in paragraph (J) of this rule.
(10) Bag or cartridge filters (in series)...	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria in paragraph (J) of this rule.
(11) Membrane filtration...	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in paragraph (K) of this rule.
(12) Second stage filtration...	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in paragraph (L) of this rule.
(13) Slow sand filters....	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in paragraph (M) of this rule.

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA	
Toolbox Option	Cryptosporidium treatment credit with design and implementation criteria
Inactivation Toolbox Options	
(14) Chlorine dioxide...	Log credit based on measured CT in relation to CT table. Specific criteria in paragraph (N)(2) of this rule.
(15) Ozone...	Log credit based on measured CT in relation to CT table. Specific criteria in paragraph (N)(2) of this rule.
(16) UV...	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in paragraph (N)(4) of this rule.

(B) Watershed control program.

Systems received 0.5-log Cryptosporidium treatment credit for implementing a watershed control program that meets the requirements of this paragraph.

(1) Systems that intend to apply for the watershed control program credit shall notify the director of this intent no later than two years prior to the treatment compliance date applicable to the system in paragraph (F) of rule 3745-81-67 of the Administrative Code.

(2) Systems shall submit to the director a proposed watershed control plan no later than one year before the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. The director shall approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan shall include the following elements:

(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 as approved by the director. This is the area to be evaluated in future watershed surveys in accordance with paragraph (B)(4)(b) of this rule. The area of influence shall include, at a minimum:

(i) For systems using inland streams, reservoirs, and lakes, the

drinking water source protection area with primary focus on the corridor management zone and any additional areas within the watershed that have been specifically identified by the public water system or the director as possible sources of Cryptosporidium.

(ii) For systems using the Ohio river, the zone of critical concern.

(iii) For systems using lake Erie, the potential influence zone, where this zone has been delineated.

(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 shall explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

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

(4) Systems shall complete the following actions to maintain the 0.5-log credit.

(a) Submit an annual watershed control program status report to the director. The annual watershed control program status report shall describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It shall explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the director or as the result of the watershed survey conducted under paragraph (B)(4)(b) of this rule. It shall 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 shall notify the director prior to making any such changes. If any change is likely to reduce the level of source water protection, the system shall 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 director. The survey shall be conducted according to Ohio environmental protection agency guidelines and by persons acceptable to the director.

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

(ii) If the director determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems shall undergo another watershed sanitary survey by a date the director requires, which may be earlier than the regular date in paragraph (B)(4)(b) of this rule.

(c) The system shall make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents shall be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The director may accept 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.

(5) If the director determines that a system is not carrying out the approved watershed control plan, or if conditions change from those approved, the watershed control plan may no longer be approvable. An approvable plan must be submitted to maintain the watershed control program treatment credit.

(C) Alternative source.

(1) A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the director approves, a system may determine its bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code based on the alternative source monitoring results.

(2) If systems conduct alternative source monitoring in accordance with paragraph (C)(1) of this rule, systems shall also monitor their current plant intake concurrently as described in paragraphs (A) to (H) of rule 3745-81-65 of the Administrative Code.

(3) Alternative source monitoring under paragraph (C)(1) of this rule shall meet the requirements for source monitoring to determine bin classification, as described in rule 3745-81-65, paragraphs (H) to (J) of rule 3745-81-27, rule 3745-89-11, and paragraph (A) of rule 3745-81-66 of the Administrative Code. Systems shall report the alternative source monitoring results to the director, along with supporting information documenting the operating conditions under which the samples were collected.

(4) If a system determines its bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code 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 shall relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.

(D) Presedimentation.

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

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

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

(3) The presedimentation basin shall achieve the performance criteria in

paragraph (D)(3)(a) or (D)(3)(b) of this rule.

(a) Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction shall be determined using daily turbidity measurements in the presedimentation process influent and effluent and shall be calculated as follows:

$\log_{10}$ (monthly mean of daily influent turbidity) - $\log_{10}$ (monthly mean of daily effluent turbidity).

The daily turbidity measurements shall be taken under normal operating conditions for that day. Presedimentation operations shall not be altered for the sole purpose of influencing sample results.

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

(E) 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 shall treat the entire plant flow taken from a surface water source.

(F) Bank filtration.

Systems receive Cryptosporidium treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code shall collect samples as described in paragraph (J)(4) of rule 3745-81-65 of the Administrative Code and are not eligible for this credit.

(1) Wells with a ground water flow path of at least twenty-five feet receive 0.5-log treatment credit; wells with a ground water flow path of at least fifty feet receive 1.0-log treatment credit. The ground water flow path shall be determined as specified in paragraph (F)(4) of this rule.

(2) Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system shall characterize the aquifer at

the well site to determine aquifer properties. Systems shall extract a core from the aquifer and demonstrate that in at least ninety per cent of the core length, grains less than 1.0 millimeters in diameter constitute at least ten per cent of the core material.

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

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

(5) Systems shall monitor each wellhead for turbidity at least once within the first and last hours of bank filtration operation and at least every four hours in between. If monthly average turbidity levels, based on daily maximum values in the well, exceed one NTU, the system shall report this result to the director and conduct an assessment within thirty days to determine the cause of the high turbidity levels in the well. If the director determines that microbial removal has been compromised, the bank filtration credit may no longer be approvable. To maintain the bank filtration treatment credit, the system shall implement corrective actions to remediate the problem and submit approvable plans.

(6) Springs and infiltration galleries are not eligible for treatment credit under paragraph (F) of this rule, but are eligible for credit under paragraph (I) of this rule.

(7) Bank filtration demonstration of performance. The director may approve Cryptosporidium treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in paragraphs (F)(1) to (F)(5) of this rule.

(a) The study shall follow a protocol acceptable to the director and shall 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 shall 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).

(G) Combined filter performance.

Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log Cryptosporidium treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity shall be less than or equal to 0.15 NTU in at least ninety-five per cent of the measurements. Turbidity shall be measured as described in paragraph (C)(3) of rule 3745-81-27 and paragraph (A) of rule 3745-81-74 of the Administrative Code.

(H) Individual filter performance.

Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log Cryptosporidium treatment credit, which can be in addition to the 0.5-log credit under paragraph (G) of this rule, during any month the system meets the criteria in this paragraph. Compliance with these criteria shall be based on individual filter turbidity monitoring as described in paragraphs (B) and (C) of rule 3745-81-74 of the Administrative Code, as applicable.

(1) The filtered water turbidity for each individual filter shall be less than or equal to 0.15 NTU in at least ninety-five per cent of the measurements recorded each month.

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

(3) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of paragraph (H)(1) or (H)(2) of this rule during any month does not receive a treatment technique violation under paragraph (E)(4) of rule 3745-81-67 of the Administrative Code if the director 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.

(I) Demonstration of performance.

The director may approve Cryptosporidium treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in paragraph (E) of rule 3745-81-67 of the Administrative Code or paragraphs (D) to (N) of this rule and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(1) Systems cannot receive the prescribed treatment credit for any toolbox option in paragraphs (D) to (N) of this rule if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

(2) The demonstration of performance study shall follow a protocol acceptable to the director and shall demonstrate the level of Cryptosporidium reduction the treatment process will achieve under the full range of expected operating conditions for the system.

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

(J) Bag and cartridge filters.

Systems receive Cryptosporidium treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in paragraphs (J)(1) to (J)(10) of this rule. To be eligible for this credit, systems shall report the results of challenge testing that meets the requirements of paragraphs (J)(2) to (J)(9) of this rule to the director. The filters shall treat the entire plant flow taken from a surface water source.

(1) The Cryptosporidium treatment credit awarded to bag or cartridge filters shall be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in paragraphs (J)(2) to (J)(9) of this rule. 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 shall 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 paragraphs (J)(2) to (J)(9) of this rule.

(2) Challenge testing shall 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 shall be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(3) Challenge testing shall 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 shall be determined using a method capable of discretely quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.

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

Maximum Feed Concentration = $1 \times 10^{4} \times$ (filtrate detection limit)

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

(6) Each filter evaluated shall be tested for the duration sufficient to reach one hundred per cent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements in paragraph (E) of rule 3745-81-67 of the Administrative Code.

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

$LRV = LOG_{10}(Cf) - LOG_{10}(Cp)$

Where: LRV = log removal value demonstrated during challenge testing; Cf = the feed concentration measured during the challenge test; and Cp = the filtrate concentration measured during the challenge test. In applying this

equation, the same units shall be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term Cp shall be set equal to the detection limit.

(8) Each filter tested shall 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 forty-five and fifty-five per cent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached one hundred per cent of the terminal pressure drop. An LRV shall be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRVfilter) shall be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

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

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

(K) Membrane filtration.

(1) Systems receive Cryptosporidium treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in rule 3745-81-01 of the Administrative Code are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under paragraphs (K)(1)(a) and (K)(1)(b) of this rule. The U.S. EPA “Membrane Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule” (November 2005), shall be used as a guide in the technical review of plans submitted for approval of membrane facilities. Approval of plans for membrane facilities may be conditioned upon requirements that may be necessary or desirable to ensure that the system being constructed, or of which the proposed project is a part, will be able to meet generally accepted standards for the design, equipping and operation of membrane

facilities. Systems shall keep daily operational logs used to determine monthly compliance with the direct and indirect integrity testing requirements. The operational logs must be signed by an operator of record and kept on a form acceptable to the director. Operational logs must be made available for review upon request.

(a) The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (K)(2) of this rule.

(b) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in paragraph (K)(3) of this rule.

(2) Challenge testing.

The membrane used by the system shall undergo challenge testing to evaluate removal efficiency, and the system shall report the results of challenge testing to the director. Challenge testing shall be conducted according to the criteria in paragraphs (K)(2)(a) to (K)(2)(g) of this rule. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in paragraphs (K)(2)(a) to (K)(2)(g) of this rule.

(a) Challenge testing shall 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 shall 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, shall 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 shall be determined according to the following equation:

maximum feed concentration = 3.16×10^6 x (filtrate detection limit)

(d) Challenge testing shall 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 per cent 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 (e.g., backwashing).

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

$LRV = LOG_{10}(Cf) - LOG_{10}(Cp)$

Where:

LRV = log removal value demonstrated during the challenge test; Cf = the feed concentration measured during the challenge test; and Cp = the filtrate concentration measured during the challenge test.

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

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

calculated using linear interpolation.

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

(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 QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane shall be conducted and submitted to the director.

(3) Direct integrity testing.

Systems shall 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 paragraphs (K)(3)(a) to (K)(3)(f) of this rule. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (e.g., one or more leaks that could result in contamination of the filtrate).

(a) The direct integrity test shall 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 shall have a resolution of three 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 shall have the sensitivity sufficient to verify the log treatment credit approved by the director for the membrane

filtration process, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity shall be determined using the approach in either paragraph (K)(3)(c)(i) or (K)(3)(c)(ii) of this rule as applicable to the type of direct integrity test the system uses.

(i) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity shall 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; Qp = 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.

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

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

Where:

LRV_{DIT} = the sensitivity of the direct integrity test; Cf = the typical feed concentration of the marker used in the test; and Cp = the filtrate concentration of the marker from an integral membrane unit.

(d) Systems shall 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 approved by the director.

(e) If the result of a direct integrity test exceeds the control limit established under paragraph (K)(3)(d) of this rule, the system shall

remove the membrane unit from service. Systems shall 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 shall conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The director may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for Cryptosporidium, or reliable process safeguards.

(4) Indirect integrity monitoring.

Systems shall conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in paragraphs (K)(4)(a) to (K)(4)(f) of this rule. 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 paragraphs (K)(3)(a) to (K)(3)(f) of this rule is not subject to the requirements for continuous indirect integrity monitoring. Systems shall submit a monthly report to the director summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

(a) Unless the director approves an alternative parameter, continuous indirect integrity monitoring shall include continuous filtrate turbidity monitoring.

(b) Continuous monitoring shall be conducted at a frequency of no less than once every fifteen minutes.

(c) Continuous monitoring shall 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 fifteen minutes (i.e., two consecutive fifteen-minute readings above 0.15 NTU), direct integrity testing shall immediately be performed on the associated membrane unit as specified in paragraphs (K)(3)(a) to (K)(3)(f) of this rule.

(e) The public water system shall validate the continuous measurement for accuracy on a regular basis using a protocol acceptable to the director.

(f) If indirect integrity monitoring includes a director-approved alternative parameter and if the alternative parameter exceeds a director-approved control limit for a period greater than fifteen minutes, direct integrity testing shall immediately be performed on the associated membrane units as specified in paragraphs (K)(3)(a) to (K)(3)(f) of this rule.

(L) Second stage filtration.

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

(M) Slow sand filtration (as secondary filter).

Systems are eligible to receive 2.5-log Cryptosporidium treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water source and no disinfectant residual is present in the influent water to the slow sand filtration process. The director shall 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.

(N) Inactivation toolbox components.

(1) Calculation of CT values.

(a) 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 paragraph (N)(2) or (N)(3) of this rule shall calculate CT at least once each day, with both “C” and “T” measured during peak hourly flow as specified in rules 3745-81-27 and 3745-81-72 of the Administrative Code.

(b) 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 shall add the Cryptosporidium CT values in each segment to determine the total CT for the treatment plant.

(2) CT values for chlorine dioxide and ozone.

(a) Systems receive the Cryptosporidium treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in paragraph (N)(1) of this rule.

CT Values (MG-MIN/L) for Cryptosporidium Inactivation by Chlorine Dioxide [1]

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25 ...	159	153	140	128	107	90	69	45	29	19	12
(ii) 0.50 ...	319	305	279	256	214	180	138	89	58	38	24
(iii) 1.0...	637	610	558	511	429	360	277	179	116	75	49
(iv) 1.5...	956	915	838	767	643	539	415	268	174	113	73
(v) 2.0...	1275	1220	1117	1023	858	719	553	357	232	150	98
(vi) 2.5...	1594	1525	1396	1278	1072	899	691	447	289	188	122
(vii) 3.0 ...	1912	1830	1675	1534	1286	1079	830	536	347	226	147

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

(b) Systems receive the Cryptosporidium treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in paragraph (N)(1) of this rule.

CT Values (MG-MIN/L) for Cryptosporidium Inactivation by Ozone [1]

Log credit	Water Temperature, °C										
	<=0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25 ...	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
(ii) 0.50 ...	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
(iii) 1.0...	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
(iv) 1.5...	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
(v) 2.0...	48	46	42	38	32	26	20	12	7.8	4.9	3.1
(vi) 2.5…	60	58	52	48	40	33	25	16	9.8	6.2	3.9
(vii) 3.0 ...	72	69	63	57	47	39	30	19	12	7.4	4.7

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

(3) Site-specific study.

The director may approve alternative chlorine dioxide or ozone CT values to those listed in paragraph (N)(2) of this rule on a site-specific basis. The director shall base this approval on a site-specific study a system conducts that follows a protocol acceptable to the director.

(4) Ultraviolet light. Systems receive Cryptosporidium, Giardia lamblia, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in paragraph (N)(4)(a) of this rule. Systems shall validate and monitor UV reactors as described in paragraphs (N)(4)(b) and (N)(4)(c) of this rule to demonstrate that they are achieving a particular UV dose value for treatment credit. The U.S. EPA “Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule” (November 2006), shall be used as a guide in the technical review of plans submitted for approval of UV facilities. Approval of plans for UV facilities may be conditioned upon requirements that may be necessary or desirable to ensure that the system being constructed, or of which the proposed project is a part, will be able to meet generally accepted standards for the design, equipping and operation of UV facilities. Systems shall keep daily operational logs used to determine monthly compliance with

the percentage of water treated under validated conditions. The operational logs must be signed by an operator of record and kept on a form acceptable to the director. Operational logs must be made available for review upon request.

(a) UV dose table.

The treatment credits listed in this table are for UV light at a wavelength of two hundred fifty-four nanometers as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems shall demonstrate an equivalent germicidal dose through reactor validation testing, as described in paragraph (N)(4)(b) of this rule. The UV dose values in this table are applicable only to post-filter applications of UV.

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

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

(b) Reactor validation testing.

Systems shall use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in paragraph (N)(4)(a) of this rule (i.e., validated operating conditions). These operating conditions shall

include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

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

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

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

(c) Reactor monitoring.

(i) Systems shall monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under paragraph (N)(4)(b) of this rule. This monitoring shall include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the director designates based on UV reactor operation. Systems shall verify the calibration of UV sensors and shall recalibrate sensors at least monthly in accordance with a protocol the director accepts. The following parameters shall be monitored and recorded at the frequencies indicated in the table below for each UV reactor:

Parameter	Recording Frequency	Required conditions for obtaining disinfection credit.
Off-specification alarm	At least every 5 minutes	Recording shall continue until the alarm condition has been corrected.

UV Intensity	At least every 4 hours	The UV intensity shall be greater than or equal to the validated set point.
UVT (required only if necessary for the dose monitoring strategy (e.g., calculated dose approach))	At least every 4 hours	The UVT shall be greater than or equal to the minimum UVT validated.
Validated Dose	At least every 4 hours	The validated dose shall be greater than or equal to the D_{req}.
Lamp Status	At least every 4 hours	Lamps shall be energized if water is flowing through the UV reactor.
Flow Rate	At least every 4 hours	The flow rate shall be less than or equal to the maximum flow tested in validation.
Production Volume	Off-specification events and monthly total	The production volume shall be recorded so the off-specification compliance calculation can be completed.
Calibration of UV Sensors	At least monthly	Calibration shall be conducted in accordance with a protocol acceptable to the director.
Calibration of On-line UVT Analyzer (required only if necessary for the dose monitoring strategy (e.g., calculated dose approach)	Weekly	Calibration must be conducted in accordance with a protocol acceptable to the director.

(ii) To receive treatment credit for UV light, systems shall treat at least ninety-five per cent 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 paragraphs (N)(4)(a) and (N)(4)(b) of this rule. Systems shall demonstrate compliance with this condition by the monitoring required under paragraph (N)(4)(c)(i) of this rule.

[This rule references the U.S. EPA "Membrane Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule," issued November 2005. This document is available from the "U.S. EPA Office of Ground Water and Drinking Water, Ariel Rios Building, 1200 Pennsylvania Ave, NW, Washington, DC 20460-0003, (202) 564-3750." A copy may also be obtained from www.epa.gov/safewater/disinfection/lt2/compliance.html.]

[This rule references the U.S. EPA "Ultraviolet Disinfection Guidance Manual for Final Long Term 2 Enhanced Surface Water Treatment Rule," issued November 2006. This document is available from the "U.S. EPA Office of Ground Water and Drinking Water, Ariel Rios Building, 1200 Pennsylvania Ave, NW, Washington, DC 20460-0003, (202) 564-3750." A copy may also be obtained from www.epa.gov/safewater/disinfection/lt2/compliance.html.]

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3745-81-69 <u>Reporting and recordkeeping requirements for LT2 only</u>.

(A) Reporting requirements.

(1) Systems shall report sampling schedules in accordance with paragraph (I) of rule 3745-81-65 of the Administrative Code and source water monitoring results in accordance with paragraph (A) of rule 3745-81-66 of the Administrative Code unless they notify the director that they will not conduct source water monitoring due to meeting the criteria of paragraph (D) of rule 3745-81-65 of the Administrative Code.

(2) Systems shall report their Cryptosporidium bin classification as described in paragraphs (A) to (D) of rule 3745-81-67 of the Administrative Code.

(3) Systems shall report disinfection profiles and benchmarks to the director as described in paragraph (E) of rule 3745-81-72 of the Administrative Code prior to making a significant change in disinfection practice.

(4) Systems shall report to the director in accordance with the following table for any microbial toolbox options used to comply with treatment requirements in accordance with paragraph (E) of rule 3745-81-67 of the Administrative Code. Alternatively, the director may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
(1) Watershed control program (WCP)	(i) Notice of intention to develop a new or continue an existing watershed control program.	No later than two years before the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
	(ii) Watershed control plan.	No later than one year before the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
	(iii) Annual watershed control program status report.	Every twelve months, beginning one year after

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
		the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
	(iv) Watershed sanitary survey report.	For community water systems, every three years beginning three years after the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(2) Alternative source/intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(3) Presedimentation	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100 per cent of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative director-approved performance criteria.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
(4) Two-stage lime softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration (ii) Both stages treated 100 per cent of the plant flow.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(5) Bank filtration	(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit). (ii) If monthly average of daily max turbidity is greater than 1 NTU then system shall report result and submit an assessment of the cause.	No later than the applicable treatment compliance date as specified in paragraph (F) of rule 3745-81-67 of the Administrative Code. Report within thirty days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(6) Combined filter performance	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 per cent of the 4 hour CFE measurements taken each month.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
(7) Individual filter performance	Monthly verification of the following: (i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 per cent of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Monthly reporting within ten days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(8) Demonstration of performance	(i) Results from testing following a protocol acceptable to the director. (ii) As required by the director, monthly verification of operation within conditions of director approval for demonstration of performance credit.	No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code. Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(9) Bag filters and cartridge filters	(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge filtration; (B) Removal efficiency established through challenge testing that meets criteria of rule 3745-81-68 of the Administrative Code. (ii) Monthly verification that 100 per cent of plant flow was filtered.	No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code. Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
		in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(10) Membrane filtration	(i) Results of verification testing demonstrating the following: (A) Removal efficiency established through challenge testing that meets criteria of rule 3745-81-68 of the Administrative Code**;** (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.	No later than the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
	(ii) Monthly report summarizing the following: (A) All direct integrity tests above the control limit; (B) if applicable, any turbidity or alternative state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(11) Second stage filtration	Monthly verification that 100 per cent of flow was filtered through both stages and that first stage was preceded by coagulation step.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(12) Slow sand filtration (as secondary filter)	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100 per cent of flow.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in paragraph (F) of rule

MICROBIAL TOOLBOX REPORTING REQUIREMENTS		
Toolbox Option	Systems shall submit the following information	On the following schedule
		3745-81-67 of the Administrative Code.
(13) Chlorine dioxide	Summary of CT values for each day as described in paragraph (N) of rule 3745-81-68 of the Administrative Code.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(14) Ozone	Summary of CT values for each day as described in paragraph (N) of rule 3745-81-68 of the Administrative Code.	Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.
(15) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose. (ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in paragraph (N)(4) of rule 3745-81-68 of the Administrative Code.	No later than the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code. Within ten days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in paragraph (F) of rule 3745-81-67 of the Administrative Code.

(B) Recordkeeping requirements.

(1) Systems shall keep results from the initial round of source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code and the second round of source water monitoring in accordance with paragraph (B) of rule 3745-81-65 of the Administrative Code until three years after bin classification in accordance with paragraphs (A) to (D) of rule 3745-81-67 for the particular round of monitoring.

(2) Systems shall keep any notification to the director that they will not conduct source water monitoring due to meeting the criteria of paragraph (D) of rule 3745-81-65 of the Administrative Code for three years.

(3) Systems shall keep the results of treatment monitoring associated with microbial toolbox options in accordance with paragraphs (B) to (N) of rule 3745-81-68 of the Administrative Code, as applicable, for three years.

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3745-81-70 **Monitoring requirements for disinfectant residuals.**

(A) Each public water system required to monitor under this rule shall develop and implement a monitoring plan. The public water system shall maintain the plan and make it available for inspection by the director and the general public. All surface water systems serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required by rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements. The public water system shall modify the plan as required by the director. The plan shall include at least the specific locations and schedules for collecting samples for any parameters included in this rule, and the plan shall include how the public water system will calculate compliance with maximum residual disinfectant levels (MRDLs). If a public water system is approved for monitoring as a consecutive system, or provides water to a consecutive system under the provisions of rule 3745-81-29 of the Administrative Code, its sampling plan shall reflect the entire distribution system. Failure to monitor according to the monitoring plan is a monitoring violation.

(B) Public water systems shall take all disinfectant residual samples during normal operating conditions.

(C) Failure to perform the required monitoring for total chlorine is a monitoring violation. The public water system will be in violation for the entire period covered by the running annual average.

(D) All samples taken and analyzed under the provisions of this rule shall be included in determining compliance, even if that number is greater than the minimum required.

(E) This paragraph applies to all community and nontransient noncommunity public water systems serving more than one thousand persons that treat their water with chlorine or chloramines for disinfection purposes. The monitoring requirements for total chlorine are as follows:

(1) Until March 31, 2016, the residual disinfectant level shall be measured at the same points in the distribution system and at the same time as total coliforms are sampled as specified in rule 3745-81-21 of the Administrative Code. However, surface water systems may use the results of residual disinfectant concentration sampling conducted under rule 3745-81-74 of the Administrative Code in lieu of taking separate samples.

(2) Beginning April 1, 2016, the residual disinfectant level shall be measured at the same points in the distribution system and at the same time as total coliforms are sampled as specified in rules 3745-81-51 and 3745-81-52 of the Administrative Code.

(3) Compliance shall be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under this rule. For total chlorine a public water system is in compliance with the MRDL when the running annual average of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. If the average of the quarterly averages covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the

MRDL and must notify the public according to rule 3745-81-32 of the Administrative Code, in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

(F) This paragraph applies to all public water systems that treat their water with chlorine dioxide. The monitoring requirements for chlorine dioxide are as follows:

(1) Chlorine dioxide levels shall be measured daily in samples taken at the entrance to the distribution system.

(2) Compliance shall be based on consecutive daily samples. A public water system 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. If any daily sample exceeds the MRDL, the public water system shall take three chlorine dioxide distribution system samples on the following day. These three samples are in addition to the sample required at the entrance to the distribution system.

(a) 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 public water system shall take the three samples as close to the first customer as possible, at intervals of at least six hours.

(b) If chlorine is used to maintain a disinfectant residual in the distribution system and there is at least one disinfection addition point after the entrance to the distribution system (i.e., booster chlorination), the public water system shall take one sample at each of the following locations: close to the first customer; in a location representative of average residence time; and at a location reflecting maximum residence time in the distribution system.

(c) If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one or more of the three samples taken in the distribution system exceed the MRDL, the public water system is in violation of the MRDL. The public water system shall take immediate corrective action to lower the level of chlorine dioxide below the MRDL, and shall notify the public according to the procedures for acute health risks in rule 3745-81-32 of the Administrative Code in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

(d) If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the public water system is in violation of the MRDL. The public water system shall take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and shall notify the public according to the procedures for nonacute health risks in rule 3745-81-32 of the Administrative Code in addition to reporting to the director according to rule 3745-81-75 of the Administrative Code.

(3) 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. The public water system shall notify the public of the violation according to the provisions for nonacute violations in paragraph (C) of rule 3745-81-32 of the Administrative Code.

(4) Failure to monitor in 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 according to the provisions for acute violations under paragraph (B) of rule 3745-81-32 of the Administrative Code.

(G) Notwithstanding the MRDLs in rule 3745-81-10 of the Administrative Code, public water systems may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events or cross-connections events.

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Prior Effective Dates:	01/01/02, 01/01/04, 01/01/10

3745-81-71 **General requirements for filtration and disinfection of surface water sources.**

(A) Rules 3745-81-71 to 3745-81-75 of the Administrative Code are derived from national primary drinking water regulations. The treatment technique requirements of this rule are established in lieu of maximum contaminant levels for the following contaminants: Cryptosporidium, Giardia lamblia, viruses, heterotrophic plate count bacteria, Legionella, and turbidity. Each public water system using a surface water source, in whole or in part, shall provide treatment of that source water which complies with the treatment technique requirements of this rule. The treatment technique requirements consist of installing and properly operating water treatment processes which consistently and reliably achieve the following:

(1) At least 99.9 per cent (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 later point before or at the first customer.

(2) At least 99.99 per cent (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 later point before or at the first customer.

(3) At least 99.0 per cent (2 log) removal of Cryptosporidium between a point where the raw water is not subject to recontamination by surface water runoff and a later point before or at the first customer.

(B) A public water system using a surface water source, in whole or in part, shall be in compliance with paragraph (A) of this rule if the public water system meets the filtration requirements of rule 3745-81-73 of the Administrative Code and the disinfection requirements of rule 3745-81-72 of the Administrative Code.

(C) The owner of a public water system using a surface water source, in whole or in part, shall place the operation of the public water system under the supervision of an operator of record. The operator of record shall have a valid certification in accordance with Chapter 3745-7 of the Administrative Code.

(D) "Uncovered finished water storage facility" means a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection and is open to the atmosphere. Systems are not permitted to begin construction of uncovered finished water storage facilities. Failure to comply with this requirement is a treatment technique violation.

(E) A new surface water source shall be sampled for twelve consecutive months and analyzed for the contaminants that are listed in the appendix to this rule, "Required Analyses for New Surface Water Sources." The director may reduce or add to the contaminants that are listed in the appendix to this rule because of treatment, promulgated drinking water standards, or other criteria. Other criteria may include existing or emerging contaminants which may pose a threat to public health. Samples collected from a public water system surface water source shall be

analyzed in a laboratory certified to analyze drinking water for contaminants in accordance with Chapter 3745-89 of the Administrative Code. The analytical methods shall be the same as required by the entry point to the distribution system monitoring in accordance with rule 3745-81-27 of the Administrative Code and shall include all the volatile organic and synthetic organic analytes that are quantified by the laboratory for the organic analytical method. Cryptosporidium samples for new surface water sources shall be collected in accordance with the source monitoring requirements in rules 3745-81-65 and 3745-81-66 of the Administrative Code.

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APPENDIX

Required Analysis for Surface Water Sources

Inorganic (quarterly testing)

Total dissolved solids	Sulfate
Calcium	Chloride
Magnesium	Fluoride
Iron	MBSA
Manganese	Asbestos
Nitrogen ammonia	Nitrite
Nitrate	Sodium

Heavy metals (quarterly testing)

Arsenic	Antimony
Barium	Beryllium
Cadmium	Cyanide
Chromium	Nickel
Lead	Thallium
Mercury	Silver
Selenium	Zinc

Radiological (quarterly testing)

Total alpha	
Total beta	

Volatile organic compounds (VOCs)

One sample taken initially in May, June, or July; quarterly if any detects.	

Synthetic organic compounds or SOCs (May, June, or July)

alachor	endrin
aldicarb	ethylene dribomide (EDB)
aldicarb sulfone	glyphosphate
aldicarb sulfoxide	heptachlor
atrazine	heptachlor epoxide
carbofuran	lindane
chlordane	methoxychlor
2,4-D	metolachlor
2,4,5-TP (silvex)	oxamyl (vydate)
dalaphon	pentachlorphenol
dibromochloropropane (DBCP)	picloram
dinoseb	polychlorinated biphenyls (PCB)
diquat	simazine

endothall	toxaphene

Disinfection byproducts

total trihalomethane simulated distribution system (TTHM-SDS) test (quarterly)	SUVA (monthly)
haloacetic acid simulated distribution system (HAA-SDS) test (quarterly)	UV absorbance (monthly)
total organic carbon (monthly)	total alkalinity (monthly)
pH (monthly)	

Microbiological

total coliform (monthly)	Cryptosporidium (twice per month for 12 months)
fecal coliform (monthly)	

Physical (daily)

Turbidity	

3745-81-72 **Disinfection of water from surface water sources.**

“Disinfection practice” means the application of a disinfectant to the treatment flow for the purpose of meeting CT requirements of this rule. Significant changes to disinfection practice include any change which will affect the ability of a system to meet the CT requirements of this rule.

(A) A public water system that uses a surface water source, in whole or in part, shall provide the disinfection treatment specified in paragraph (B) of this rule. Failure to meet any requirement of this rule, excluding paragraph (E) of this rule, is a treatment technique violation for which public notification is required under rule 3745-81-32 of the Administrative Code. Failure to meet any requirement of paragraph (E) of this rule is a monitoring violation for which public notification is required under rule 3745-81-32 of the Administrative Code. A public water system that uses a surface water source, in whole or in part, and does not already provide filtration treatment shall comply with any interim disinfection requirements established by the director before filtration is installed.

(B) Each public water system that uses a surface water source, in whole or in part, shall provide disinfection treatment of the water as follows:

(1) The disinfection treatment shall be considered sufficient if the total treatment processes of that public water system would consistently and reliably achieve at least 99.9 per cent (3 log) inactivation and/or removal of Giardia lamblia cysts and at least 99.99 per cent (4 log) inactivation and/or removal of viruses, as determined from table A, and tables B-1 to B-13 of this rule or tables under paragraph (N) of rule 3745-81-68 of the Administrative Code. The inactivation by disinfection is calculated from the actual CT divided by the required CT during the peak hourly flow of each day that the public water system is in operation.

(2) Table A of this rule lists: the minimum requirement for inactivation and/or removal of Cryptosporidium, Giardia lamblia and viruses; the extent to which a properly operated conventional filtration treatment, direct filtration, and slow sand filtration are considered sufficient to remove Cryptosporidium, Giardia lamblia, and viruses; and the minimum disinfection needed to complete the required minimum inactivation and/or removal of Cryptosporidium, Giardia lamblia and viruses. Table A specifies the additional minimum log inactivation of Giardia lamblia and viruses by disinfection if filtration is properly operated and the turbidity treatment technique requirements of rule 3745-81-73 of the Administrative Code are satisfied. The filtration and disinfection treatment shall include disinfection that consistently and reliably achieves at least the minimum log inactivation by disinfection

of Giardia lamblia and viruses as specified in table A.

(3) The residual disinfectant concentration in the water entering the distribution system shall not be less than 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine for more than four consecutive hours.

(4) The residual disinfectant concentration in the distribution system shall not be less than 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine in more than five per cent of the samples each month for any two consecutive months that the public water system serves water to the public.

(C) Disinfection treatment sufficiency determination.

(1) Paragraph (B)(1) of this rule requires a minimum percentage of inactivation and/or removal of Giardia lamblia and viruses in water obtained at least partly from a surface water source. Because of the difficulties in measuring the concentrations of viable Cryptosporidium, Giardia lamblia, and viruses, maximum contaminant levels are not practical and treatment technique requirements are used to ensure control of these contaminants in drinking water. For disinfectants other than UV, tables B-1 to B-13 of this rule shall be used to determine the sufficiency of disinfection. This determination is made at the peak hourly flow rate of each day the water system is in operation. Systems using UV to comply with the inactivation requirements of this rule shall meet paragraph (N) of rule 3745-81-68 of the Administrative Code.

(2) For disinfectants other than UV, the level of inactivation being provided by the system is determined by measuring actual CT values. The level of inactivation being provided by a system using UV is determined by the UV dosage. For systems using chlorine dioxide or ozone to comply with the additional Cryptosporidium treatment requirements in paragraph (E) of rule 3745-81-67 of the Administrative Code, unfiltered water flow may be used to achieve the additional treatment credit if approved by the director.

Only filtered water flow shall be used in the required CT calculations to meet the minimum log inactivation in table A of this rule, regardless of the disinfectant used.

Actual CT values are obtained by multiplying the residual disinfectant, C, by the disinfection contact time, T, giving the resultant, CT. The value of C in milligrams per liter is determined at a point before or at the first customer. The value of T in minutes is based on the time

available for the disinfectant to work from the point at which it is added to the water until the point at which C is measured. Values of T are determined based on the approved effective volume factor of the clearwell or contact tank. It may be appropriate to determine the value of C at more than one point of the water treatment flow, with the T associated with each C being estimated from the previous measurement point or the previous addition of disinfectant, which ever is closer. If more than one disinfectant concentration point is used, the products of each C and its associated T are added and the sum of these products is the actual CT value to compare with the appropriate value of the required minimum CT values for specified conditions and levels of inactivation in the following tables. Note that any disinfection after the last determination of C is not included in the actual CT value. Minimum required CT values for inactivation of Giardia lamblia and viruses by disinfection in relation to the disinfectant, the extent of inactivation, the disinfectant concentration, the pH, and the water temperature at the peak hourly flow rate for each day of operation are found in tables B-1 to B-13 of this rule. Applicable information for UV is found in paragraph (N) of rule 3745-81-68 of the Administrative Code.

(3) In tables B-1 to B-13 of this rule, the required CT between the indicated pH or residual disinfectant concentration may be determined by linear interpolation. The required CT between the indicated temperatures of different tables may
be determined by linear interpolation.

If no interpolation is used, then the required CT shall be determined at the lower temperature, and at the higher pH, and at the higher residual disinfectant concentration. For Giardia lamblia inactivation at a pH greater than nine, the required CT shall be the same as the required CT at a pH equal to nine. For virus inactivation at a pH greater than nine, the required CT shall be the same as the required CT at a pH equal to ten.

(4) On each day when the actual CT value meets or exceeds the required minimum CT value in or linearly interpolated from tables B-1 to B-13 of this rule for chlorine, chlorine dioxide, ozone, or chloramines, or the table in paragraph (N) of rule 3745-81-68 of the Administrative Code for UV disinfection, then the water treatment plant is considered to be satisfying treatment technique requirements of this rule for disinfection of surface water sources. On each day when the actual CT value does not meet or exceed the required minimum CT value from tables B-1 to B-13 of this rule, then the water treatment plant is in violation of paragraph (B)(1) of this rule.

(5) For each clearwell, or contact tank, the approved effective volume factor shall be determined by the director based upon its design characteristics including: the average flow path length to channel width ratio; baffling; and the proximity of the outlet to the inlet using figures B-1 and B-2 of this rule. The approved effective volume factor shall be the preliminary effective volume factor obtained from figure B-1 of this rule multiplied by the reduction factor obtained from figure B-2 of this rule, rounded down to the nearest 0.05. A public water system may request that the director approve an effective volume factor that was determined by tracer studies, hydraulic analysis or modeling, or an equivalent demonstration. For a tracer study to be acceptable, the net advection of the tracer shall be within ten per cent of the change in the tracer chemical storage within the clearwell system. Net advection means the amount of tracer convected out of the clearwell system minus the amount of tracer convected into the clearwell system over the duration of the tracer study.

[Note: Refer to the appendix to this rule for more information on how to determine disinfection sufficiency.]

(D) A public water system that serves a population of at least ten thousand persons and was required to develop a disinfection profile or benchmark under 40 CFR 141.172 or 40 CFR 141.170(d), or a community or nontransient noncommunity public water system that serves a population of less than ten thousand persons and was required to develop a disinfection profile or benchmark under 40 CFR 141.530, shall follow these requirements:

(1) Prior to making a significant change in its disinfection practice, the public water system shall submit the disinfection profile to the director for review and consultation. Such changes may require approval if determined substantial by the director as specified by rule 3745-91-02 of the Administrative Code. Significant changes to disinfection practice include any of the following:

(a) Changes to the point of disinfection;

(b) Changes to the disinfectant used in the treatment plant;

(c) Changes to the disinfection process; and

(d) Any other modification identified by the director, including those identified and proposed in a general plan required by paragraph (A)(7) of rule 3745-81-24 of the Administrative Code.

[Comment: The 40 CFR 141.172, 40 CFR 141.170(d), and 40 CFR 141.530 refer to the "Code of Federal Regulations" published on July 1, 2012. At the effective date of this rule, a copy may be obtained from the "Superintendent of Documents, PO Box 371954, Pittsburgh, PA 15250-7954," (866) 512-1800, or http://bookstore.gpo.gov. This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Columbus, OH, 43215-3425."]

(2) The public water system shall calculate its disinfection benchmark using the following procedure:

(a) The disinfection benchmark is the lowest monthly average value (for public water systems with one year of profiling data) or average of lowest monthly average values (for public water systems with more than one year of profiling data) of the monthly logs of Giardia lamblia inactivation in each year of profiling data.

(b) For each year of profiling data collected and calculated, the public water system shall determine the lowest average monthly Giardia lamblia inactivation in each year of profiling data. The average Giardia lamblia inactivation shall be determined by dividing the sum of Giardia lamblia inactivation values by the number of values calculated for that month. For public water systems with a combined population of at least ten thousand persons, daily values shall be used. For public water systems with a combined population less than ten thousand persons, weekly values may be used. Values for each calendar month for each year of profiling data shall be used in the calculation.

(3) A public water system that uses chloramines, chlorine dioxide, or ozone for primary disinfection shall also calculate the disinfection benchmark for viruses using a method acceptable to the director.

(4) Prior to making a significant change, the public water system shall submit the following information for review by the director:

(a) A description of the proposed change;

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

(c) An analysis of how the proposed change will affect the current levels of disinfection.

(5) The public water system shall retain the disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the director for review as part of a sanitary survey. The disinfection profile, disinfection benchmark, and all data and analysis used to complete the disinfection profile shall be retained by the public water system indefinitely.

(E) Disinfection profiling and benchmarking requirements for any system making a significant change to their disinfection practice.

(1) Following the completion of initial source water monitoring in accordance with paragraph (A) of rule 3745-81-65 of the Administrative Code, a system that plans to make a significant change to its disinfection practice, as defined in paragraph (E)(2) of this rule, shall develop disinfection profiles and calculate disinfection benchmarks for Giardia lamblia and viruses as described in paragraphs (E)(3) to (E)(7) of this rule. Prior to changing the disinfection practice, the system shall notify the director and shall include in this notice the following information:

(a) A completed disinfection profile and disinfection benchmark for Giardia lamblia and viruses as described in paragraphs (E)(3) to (E)(7) of this rule.

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

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

(2) Significant changes to disinfection practices include any of the following:

(a) Changes to the point of disinfection;

(b) Changes to the disinfectant used in the treatment plant:

(c) Changes to the disinfection process; or

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

(3) Systems required to develop disinfection profiles in accordance with paragraphs (E)(1) and (E)(2) of this rule shall monitor at least weekly

for a period of twelve consecutive months to determine the total log inactivation for Giardia lamblia and viruses. If systems monitor more frequently, the monitoring frequency shall be evenly spaced. Systems that operate for fewer than twelve months per year shall monitor weekly during the period of operation. Systems shall determine log inactivation for Giardia lamblia and viruses through the entire plant, based on $CT_{99.9}$ values in tables B-1 to B-13 of this rule, as applicable. Systems shall determine log inactivation of viruses through the entire treatment plant based on a protocol accepted by the director.

(4) Systems with a single point of disinfectant application prior to the entrance to the distribution system shall conduct the monitoring in this paragraph. Systems with more than one point of disinfectant application shall conduct the monitoring in this paragraph for each disinfection segment. Systems shall monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in accordance with paragraph (C) of rule 3745-81-27 of the Administrative Code.

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

(b) For systems using chlorine, the pH of the disinfected water shall be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location accepted by the director.

(c) The disinfectant contact time(s), T, shall be determined during peak hourly flow.

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

(5) In lieu of conducting new monitoring under paragraph (E)(4) of this rule, systems may elect to meet the requirements of paragraph (E)(5)(a) or (E)(5)(b) of this rule.

(a) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of paragraph (E)(4) of this rule may use these data to develop disinfection profiles as specified in this rule if the system has

neither made a significant change to the treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

(b) Systems may use disinfection profile(s) developed in accordance with paragraph (D) of this rule in lieu of developing a new profile if the system has neither made a significant change to the treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under paragraph (D) of this rule shall develop a virus profile using the same monitoring data on which the Giardia lamblia profile is based.

(6) Systems shall calculate the total inactivation ratio for Giardia lamblia as specified in paragraphs (E)(6)(a) to (E)(6)(c) of this rule.

(a) Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the following:

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

(ii) Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system shall 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) Systems using more than one point of disinfectant application before the first customer shall determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and (Σ ($CTcalc/CT_{99.9}$)) shall be calculated using the method in paragraph (E)(6)(a)(ii) of this rule.

(c) The system shall determine the total logs of inactivation by multiplying the value calculated in paragraph (E)(6)(a) or (E)(6)(b) of this rule by 3.0.

(d) Systems shall calculate the log of inactivation for viruses using a protocol approved by the director.

(7) Systems shall use the following procedures to calculate a disinfection benchmark:

(a) For each year of profiling data collected and calculated under paragraphs (E)(3) to (E)(6) of this rule, systems shall determine the lowest average monthly level of both Giardia lamblia and virus inactivation. Systems shall determine the average 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.

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

Table A
Minimum Requirements For Inactivation Or Removal of Cryptosporidium, Giardia Lamblia, and Viruses

Type of Filtration	Required Minimum Log Removal/Inactivation			Expected Log Removal by Filtration			Minimum Log Inactivation by Disinfection	
	Cryptosporidium (Log Removal Only)	Giardia	Viruses	Cryptosporidium	Giardia	Viruses	Giardia	Viruses
Conventional	2	3	4	2	2.5	2.0	0.5	2.0
Direct	2	3	4	2	2.0	1.0	1.0	3.0
Slow Sand	2	3	4	2	2.0	2.0	1.0	2.0

Comment: Log removal and log inactivation refer to the negative logarithm of the quotient of the concentration of an impurity after treatment divided by the concentration before treatment. For instance, a 99.9 per cent decrease in viruses has a post treatment concentration 0.001 times the pretreatment concentration and a 3 log removal designation. Common conversions include:

Removal designation	Concentration decrease	Quotient after/before
0.5 log	70%	0.3
1 log	90%	0.1
1.5 log	97%	0.03
2 log	99%	0.01
2.5 log	99.7%	0.003
3 log	99.9%	0.001
4 log	99.99%	0.0001

Table B-1
Required CT For Inactivation Of Giardia Cysts By Free Chlorine At 0.5° Celsius Or Less

pH≤6

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	23	46	69	91	114	137
0.6	24	47	71	94	118	141
0.8	24	48	73	97	121	145
1	25	49	74	99	123	148
1.2	25	51	76	101	127	152
1.4	26	52	78	103	129	155
1.6	26	52	79	105	131	157
1.8	27	54	81	108	135	162
2	28	55	83	110	138	165
2.2	28	56	85	113	141	169
2.4	29	57	86	115	143	172
2.6	29	58	88	117	146	175
2.8	30	59	89	119	148	178
3	30	60	91	121	151	181

pH=6.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	27	54	82	109	136	163
0.6	28	56	84	112	140	168
0.8	29	57	86	115	143	172
1	29	59	88	117	147	176
1.2	30	60	90	120	150	180
1.4	31	61	92	123	153	184
1.6	32	63	95	126	158	189
1.8	32	64	97	129	161	193
2	33	66	99	131	164	197
2.2	34	67	101	134	168	201
2.4	34	68	103	137	171	205
2.6	35	70	105	139	174	209
2.8	36	71	107	142	178	213
3	36	72	109	145	181	217

pH=7.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	33	65	98	130	163	195
0.6	33	67	100	133	167	200
0.8	34	68	103	137	171	205
1	35	70	105	140	175	210
1.2	36	72	108	143	179	215
1.4	37	74	111	147	184	221
1.6	38	75	113	151	188	226
1.8	39	77	116	154	193	231
2	39	79	118	157	197	236
2.2	40	81	121	161	202	242
2.4	41	82	124	165	206	247
2.6	42	84	126	168	210	252
2.8	43	86	129	171	214	257
3	44	87	131	174	218	261

pH=7.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	40	79	119	158	198	237
0.6	40	80	120	159	199	239
0.8	41	82	123	164	205	246
1	42	84	127	169	211	253
1.2	43	86	130	173	216	259
1.4	44	89	133	177	222	266
1.6	46	91	137	182	228	273
1.8	47	93	140	186	233	279
2	48	95	143	191	238	286
2.2	50	99	149	198	248	297
2.4	50	99	149	199	248	298
2.6	51	101	152	203	253	304
2.8	52	103	155	207	258	310
3	53	105	158	211	263	316

pH=8.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	46	92	139	185	231	277
0.6	48	95	143	191	238	286
0.8	49	98	148	197	246	295
1	51	101	152	203	253	304
1.2	52	104	157	209	261	313
1.4	54	107	161	214	268	321
1.6	55	110	165	219	274	329
1.8	56	113	169	225	282	338
2	58	115	173	231	288	346
2.2	59	118	177	235	294	353
2.4	60	120	181	241	301	361
2.6	61	123	184	245	307	368
2.8	63	125	188	250	313	375
3	64	127	191	255	318	382

pH=8.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	55	110	165	219	274	329
0.6	57	114	171	228	285	342
0.8	59	118	177	236	295	354
1	61	122	183	243	304	365
1.2	63	125	188	251	313	376
1.4	65	129	194	258	323	387
1.6	66	132	199	265	331	397
1.8	68	136	204	271	339	407
2	70	139	209	278	348	417
2.2	71	142	213	284	355	426
2.4	73	145	218	290	363	435
2.6	74	148	222	296	370	444
2.8	75	151	226	301	377	452
3	77	153	230	307	383	460

pH=9.0 or pH>9.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	65	130	195	260	325	390
0.6	68	136	204	271	339	407
0.8	70	141	211	281	352	422
1	73	146	219	291	364	437
1.2	75	150	226	301	376	451
1.4	77	155	232	309	387	464
1.6	80	159	239	318	398	477
1.8	82	163	245	326	408	489
2	83	167	250	333	417	500
2.2	85	170	256	341	426	511
2.4	87	174	261	348	435	522
2.6	89	178	267	355	444	533
2.8	91	181	272	362	453	543
3	92	184	276	368	460	552

[Comment: $CT_{99.9}$ = CT for 3 log inactivation.]

Table B-2
Required CT For Inactivation
Of Giardia Cysts By Free Chlorine
At 5° Celsius

pH≤6

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	16	32	49	65	81	97
0.6	17	33	50	67	83	100
0.8	17	34	52	69	86	103
1	18	35	53	70	88	105
1.2	18	36	54	71	89	107
1.4	18	36	55	73	91	109
1.6	19	37	56	74	93	111
1.8	19	38	57	76	95	114
2	19	39	58	77	97	116
2.2	20	39	59	79	98	118
2.4	20	40	60	80	100	120
2.6	20	41	61	81	102	122
2.8	21	41	62	83	103	124
3	21	42	63	84	105	126

pH=6.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	20	39	59	78	98	117
0.6	20	40	60	80	100	120
0.8	20	41	61	81	102	122
1	21	42	63	83	104	125
1.2	21	42	64	85	106	127
1.4	22	43	65	87	108	130
1.6	22	44	66	88	110	132
1.8	23	45	68	90	113	135
2	23	46	69	92	115	138
2.2	23	47	70	93	117	140
2.4	24	48	72	95	119	143
2.6	24	49	73	97	122	146
2.8	25	49	74	99	123	148
3	25	50	76	101	126	151

pH=7.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	23	46	70	93	116	139
0.6	24	48	72	95	119	143
0.8	24	49	73	97	122	146
1	25	50	75	99	124	149
1.2	25	51	76	101	127	152
1.4	26	52	78	103	129	155
1.6	26	53	79	105	132	158
1.8	27	54	81	108	135	162
2	28	55	83	110	138	165
2.2	28	56	85	113	141	169
2.4	29	57	86	115	143	172
2.6	29	58	88	117	146	175
2.8	30	59	89	119	148	178
3	30	61	91	121	152	182

pH=7.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	28	55	83	111	138	166
0.6	29	57	86	114	143	171
0.8	29	58	88	117	146	175
1	30	60	90	119	149	179
1.2	31	61	92	122	153	183
1.4	31	62	94	125	156	187
1.6	32	64	96	128	160	192
1.8	33	65	98	131	163	196
2	33	67	100	133	167	200
2.2	34	68	102	136	170	204
2.4	35	70	105	139	174	209
2.6	36	71	107	142	178	213
2.8	36	72	109	145	181	217
3	37	74	111	147	184	221

pH=8.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	33	66	99	132	165	198
0.6	34	68	102	136	170	204
0.8	35	70	105	140	175	210
1	36	72	108	144	180	216
1.2	37	74	111	147	184	221
1.4	38	76	114	151	189	227
1.6	39	77	116	155	193	232
1.8	40	79	119	159	198	238
2	41	81	122	162	203	243
2.2	41	83	124	165	207	248
2.4	42	84	127	169	211	253
2.6	43	86	129	172	215	258
2.8	44	88	132	175	219	263
3	45	89	134	179	223	268

pH=8.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	39	79	118	157	197	236
0.6	41	81	122	163	203	244
0.8	42	84	126	168	210	252
1	43	87	130	173	217	260
1.2	45	89	134	178	223	267
1.4	46	91	137	183	228	274
1.6	47	94	141	187	234	281
1.8	48	96	144	191	239	287
2	49	98	147	196	245	294
2.2	50	100	150	200	250	300
2.4	51	102	153	204	255	306
2.6	52	104	156	208	260	312
2.8	53	106	159	212	265	318
3	54	108	162	216	270	324

pH=9.0 or pH>9.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
0.4	47	93	140	186	233	279
0.6	49	97	146	194	243	291
0.8	50	100	151	201	251	301
1	52	104	156	208	260	312
1.2	53	107	160	213	267	320
1.4	55	110	165	219	274	329
1.6	56	112	169	225	281	337
1.8	58	115	173	230	288	345
2	59	118	177	235	294	353
2.2	60	120	181	241	301	361
2.4	61	123	184	245	307	368
2.6	63	125	188	250	313	375
2.8	64	127	191	255	318	382
3	65	130	195	259	324	389

[Comment: $CT_{99.9}$ = CT for 3 log inactivation.]

Table B-3
Required CT For Inactivation
Of Giardia Cysts By Free Chlorine
At 10° Celsius

pH≤6

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	12	24	37	49	61	73
0.6	13	25	38	50	63	75
0.8	13	26	39	52	65	78
1	13	26	40	53	66	79
1.2	13	27	40	53	67	80
1.4	14	27	41	55	68	82
1.6	14	28	42	55	69	83
1.8	14	29	43	57	72	86
2	15	29	44	58	73	87
2.2	15	30	45	59	74	89
2.4	15	30	45	60	75	90
2.6	15	31	46	61	77	92
2.8	16	31	47	62	78	93
3	16	32	48	63	79	95

pH=6.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	15	29	44	59	73	88
0.6	15	30	45	60	75	90
0.8	15	31	46	61	77	92
1	16	31	47	63	78	94
1.2	16	32	48	63	79	95
1.4	16	33	49	65	82	98
1.6	17	33	50	66	83	99
1.8	17	34	51	67	84	101
2	17	35	52	69	87	104
2.2	18	35	53	70	88	105
2.4	18	36	54	71	89	107
2.6	18	37	55	73	92	110
2.8	19	37	56	74	93	111
3	19	38	57	75	94	113

pH=7.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	17	35	52	69	87	104
0.6	18	36	54	71	89	107
0.8	18	37	55	73	92	110
1	19	37	56	75	93	112
1.2	19	38	57	76	95	114
1.4	19	39	58	77	97	116
1.6	20	40	60	79	99	119
1.8	20	41	61	81	102	122
2	21	41	62	83	103	124
2.2	21	42	64	85	106	127
2.4	22	43	65	86	108	129
2.6	22	44	66	87	109	131
2.8	22	45	67	89	112	134
3	23	46	69	91	114	137

pH=7.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	21	42	63	83	104	125
0.6	21	43	64	85	107	128
0.8	22	44	66	87	109	131
1	22	45	67	89	112	134
1.2	23	46	69	91	114	137
1.4	23	47	70	93	117	140
1.6	24	48	72	96	120	144
1.8	25	49	74	98	123	147
2	25	50	75	100	125	150
2.2	26	51	77	102	128	153
2.4	26	52	79	105	131	157
2.6	27	53	80	107	133	160
2.8	27	54	82	109	136	163
3	28	55	83	111	138	166

pH=8.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	25	50	75	99	124	149
0.6	26	51	77	102	128	153
0.8	26	53	79	105	132	158
1	27	54	81	108	135	162
1.2	28	55	83	111	138	166
1.4	28	57	85	113	142	170
1.6	29	58	87	116	145	174
1.8	30	60	90	119	149	179
2	30	61	91	121	152	182
2.2	31	62	93	124	155	186
2.4	32	63	95	127	158	190
2.6	32	65	97	129	162	194
2.8	33	66	99	131	164	197
3	34	67	101	134	168	201

pH=8.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	30	59	89	118	148	177
0.6	31	61	92	122	153	183
0.8	32	63	95	126	158	189
1	33	65	98	130	163	195
1.2	33	67	100	133	167	200
1.4	34	69	103	137	172	206
1.6	35	70	106	141	176	211
1.8	36	72	108	143	179	215
2	37	74	111	147	184	221
2.2	38	75	113	150	188	225
2.4	38	77	115	153	192	230
2.6	39	78	117	156	195	234
2.8	40	80	120	159	199	239
3	41	81	122	162	203	243

pH=9.0 or pH>9.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	35	70	105	139	174	209
0.6	36	73	109	145	182	218
0.8	38	75	113	151	188	226
1	39	78	117	156	195	234
1.2	40	80	120	160	200	240
1.4	41	82	124	165	206	247
1.6	42	84	127	169	211	253
1.8	43	86	130	173	216	259
2	44	88	133	177	221	265
2.2	45	90	136	181	226	271
2.4	46	92	138	184	230	276
2.6	47	94	141	187	234	281
2.8	48	96	144	191	239	287
3	49	97	146	195	243	292

[Comment: $CT_{99.9}$ = CT for 3 log inactivation.]

Table B-4
Required CT For Inactivation
Of Giardia Cysts By Free Chlorine
At 15° Celsius

pH≤6

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	8	16	25	33	41	49
0.6	8	17	25	33	42	50
0.8	9	17	26	35	43	52
1	9	18	27	35	44	53
1.2	9	18	27	36	45	54
1.4	9	18	28	37	46	55
1.6	9	19	28	37	47	56
1.8	10	19	29	38	48	57
2	10	19	29	39	48	58
2.2	10	20	30	39	49	59
2.4	10	20	30	40	50	60
2.6	10	20	31	41	51	61
2.8	10	21	31	41	52	62
3	11	21	32	42	53	63

pH=6.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	10	20	30	39	49	59
0.6	10	20	30	40	50	60
0.8	10	20	31	41	51	61
1	11	21	32	42	53	63
1.2	11	21	32	43	53	64
1.4	11	22	33	43	54	65
1.6	11	22	33	44	55	66
1.8	11	23	34	45	57	68
2	12	23	35	46	58	69
2.2	12	23	35	47	58	70
2.4	12	24	36	48	60	72
2.6	12	24	37	49	61	73
2.8	12	25	37	49	62	74
3	13	25	38	51	63	76

pH=7.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	12	23	35	47	58	70
0.6	12	24	36	48	60	72
0.8	12	24	37	49	61	73
1	13	25	38	50	63	75
1.2	13	25	38	51	63	76
1.4	13	26	39	52	65	78
1.6	13	26	40	53	66	79
1.8	14	27	41	54	68	81
2	14	28	42	55	69	83
2.2	14	28	43	57	71	85
2.4	14	29	43	57	72	86
2.6	15	29	44	59	73	88
2.8	15	30	45	59	74	89
3	15	30	46	61	76	91

pH=7.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	14	28	42	55	69	83
0.6	14	29	43	57	72	86
0.8	15	29	44	59	73	88
1	15	30	45	60	75	90
1.2	15	31	46	61	77	92
1.4	16	31	47	63	78	94
1.6	16	32	48	64	80	96
1.8	16	33	49	65	82	98
2	17	33	50	67	83	100
2.2	17	34	51	68	85	102
2.4	18	35	53	70	88	105
2.6	18	36	54	71	89	107
2.8	18	36	55	73	91	109
3	19	37	56	74	93	111

pH=8.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	17	33	50	66	83	99
0.6	17	34	51	68	85	102
0.8	18	35	53	70	88	105
1	18	36	54	72	90	108
1.2	19	37	56	74	93	111
1.4	19	38	57	76	95	114
1.6	19	39	58	77	97	116
1.8	20	40	60	79	99	119
2	20	41	61	81	102	122
2.2	21	41	62	83	103	124
2.4	21	42	64	85	106	127
2.6	22	43	65	86	108	129
2.8	22	44	66	88	110	132
3	22	45	67	89	112	134

pH=8.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	20	39	59	79	98	118
0.6	20	41	61	81	102	122
0.8	21	42	63	84	105	126
1	22	43	65	87	108	130
1.2	22	45	67	89	112	134
1.4	23	46	69	91	114	137
1.6	24	47	71	94	118	141
1.8	24	48	72	96	120	144
2	25	49	74	98	123	147
2.2	25	50	75	100	125	150
2.4	26	51	77	102	128	153
2.6	26	52	78	104	130	156
2.8	27	53	80	106	133	159
3	27	54	81	108	135	162

pH=9.0 or pH>9.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	23	47	70	93	117	140
0.6	24	49	73	97	122	146
0.8	25	50	76	101	126	151
1	26	52	78	104	130	156
1.2	27	53	80	107	133	160
1.4	28	55	83	110	138	165
1.6	28	56	85	113	141	169
1.8	29	58	87	115	144	173
2	30	59	89	118	148	177
2.2	30	60	91	121	151	181
2.4	31	61	92	123	153	184
2.6	31	63	94	125	157	188
2.8	32	64	96	127	159	191
3	33	65	98	130	163	195

[Comment: $CT_{99.9}$ = CT for 3 log inactivation.]

Table B-5
Required CT For Inactivation
Of Giardia Cysts By Free Chlorine
At 20° Celsius

pH≤6

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	6	12	18	24	30	36
0.6	6	13	19	25	32	38
0.8	7	13	20	26	33	39
1	7	13	20	26	33	39
1.2	7	13	20	27	33	40
1.4	7	14	21	27	34	41
1.6	7	14	21	28	35	42
1.8	7	14	22	29	36	43
2	7	15	22	29	37	44
2.2	7	15	22	29	37	44
2.4	8	15	23	30	38	45
2.6	8	15	23	31	38	46
2.8	8	16	24	31	39	47
3	8	16	24	31	39	47

pH=6.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	7	15	22	29	37	44
0.6	8	15	23	30	38	45
0.8	8	15	23	31	38	46
1	8	16	24	31	39	47
1.2	8	16	24	32	40	48
1.4	8	16	25	33	41	49
1.6	8	17	25	33	42	50
1.8	9	17	26	34	43	51
2	9	17	26	35	43	52
2.2	9	18	27	35	44	53
2.4	9	18	27	36	45	54
2.6	9	18	28	37	46	55
2.8	9	19	28	37	47	56
3	10	19	29	38	48	57

pH=7.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	9	17	26	35	43	52
0.6	9	18	27	36	45	54
0.8	9	18	28	37	46	55
1	9	19	28	37	47	56
1.2	10	19	29	38	48	57
1.4	10	19	29	39	48	58
1.6	10	20	30	39	49	59
1.8	10	20	31	41	51	61
2	10	21	31	41	52	62
2.2	11	21	32	42	53	63
2.4	11	22	33	43	54	65
2.6	11	22	33	44	55	66
2.8	11	22	34	45	56	67
3	11	23	34	45	57	68

pH=7.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	10	21	31	41	52	62
0.6	11	21	32	43	53	64
0.8	11	22	33	44	55	66
1	11	22	34	45	56	67
1.2	12	23	35	46	58	69
1.4	12	23	35	47	58	70
1.6	12	24	36	48	60	72
1.8	12	25	37	49	62	74
2	13	25	38	50	63	75
2.2	13	26	39	51	64	77
2.4	13	26	39	52	65	78
2.6	13	27	40	53	67	80
2.8	14	27	41	54	68	81
3	14	28	42	55	69	83

pH=8.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	12	25	37	49	62	74
0.6	13	26	39	51	64	77
0.8	13	26	40	53	66	79
1	14	27	41	54	68	81
1.2	14	28	42	55	69	83
1.4	14	28	43	57	71	85
1.6	15	29	44	58	73	87
1.8	15	30	45	59	74	89
2	15	30	46	61	76	91
2.2	16	31	47	62	78	93
2.4	16	32	48	63	79	95
2.6	16	32	49	65	81	97
2.8	17	33	50	66	83	99
3	17	34	51	67	84	101

pH=8.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	15	30	45	59	74	89
0.6	15	31	46	61	77	92
0.8	16	32	48	63	79	95
1	16	33	49	65	82	98
1.2	17	33	50	67	83	100
1.4	17	34	52	69	86	103
1.6	18	35	53	70	88	105
1.8	18	36	54	72	90	108
2	18	37	55	73	92	110
2.2	19	38	57	75	94	113
2.4	19	38	58	77	96	115
2.6	20	39	59	78	98	117
2.8	20	40	60	79	99	119
3	20	41	61	81	102	122

pH=9.0 or pH>9.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	18	35	53	70	88	105
0.6	18	36	55	73	91	109
0.8	19	38	57	75	94	113
1	20	39	59	78	98	117
1.2	20	40	60	80	100	120
1.4	21	41	62	82	103	123
1.6	21	42	63	84	105	126
1.8	22	43	65	86	108	129
2	22	44	66	88	110	132
2.2	23	45	68	90	113	135
2.4	23	46	69	92	115	138
2.6	24	47	71	94	118	141
2.8	24	48	72	95	119	143
3	24	49	73	97	122	146

[Comment: $CT_{99.9}$ = CT for 3 log inactivation.]

Table B-6
Required CT For Inactivation Of Giardia Cysts By Free Chlorine At 25° Celsius And Greater

pH≤6

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	4	8	12	16	20	24
0.6	4	8	13	17	21	25
0.8	4	9	13	17	22	26
1	4	9	13	17	22	26
1.2	5	9	14	18	23	27
1.4	5	9	14	18	23	27
1.6	5	9	14	19	23	28
1.8	5	10	15	19	24	29
2	5	10	15	19	24	29
2.2	5	10	15	20	25	30
2.4	5	10	15	20	25	30
2.6	5	10	16	21	26	31
2.8	5	10	16	21	26	31
3	5	11	16	21	27	32

pH=6.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	5	10	15	19	24	29
0.6	5	10	15	20	25	30
0.8	5	10	16	21	26	31
1	5	10	16	21	26	31
1.2	5	11	16	21	27	32
1.4	6	11	17	22	28	33
1.6	6	11	17	22	28	33
1.8	6	11	17	23	28	34
2	6	12	18	23	29	35
2.2	6	12	18	23	29	35
2.4	6	12	18	24	30	36
2.6	6	12	19	25	31	37
2.8	6	12	19	25	31	37
3	6	13	19	25	32	38

pH=7.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	6	12	18	23	29	35
0.6	6	12	18	24	30	36
0.8	6	12	19	25	31	37
1	6	12	19	25	31	37
1.2	6	13	19	25	32	38
1.4	7	13	20	26	33	39
1.6	7	13	20	27	33	40
1.8	7	14	21	27	34	41
2	7	14	21	27	34	41
2.2	7	14	21	28	35	42
2.4	7	14	22	29	36	43
2.6	7	15	22	29	37	44
2.8	8	15	23	30	38	45
3	8	15	23	31	38	46

pH=7.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	7	14	21	28	35	42
0.6	7	14	22	29	36	43
0.8	7	15	22	29	37	44
1	8	15	23	30	38	45
1.2	8	15	23	31	38	46
1.4	8	16	24	31	39	47
1.6	8	16	24	32	40	48
1.8	8	16	25	33	41	49
2	8	17	25	33	42	50
2.2	9	17	26	34	43	51
2.4	9	17	26	35	43	52
2.6	9	18	27	35	44	53
2.8	9	18	27	36	45	54
3	9	18	28	37	46	55

pH=8.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	8	17	25	33	42	50
0.6	9	17	26	34	43	51
0.8	9	18	27	35	44	53
1	9	18	27	36	45	54
1.2	9	18	28	37	46	55
1.4	10	19	29	38	48	57
1.6	10	19	29	39	48	58
1.8	10	20	30	40	50	60
2	10	20	31	41	51	61
2.2	10	21	31	41	52	62
2.4	11	21	32	42	53	63
2.6	11	22	33	43	54	65
2.8	11	22	33	44	55	66
3	11	22	34	45	56	67

pH=8.5

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	10	20	30	39	49	59
0.6	10	20	31	41	51	61
0.8	11	21	32	42	53	63
1	11	22	33	43	54	65
1.2	11	22	34	45	56	67
1.4	12	23	35	46	58	69
1.6	12	23	35	47	58	70
1.8	12	24	36	48	60	72
2	12	25	37	49	62	74
2.2	13	25	38	50	63	75
2.4	13	26	39	51	64	77
2.6	13	26	39	52	65	78
2.8	13	27	40	53	67	80
3	14	27	41	54	68	81

pH=9.0 or pH>9.0

Chlorine Concentration (mg/L)	Log Inactivations 0.5	1.0	1.5	2.0	2.5	3.0
≤0.4	12	23	35	47	58	70
0.6	12	24	37	49	61	73
0.8	13	25	38	50	63	75
1	13	26	39	52	65	78
1.2	13	27	40	53	67	80
1.4	14	27	41	55	68	82
1.6	14	28	42	56	70	84
1.8	14	29	43	57	72	86
2	15	29	44	59	73	88
2.2	15	30	45	60	75	90
2.4	15	31	46	61	77	92
2.6	16	31	47	63	78	94
2.8	16	32	48	64	80	96
3	16	32	49	65	81	97

[Comment: $CT_{99.9}$ = CT for 3 log inactivation.]

Table B-7
Required CT For Inactivation
of Viruses by Free Chlorine

	····· Log Inactivation ·····					
	2.0 Log		3.0 Log		4.0 Log	
Temperature (Celsius)	pH 6-9	pH 10	pH 6-9	pH 10	pH 6-9	pH 10
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table B-8
CT Values for Inactivation of Giardia Cysts
by Chlorine Dioxide pH 6-9

	····· Temperature (Celsius) ·····					
Log Inactivation	≤1	5	10	15	20	≥25
0.5	10	4.3	4	3.2	2.5	2
1	21	8.7	7.7	6.3	5	3.7
1.5	32	13	12	10	7.5	5.5
2	42	17	15	13	10	7.3
2.5	52	22	19	16	13	9
3	63	26	23	19	15	11

Table B-9
CT Values for Inactivation of Viruses
By Chlorine Dioxide pH 6-9

	····· Temperature (Celsius) ·····					
Log Inactivation	≤1	5	10	15	20	≥25
2	8.4	5.6	4.2	2.8	2.1	1.4
3	25.6	17.1	12.8	8.6	6.4	4.3
4	50.1	33.4	25.1	16.7	12.5	8.4

Table B-10
CT Values for Inactivation of Giardia Cysts
By Ozone pH 6-9

	····· Temperature (Celsius) ·····					
Log Inactivation	≤1	5	10	15	20	≥25
0.5	0.48	0.32	0.23	0.16	0.12	0.08
1	0.97	0.63	0.48	0.32	0.24	0.16
1.5	1.5	0.95	0.72	0.48	0.36	0.24
2	1.9	1.3	0.95	0.63	0.48	0.32
2.5	2.4	1.6	1.2	0.79	0.60	0.40
3	2.9	1.9	1.43	0.95	0.72	0.48

Table B-11
CT Values for Inactivation of Viruses by Ozone

	····· Temperature (Celsius) ·····					
Log Inactivation	≤1	5	10	15	20	≥25
2	0.9	0.6	0.5	0.3	0.25	0.15
3	1.4	0.9	0.8	0.5	0.4	0.25
4	1.8	1.2	1.0	0.6	0.5	0.3

Table B-12

Required CT Values for Inactivation of Giardia Cysts by Chloramine, pH 6.0-9.0																									
Temperature (Celsius)																									
Log Inactivation	≤1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0.5	635	568	500	433	365	354	343	332	321	310	298	286	274	262	250	237	224	211	198	185	173	161	149	137	125
1	1270	1136	1003	869	735	711	687	663	639	615	592	569	546	523	500	474	448	422	396	370	346	322	298	274	250
1.5	1900	1700	1500	1300	1100	1066	1032	998	964	930	894	858	822	786	750	710	670	630	590	550	515	480	445	410	375
2	2535	2269	2003	1736	1470	1422	1374	1326	1278	1230	1184	1138	1092	1046	1000	947	894	841	788	735	688	641	594	547	500
2.5	3170	2835	2500	2165	1830	1772	1714	1656	1598	1540	1482	1424	1366	1308	1250	1183	1116	1049	982	915	857	799	741	683	625
3	3800	3400	3000	2600	2200	2130	2060	1990	1920	1850	1780	1710	1640	1570	1500	1420	1340	1260	1180	1100	1030	960	890	820	750

Table B-13

Required CT for Inactivation of Viruses by Chloramine[1]																									
Temperature (Celsius)																									
Log Inactivation	≤1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
2	1243	1147	1050	954	857	814	771	729	686	643	600	557	514	471	428	407	385	364	342	321	300	278	257	235	214
3	2063	1903	1743	1583	1423	1352	1281	1209	1138	1067	996	925	854	783	712	676	641	605	570	534	498	463	427	392	356
4	2883	2659	2436	2212	1988	1889	1789	1690	1590	1491	1392	1292	1193	1093	994	944	895	845	796	746	696	646	597	547	497

[1]These required CT may be assumed to achieve greater than 99.99 per cent 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 public water system must demonstrate, based on onsite studies or other information, as approved by the director, that the public water system is achieving at least 99.99 per cent inactivation of viruses.

Figure B-1

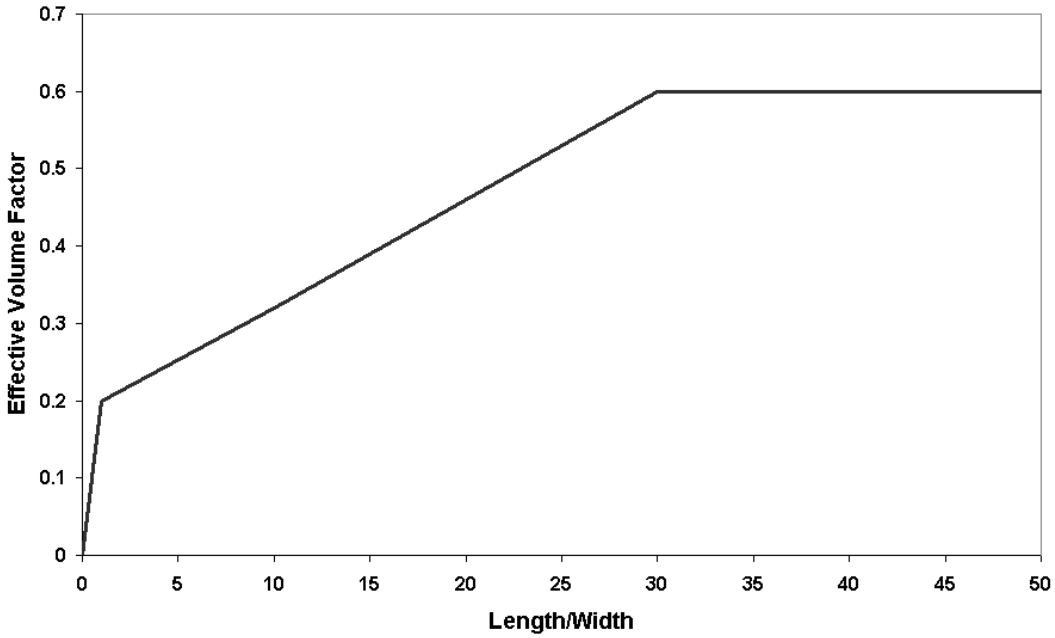
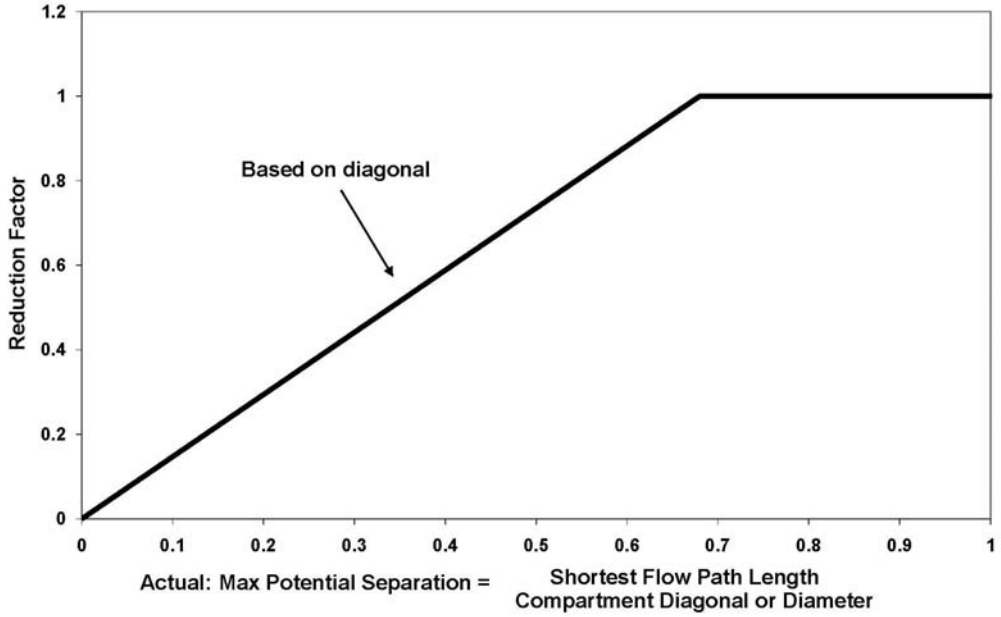


Figure B-2



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Appendix

Disinfection Treatment Sufficiency Determination

This rule specifies the minimum log inactivation or removal of Giardia lamblia, Cryptospordium, and viruses in water obtained from a surface water source, in whole or in part. A treatment technique is required in lieu of a maximum contaminant level for Cryptosporidium, Giardia lamblia viruses, heterotrophic plate count bacteria, Legionella, and turbidity.

The effectiveness of disinfection increases with increasing concentration of the disinfectant and with increasing time the disinfectant is in the water. A measure of the effectiveness of disinfection at the peak hourly flow rate, CT, is obtained by multiplying the lowest daily residual disinfectant concentration, C, by the lowest daily disinfectant contact time, T.

The value of C in milligrams per liter is determined at the entry to the distribution system and/or, if approved by the director, before the first customer. The value of T in minutes is based on the disinfectant contact time available for the disinfectant to work from the point where the disinfectant is added to the point where C is measured. Only filtered water flow shall be used in the required CT calculations to meet the minimum log inactivation in table A of this rule, regardless of the disinfectant used. For systems using chlorine dioxide or ozone to comply with additional Cryptosporidium treatment requirements in paragraph (E) of rule 3745-81-67 of the Administrative Code, unfiltered water flow may be used to achieve the additional treatment credit if approved by the director. Values of T shall be determined from:

(a) Acceptable tracer studies; or

(b) The lowest daily water volume divided by the peak flow; and

(c) An approved effective volume factor as determined by the director.

For a typical day in many public water systems, the value of a single determination of C multiplied by its associated T will give an actual CT which is larger than the required CT. However, in other cases, it may be appropriate to determine the value of C at more than one point of the water treatment flow, with the T associated with each C being estimated from the previous measurement point or the previous addition of disinfectant, whichever is closer. If more than one disinfectant concentration point is used, the products of each C and its associated T are added and the sum of these products is the actual CT to compare with the appropriate value of the required CT for specified conditions and log inactivation. Any disinfection after the last determination of C is not included in the actual CT value.

On each day if the actual CT is greater than or equal to the required CT, then the public water system is considered to be satisfying this rule's treatment technique requirements for disinfection. On each day if the actual CT is less than the required CT, then the water treatment plant is in violation of this rule.

3745-81-73 **Filtration of water from surface water sources.**

A public water system that uses a surface water source, in whole or in part, shall provide treatment consisting of both disinfection, as specified in paragraph (B) of rule 3745-81-72 of the Administrative Code, and filtration treatment which complies with paragraph (A), (B), or (C) of this rule. . Distinction between surface water sources and ground water sources is set forth in rule 3745-81-76 of the Administrative Code. Filtration treatment shall consistently and reliably achieve at least ninety-nine per cent (2 log) removal of Cryptosporidium. Failure to meet any requirement of this rule shall be a treatment technique violation and shall require public notification as set forth in rule 3745-81-32 of the Administrative Code.

(A) Conventional filtration treatment or direct filtration treatment. All public water systems using conventional filtration treatment or direct filtration treatment to treat surface water shall meet the following:

(1) Turbidity levels of representative samples of filtered water shall be less than or equal to 0.3 nephelometric turbidity units (NTU) in at least ninety-five per cent of the samples analyzed each month.

(2) The turbidity level of representative samples of a public water system's filtered water shall not exceed one NTU.

(B) Slow sand filtration. Filtration by a public water system filtering surface water by slow sand filtration shall meet the following:

(1) For a public water system using slow sand filtration, the turbidity level of representative samples of filtered water shall be less than or equal to one NTU in at least ninety-five per cent of the samples each month.

(2) The turbidity level of representative samples of a public water system's filtered water shall not exceed five NTU.

(C) Alternative filtration technologies. If a public water system using a surface water source, in whole or in part, can demonstrate to the director, using pilot plant studies or other means, that a filtration technology not listed in paragraph (A) or (B) of this rule, in combination with disinfection treatment that meets the requirements of paragraph (B) of rule 3745-81-72 of the Administrative Code, consistently and reliably achieves ninety-nine per cent (2 log) removal of Cryptosporidium, 99.9 per cent (3 log) removal and/or inactivation of Giardia lamblia cysts and 99.99 per cent (4 log) removal and/or inactivation of viruses, the director may accept this alternative filtration technology for use by the public water system. For a public water system that makes this demonstration, the requirements of paragraph (A) of this rule apply. For a public water system that makes this demonstration, the minimum log removal and inactivation requirements for conventional filtration in table A of rule 3745-81-72 of the Administrative Code shall apply. Each membrane filter which has been awarded credit for log removal as described in this paragraph shall undergo direct integrity testing daily to verify the log removal it has been credited to achieve. The direct integrity testing requirements in paragraph (K)(3) of

rule 3745-81-68 of the Administrative Code shall apply. In addition, continuous filtrate turbidity monitoring shall be performed on each membrane filter. If the turbidity of a membrane filter exceeds 0.15 NTU in two consecutive readings taken fifteen minutes apart, the system shall conduct a direct integrity test on the membrane filter. A membrane filter shall be removed from service for repairs until the membrane filter can pass a direct integrity test to verify the log removal it has been credited to achieve. Systems shall submit a monthly report including daily direct integrity test results, any turbidity monitoring results which trigger direct integrity testing, and any corrective action taken.

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3745-81-74 **Turbidity and disinfection monitoring requirements for surface water systems.**

A public water system that uses a surface water source, in whole or in part, shall conduct turbidity and disinfection monitoring in accordance with this rule.

(A) Turbidity measurements to ensure compliance with rule 3745-81-73 of the Administrative Code shall be performed on representative samples of filtered water at least every four hours that the water treatment plant is in operation. If using grab sampling for turbidity monitoring, samples shall be obtained within the first and last hours of filter operation and at least every four hours in between. Systems using grab sampling and monitoring at the clearwell effluent, the plant effluent, or immediately prior to entry into the distribution system shall monitor turbidity at least every four hours unless the high service pumps are locked out for a portion of the day. If the pumps are locked out for a portion of the day, samples shall be taken during the first and last hours of pump operations, and every four hours in-between. A public water system may substitute continuous turbidity monitoring (a reading at least every fifteen minutes) for grab sample monitoring if acceptable to the director. Continuous turbidity monitoring shall only be used for compliance if the continuous measurement is validated for accuracy using a protocol acceptable to the director. Any of the following locations are acceptable for monitoring turbidity of filtered water:

(1) At the combined filter effluent prior to entry into the clearwell

(2) The average of turbidity measurements from each individual filter effluent if each filter has essentially the same loading rate

(3) At the clearwell effluent

(4) At the plant effluent or immediately prior to entry into the distribution system.

(B) A public water system using conventional filtration treatment or direct filtration treatment, shall also conduct individual filter turbidity monitoring as follows:

(1) A public water system that provides conventional filtration treatment or direct filtration treatment shall conduct continuous monitoring of turbidity for each individual filter effluent and validate the continuous measurement for accuracy on a regular basis using the protocol acceptable to the director. The public water system shall record the results of individual filter monitoring every fifteen minutes. A public water system serving a combined population of less than ten thousand and which has two filters may conduct continuous monitoring of turbidity of the combined filter effluent, prior to entry into the clearwell, in lieu of individual filter effluent turbidity monitoring. The public

water system shall record the results of the combined filter monitoring every fifteen minutes.

(2) If there is a failure in the continuous turbidity monitoring equipment, the public water system shall conduct grab sampling every four hours in lieu of continuous monitoring until the continuous turbidity monitoring equipment is repaired and placed back online. A public water system serving a combined population of at least ten thousand has no more than five working days after the failure of the equipment to repair the continuous turbidity monitoring equipment and to place it back online. A public water system serving a combined population of less than ten thousand has no more than fourteen days after the failure of the equipment to repair the continuous turbidity monitoring equipment and to place it back online.

(C) Turbidity analysis shall be conducted as specified in paragraph (C) of rule 3745-81-27 of the Administrative Code.

(D) 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 under the following conditions:

(1) If there is a failure in the continuous disinfection monitoring equipment, the public water system shall conduct grab sampling every four hours in lieu of continuous monitoring until the continuous monitoring equipment is repaired and placed back online. A public water system has no more than five working days after failure of the equipment to repair the continuous monitoring equipment and place it back online.

(2) Public water systems serving three thousand three hundred or fewer persons may, with prior acceptance by the director, take grab samples in lieu of providing continuous monitoring. Grab sample monitoring shall require at least one sample every four hours that the water treatment plant is in operation. Systems shall monitor disinfectant residual at least every four hours unless the high service pumps are locked out for a portion of the day. If the pumps are locked out for a portion of the day, samples shall be taken during the first and last hours of pump operations, and every four hours in-between.

(E) The residual disinfectant concentration shall be measured at least at the sample points in the distribution system and at the same time as total coliforms are sampled, as specified in rules 3745-81-51 and 3745-81-52 of the Administrative Code.

(F) Parameters necessary to determine the sufficiency of disinfection prior to the first customer as required in rule 3745-81-72 of the Administrative Code shall be measured and recorded at the peak hourly flow rate each day the public water system is in operation. Public water systems which do not record any or all of the parameters set forth in paragraphs (G)(1) to (G)(3) of this rule on continuously recording devices, may estimate the period at which peak hourly flow will occur from records of flow rates from previous days for that water plant. The parameters necessary to calculate the actual CT value may then be those measured during this estimated peak hourly flow period. Temperature, pH, and residual disinfection concentration shall be analyzed in accordance with the methods specified in rule 3745-81-27 of the Administrative Code. The parameters necessary to calculate the actual CT value include all of the following:

(1) The temperature of the disinfected water at each residual disinfectant concentration sampling point.

(2) The pH of the disinfected water at each residual disinfectant concentration sampling point.

(3) The kind of disinfectant used and the residual disinfectant concentration at each sampling point before or at the first customer.

(4) The flow rate, clearwell used volume or depth, approved effective volume factor, and any other parameters needed to calculate the disinfectant contact time for each sampling point during each day's peak hourly flow.

(5) The actual CT value as determined for each day in the month, calculated from the above water temperature, pH, residual disinfectant concentration, disinfectant contact time, and other characteristics of the water treatment plant as it was operating at peak hourly flow rate for that day.

(6) The required CT value for each day of the month, determined from the water temperature, the water pH, the disinfectant in use, and other information referred to in rule 3745-81-72 of the Administrative Code.

(7) The number of days, if any, for which the required CT value was greater than the actual CT value.

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CERTIFIED ELECTRONICALLY

Certification

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3745-81-75 **Recordkeeping, reporting and actionable requirements.**

A public water system that uses a surface water source shall report monthly to the director the information specified in paragraphs (A) to (F) of this rule. In addition, a public water system that must monitor for TTHM, HAA5, bromate, chlorite, total residual chlorine, chlorine dioxide, or TOC shall comply with the applicable sections of paragraph (G) of this rule.

(A) Turbidity determinations as required by paragraph (A) of rule 3745-81-74 of the Administrative Code shall be reported to the director within ten days after the end of each month the public water system serves water to the public. The information reported shall include the following:

(1) The total number of filtered water turbidity determinations during the month. When filtered water turbidity is recorded continuously, the reported number shall be the number of hours in which turbidity values were recorded during the month.

(2) The number and per cent of filtered water turbidity determinations during the month which are less than or equal to the turbidity limits specified in paragraph (A)(1) or (B)(1) of rule 3745-81-73 of the Administrative Code for the filtration method being used. For public water systems which continuously monitor turbidity, the duration and per cent of filtered water turbidity readings during the month which are less than or equal to the turbidity limits in paragraph (A)(1) or (B)(1) of rule 3745-81-73 of the Administrative Code shall be reported.

(3) The date and value of each turbidity determination during the month which exceeds any applicable turbidity limit specified in rule 3745-81-73 of the Administrative Code for the filtration method being used. For public water systems which continuously monitor turbidity, the date and duration of each period during the month that the turbidity exceeds the turbidity limit specified in paragraph (A)(1) or (B)(1) and paragraph (A)(2) or (B)(2) of rule 3745-81-73 of the Administrative Code shall be reported.

(B) The following individual filter turbidity monitoring activities as required by paragraph (B) of rule 3745-81-74 of the Administrative Code shall be reported to the director as follows:

(1) Confirmation that individual filter monitoring was conducted shall be reported within ten days after the end of each month the public water system serves water to the public.

(2) Public water systems serving a combined population of at least ten thousand shall report individual filter turbidity monitoring results within ten days after the end of each month the public water system serves water to the public only if measurements demonstrate one or more of the following conditions:

(a) For any individual filter that has a measured turbidity level of greater than

1.0 nephelometric turbidity units (NTU) in two consecutive measurements taken fifteen minutes apart, the public water system shall report the filter number, the turbidity measurements, and the date and times on which the exceedance occurred. In addition, the public water system shall either produce a filter profile for the filter within seven days of the exceedance and report that the filter profile has been produced or report the obvious reason for the exceedance.

(b) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken fifteen minutes apart between the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, and at the end of a filter run the public water system shall report the filter number, the turbidity measurements, and that date and times on which the exceedance occurred. In addition, the public water system shall either produce a filter profile for the filter within seven days of the exceedance and report that the profile has been produced or report the obvious reason for the exceedance.

(c) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of three consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, the public water system shall conduct a self-assessment of the filter within fourteen days of the exceedance and report that the self-assessment was conducted. The self assessment shall consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(d) For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of two consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, no later than thirty days following the exceedance, the public water system shall arrange for a comprehensive performance evaluation (CPE) to be conducted by the director. If the director decides not to conduct the CPE, then the CPE shall be conducted by a third party in accordance with procedures acceptable to the director. A report of the evaluation shall be completed and submitted to the director no later than ninety days following the exceedance. The director may require the public water system to correct any or all of the deficiencies noted in the report.

(3) Public water systems serving a combined population of less than ten thousand shall report individual filter turbidity monitoring results within ten

days after the end of each month the public water system serves water to the public only if measurements demonstrate one or more of the following conditions:

(a) For any individual filter (or combined filter effluent for systems with two filters that monitor combined filter effluent in lieu of individual filters) that has a measured turbidity level of greater than 1.0 nephelometric turbidity units (NTU) in two consecutive measurements taken fifteen minutes apart, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, the public water system shall report the cause of the exceedance if known.

(b) For any individual filter (or combined filter effluent for systems with two or fewer filters that monitor combined filter effluent in lieu of individual filters) that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of three consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, the public water system shall conduct a self-assessment of the filter (or both filters if the system monitors the combined filter effluent in lieu of individual filters) within fourteen days of the exceedance and report that the self-assessment was conducted unless the requirement to conduct a comprehensive performance evaluation which includes a self-assessment of this filter is required during this time period by paragraph (B)(3)(c) of this rule. The self-assessments shall consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(c) For any individual filter (or combined filter effluent for systems with two or fewer filters that monitor combined filter effluent in lieu of individual filters) that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken fifteen minutes apart at any time in each of two consecutive months, the public water system shall report the filter number, the turbidity measurements, and the dates and times on which the exceedance occurred. In addition, no later than sixty days following the exceedance, the public water system shall arrange for a comprehensive performance evaluation (CPE) to be conducted by the director. If the director decides not to conduct the CPE, then the CPE shall be conducted by a third party in accordance with procedures acceptable to the director. A report of the evaluation shall be completed and submitted to the director no later than one hundred twenty days following the exceedance. The director may require the public water system to correct any or all of the deficiencies noted in the report. If a

CPE has been completed within twelve months prior to the exceedance or if the director and public water system are jointly participating in an ongoing comprehensive technical assistance (CTA) at the system, the director may not require a new CPE to be conducted.

(4) Recorded results of individual filter turbidity monitoring shall be maintained by the public water system for a minimum of three years.

(C) Disinfection information specified in rule 3745-81-74 of the Administrative Code shall be reported to the director within ten days after the end of each month the public water system serves water to the public. The information reported shall include the following:

(1) For each day, the lowest residual disinfectant concentration in milligrams per liter in water entering the distribution system.

(2) The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine and when the director was notified of the occurrence.

(3) The following information on all the residual disinfectant concentration samples taken in the distribution system in conjunction with total coliform monitoring pursuant to rule 3745-81-21 of the Administrative Code:

(a) The number of residual disinfectant concentration samples analyzed for the distribution system;

(b) The number of samples with residual disinfectant concentration determined to be less than 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine; and

(c) The per cent of samples with residual disinfectant concentration of at least 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine.

(4) The CT parameters during peak hourly flow rate for each day, including the temperature, pH, disinfectant, residual disinfectant concentration, disinfectant contact time, actual CT value, required CT value, and the number of days, if any, for which the required CT value is larger than the actual CT value.

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

(E) If at any time the turbidity in representative samples of filtered water in accordance with paragraph (A) of rule 3745-81-74 of the Administrative Code exceeds one NTU, for conventional or direct filtration or alternative filtration surface water

systems, the public water system shall notify the director as soon as practical, but no later than twenty-four hours after the exceedance is known. For all other surface water systems, if at any time the turbidity in representative samples of filtered water in accordance with paragraph (A) of rule 3745-81-74 exceeds five NTU, the public water system shall notify the director as soon as practical, but no later than twenty-four hours after the exceedance is known.

(F) If at any time the residual disinfectant concentration falls below 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine in the water entering the distribution system, the public water system shall notify the director as soon as possible, but no later than by the end of the next business day. The public water system also shall notify the director by the end of the next business day whether or not the residual disinfectant concentration was restored to at least 0.2 milligram per liter free chlorine or one milligram per liter combined chlorine within four hours.

(G) This paragraph is applicable to public water systems that monitor for TTHM, HAA5, bromate, chlorite, chlorine, chloramines, chlorine dioxide, or TOC:

(1) Public water systems monitoring for TTHM and HAA5 under the provisions of rule 3745-81-24 of the Administrative Code shall ensure that the analytical results are reported to the director according to the requirements specified in rule 3745-89-08 of the Administrative Code. In order to determine compliance with the sample monitoring plan for total TTHM and HAA5, the sample submission reports shall contain the sample location description. Compliance with the MCLs for TTHM and HAA5 in rule 3745-81-12 of the Administrative Code shall be determined by the director. Exceedance of the operational evaluation level for TTHM and HAA5 in paragraph (D) of rule 3745-81-24 of the Administrative Code shall be determined by the director.

(2) Public water systems monitoring for bromate under rule 3745-81-23 of the Administrative Code shall report the following:

(a) The number of samples taken during the last quarter.

(b) The location, date, and result of each sample taken during the last quarter.

(c) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year.

(d) Whether the MCL was exceeded.

(3) Public water systems monitoring for chlorite under rule 3745-81-23 of the Administrative Code shall report the following:

(a) The number of entry point samples taken each month for the last three months.

(b) The location, date, and result of each sample (both entry point and

distribution) taken during the last quarter.

(c) For each month in the reporting period, the arithmetic average of all samples taken in each three sample sets taken in the distribution system.

(d) Whether the MCL was exceeded, in which month, and how many times it was exceeded each month.

(4) Public water systems monitoring for total chlorine under rule 3745-81-70 of the Administrative Code shall report the following:

(a) The number of samples taken during each month of the last quarter.

(b) The monthly arithmetic average of all samples taken in each month for the last twelve months.

(c) The arithmetic average of the monthly averages for the last twelve months.

(d) Whether the MRDL was exceeded.

(5) Public water systems monitoring for chlorine dioxide under rule 3745-81-70 of the Administrative Code shall report the following:

(a) The dates, results, and locations of samples taken during the last quarter.

(b) Whether the MRDL was exceeded.

(c) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

(6) Public water systems monitoring monthly or quarterly for TOC under rule 3745-81-77 of the Administrative Code and required to meet the enhanced coagulation or enhanced softening requirements in rule 3745-81-77 of the Administrative Code shall report the following:

(a) The number of paired (source water and treated water, prior to continuous disinfection) samples taken during the last quarter.

(b) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.

(c) For each month in the reporting period that paired samples were taken, the arithmetic average of the per cent reduction of TOC for each paired sample and the required TOC per cent removal.

(d) Calculations for determining compliance with the TOC per cent removal requirements, as provided in rule 3745-81-77 of the Administrative Code.

(e) Whether the public water system is in compliance with the enhanced coagulation or enhanced softening per cent removal requirements in rule 3745-81-77 of the Administrative Code for the last four quarters.

(7) Public water systems monitoring monthly or quarterly for TOC under rule 3745-81-77 of the Administrative Code and meeting one or more of the alternative compliance criteria in rule 3745-81-77 of the Administrative Code shall report the following:

(a) The alternative compliance criterion that the system is using.

(b) The number of paired samples taken during the last quarter.

(c) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.

(d) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for public water systems meeting a criterion in paragraph (D)(1) or (D)(3) of rule 3745-81-77 of the Administrative Code or of treated water TOC for public water systems meeting the criterion in paragraph (D)(2) of rule 3745-81-77 of the Administrative Code.

(e) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for public water systems meeting the criterion in paragraph (D)(6) of rule 3745-81-77 of the Administrative Code or of treated water SUVA for public water systems meeting the criterion in paragraph (D)(7) of rule 3745-81-77 of the Administrative Code.

(f) The running annual average of source water alkalinity for public water systems meeting the criterion in paragraph (D)(3) of rule 3745-81-77 of the Administrative Code and of treated water alkalinity for public water systems meeting the criterion in paragraph (E)(1) of rule 3745-81-77 of the Administrative Code.

(g) The running annual average for both TTHM and HAA5 for public water systems meeting the criterion in paragraph (D)(3) or (D)(5) of rule 3745-81-77 of the Administrative Code.

(h) The running annual average of the amount of magnesium hardness removal (as $CaCO_3$, in mg/l) for public water systems meeting the criterion in paragraph (E)(2) of rule 3745-81-77 of the Administrative Code.

(i) Whether the public water system is in compliance with the particular alternative compliance criterion in rule 3745-81-77 of the Administrative Code.

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3745-81-76 **Water source designation.**

(A) Source water which is open to the atmosphere or subject to surface runoff is designated as surface water. Surface water sources include streams, rivers, ponds, lakes, reservoirs, springs, roof collection and impoundments.

(B) Source water which is obtained from a well is designated as ground water unless the director designates the source as surface water.

(C) The director may designate a well as surface water based on information available in Ohio environmental protection agency files about the water source and the water produced from the source, information from on-site sanitary or geological surveys, information supplied by the public water system upon a request from the director, any additional information which becomes available, and the guidelines outlined in the following paragraphs. A public water system shall provide information requested by the director within six months of receipt of a written request. Information requested for each water source may concern water quality, well construction and location, geological information, particulate analysis, Cryptosporidium analysis, Giardia lamblia analysis, E.coli analysis, ground water source samples related to rules 3745-81-41 to 3745-81-43 of the Administrative Code, and other information related to designation of the water source. A well may be designated as surface water if it meets any of the following criteria:

(1) The well does not meet all of the requirements for wells in Chapter 3745-9 of the Administrative Code;

(2) The well obtains water from a site at which rapid pathways or compromised hydrogeologic barriers have been identified; or

(3) If required by the director, analysis shows the annual mean E. coli concentration is greater than or equal to ten E. coli per one hundred milliliters.

(D) The director shall at a minimum consider the following criteria in making a surface water designation for a well:

(1) A well does not meet all of the requirements for wells in Chapter 3745-9 of the Administrative Code;

(2) A well obtains water from a site at which rapid pathways or compromised hydrogeologic barriers have been identified;

(3) A well is cased less than fifteen feet in depth;

(4) A vertical well where the sum of the casing depth plus the horizontal distance to a normal surface water pool is less than forty feet;

(5) A horizontal collector well lateral or infiltration gallery collector pipe less than twenty-five feet below the ground surface;

(6) A horizontal collector well where the sum of the depth of any lateral below

grade or stream, lake, reservoir bed plus the horizontal distance measured at the end of any lateral to a normal surface water pool is less than fifty feet; or

(7) An annual mean E. coli concentration equal to or more than ten E.coli colonies per one hundred milliliters based on monitoring of the source.

(E) Assessment source water monitoring as described in paragraph (B) of rule 3745-81-42 of the Administrative Code shall be completed for the source when one of the following conditions exist:

(1) A well is cased between fifteen and twenty-five feet in depth;

(2) A well is located less than fifty feet from a normal water surface;

(3) Infiltration galleries, recharge lagoons or other basins constructed to increase the rate of infiltration are used;

(4) A horizontal collector which meets the criteria in paragraph (D)(5) or (D)(6) of this rule;

(5) Any potential for surface water contamination exists within the approved isolation radius, including but not limited to improperly abandoned wells, leach beds, sanitary or combined sewers, or septic tanks;

(6) Gravity sewers built to water line standards and pressure tested are closer than one third the usually required isolation or if there are manholes on these pressure tested lines within the isolation area;

(7) A well is located in bedrock where the bedrock may be directly connected to surface water such as through fractures or solution features;

(8) A waterborne disease outbreak has been associated with the well; or

(9) Other surface water contamination hazards exist.

(F) Designation of a public water system's water sources as including surface water shall bring this public water system under the requirements of rules 3745-81-64 to 3745-81-69 and 3745-81-71 to 3745-81-75 of the Administrative Code.

(G) Designation of a public water system's water sources as including ground water shall bring this public water system under the requirements of rules 3745-81-41 to 3745-81-45 of the Administrative Code, unless all of the ground water is combined with surface water prior to treatment under rule 3745-81-71 of the Administrative Code.

(H) The director may redesignate a water source as surface water or as ground water at any time that additional information indicates that redesignation is appropriate.

Replaces: former 3745-81-76

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3745-81-77 **Treatment techniques for control of disinfection byproduct (DBP) precursors.**

(A) Surface water community and nontransient noncommunity public water systems using conventional filtration treatment shall operate with enhanced coagulation or enhanced softening to achieve the TOC per cent removal levels specified in paragraph (F) of this rule unless the system meets at least one of the alternative compliance criteria listed in paragraph (D) or (E) of this rule.

(B) Surface water systems using conventional filtration treatment shall comply with the following monitoring requirements for disinfection byproduct precursors (DBPP).

(1) Routine monthly monitoring: public water systems using surface water as a source which use conventional filtration treatment shall monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All public water systems required to monitor under this paragraph shall also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems shall monitor for alkalinity in the source water prior to any treatment. Public water systems shall take one paired sample and one source water alkalinity sample every thirty days per plant at a time representative of normal operating conditions and influent water quality. The thirty day monitoring frequency may be extended or reduced by three days to allow for unplanned circumstances that prevent monitoring precisely thirty days apart, as long as the samples are collected during each calendar month.

(2) Reduced quarterly monitoring: public water systems using surface water as a source 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 every ninety days. The ninety day monitoring frequency may be extended or reduced by five days to allow for unplanned circumstances that prevent monitoring precisely ninety days apart, as long as the samples are collected during each calendar quarter. The public water system must revert to routine monitoring in the month following the quarter when the running annual average treated water TOC $\geq$ 2.0 mg/l.

(C) Public water systems may begin monitoring twelve months prior to the

compliance date for the system, to determine whether step 1 TOC removals can be met. This monitoring is not required and failure to monitor during this period is not a violation. However, any public water system that does not monitor during this period, and then determines in the first twelve months after the compliance date that it is not able to meet the step 1 requirements in paragraph (F)(2) of this rule and must 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 by paragraph (F)(3) of this rule and is in violation of the treatment technique for TOC removal of this rule. Public water systems may apply for alternate minimum TOC removal (step 2) requirements any time after the compliance date.

(D) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Surface water systems using conventional filtration treatment may use one or more of the alternative compliance criteria in paragraphs (D)(1) to (D)(7) of this rule to comply with this rule in lieu of complying with paragraph (F) of this rule. Public water systems must still comply with the monitoring requirements of paragraph (B) of this rule.

(1) The system's source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, calculated quarterly as a running annual average.

(2) The system's treated water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, calculated quarterly as a running annual average.

(3) The system's source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity, measured according to rule 3745-81-27 of the Administrative Code , is greater than 60.0 mg/l (as $CaCO_3$), calculated quarterly as a running annual average and the TTHM and HAA5 running annual averages are no greater than 0.040 mg/l and 0.030 mg/l, respectively.

(4) The system's source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity, measured according to rule 3745-81-27 of the Administrative Code, is greater than 60.0 mg/l (as $CaCO_3$), calculated quarterly as a running annual average and the system has made a clear and irrevocable financial commitment to use technologies that will limit the levels of

TTHMs and HAA5 to no more than 0.040 mg/l and 0.030 mg/l, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the director for approval. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of the Administrative Code primary drinking water regulations for control of disinfection byproduct precursors.

(5) 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.

(6) The system's source water SUVA, prior to any treatment and measured monthly according to ~~of~~ rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, calculated quarterly as a running annual average.

(7) The system's finished water SUVA, measured monthly according to rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, calculated quarterly as a running annual average.

(E) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (F)(2) of this rule may use the alternative compliance criteria in paragraph (E)(1) or (E)(2) of this rule in lieu of complying with paragraph (F) of this rule. Systems must still comply with monitoring requirements in paragraph (B) of this rule.

(1) Softening that results in lowering the treated water alkalinity to less than 60.0 mg/l (as $CaCO_3$), measured monthly according to rule 3745-81-27 of the Administrative Code and calculated quarterly as a running annual average.

(2) Softening that results in removing at least 10.0 mg/l of magnesium hardness (as $CaCO_3$), measured monthly according to paragraph (C)(4)(c) of rule 3745-81-27 of the Administrative Code and calculated quarterly as an annual running average.

(F) Enhanced coagulation and enhanced softening performance requirements.

(1) Public water systems must achieve the per cent reduction of TOC specified in paragraph (F)(2) of this rule between the source water and the combined filter effluent, unless the director approves a system's request for alternate minimum TOC removal (step 2) requirements under paragraph (F)(3) of this rule.

(2) Required step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured according to rule 3745-81-27 of the Administrative Code. Systems practicing softening are required to meet the step 1 TOC reductions in the far-right column (source water alkalinity >120 mg/l) for the specified source water TOC:

Step 1 required removal of TOC by enhanced coagulation and enhanced softening for surface water systems using conventional treatment[1,2]

Source-water TOC, mg/l	Source-water alkalinity, mg/l as $CaCO_3$		
	0 - 60 (Per cent)	>60 - 120 (Per cent)	>120[3] (Per cent)
>2.0 - 4.0	35.0	25.0	15.0
>4.0 - 8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

[1] Systems meeting at least one of the conditions in paragraphs (D)(1) to (D)(7) of this rule are not required to operate with enhanced coagulation.

[2] Softening systems meeting one of the alternative compliance criteria in paragraphs (E)(1) and (E)(2) of this rule are not required to operate with enhanced softening.

[3] Systems practicing softening must meet the TOC removal requirements in this column.

(3) Surface water conventional treatment systems that cannot achieve the step 1 TOC removals required by paragraph (F)(2) of this rule due to water quality parameters or operational constraints shall apply to the director, within three months of failure to achieve the TOC removals required by paragraph (F)(2) of this rule, for approval of alternative minimum TOC removal (step 2) requirements submitted by the system. If the director approves the alternative minimum TOC removal (step 2) requirements, the director may make those requirements retroactive for the purposes of determining compliance. Until the director approves the alternate minimum TOC removal (step 2) requirements, the system must

meet the step 1 TOC removals contained in paragraph (F)(2) of this rule.

(4) Alternate minimum TOC removal (step 2) requirements. Applications made to the director by enhanced coagulation systems for approval of alternative minimum TOC removal (step 2) requirements under paragraph (F)(3) of this rule shall include, at a minimum, results of bench- or pilot-scale testing conducted under paragraphs (F)(6) to (F)(9) of this rule. The submitted bench- or pilot-scale testing shall be used to determine the alternate enhanced coagulation level.

(5) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in paragraphs (F)(6) to (F)(9) of this rule such that an incremental addition of 10.0 mg/l of alum (or equivalent amount of ferric salt) results in a TOC removal of ≤ 0.3 mg/l. The per cent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the director, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (F)(2) of this rule. This requirement will be effective until such time as the director approves a new value based on the results of a new bench- or pilot-scale test. Failure to achieve alternative minimum TOC removal levels as set by the director is a violation of the Administrative Code primary drinking water regulations for control of disinfection byproduct precursors.

(6) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10.0 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

(7) For waters with alkalinities of less than 60.0 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 10.0 mg/l alum added (or equivalent addition of iron coagulant) is reached.

(8) The system may operate at any coagulant dose or pH necessary (consistent with other state primary drinking water regulations) to achieve the minimum TOC per cent removal approved under paragraph (F)(3) of this rule.

(9) If the TOC removal is consistently less than 0.3 mg/l of TOC per 10.0 mg/l of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the director for a waiver of enhanced coagulation requirements.

(G) Compliance calculations: surface water systems other than those identified in paragraph (D) or (E) of this rule shall comply with requirements contained in paragraph (F)(2) or (F)(3) of this rule. Systems shall calculate compliance quarterly, beginning after the system has collected twelve months of data, by determining a running annual average using the following method:

(1) Determine actual monthly TOC per cent removal. This is equal to: (1.0 - (treated water TOC/source water TOC)) x 100.0.

(2) Determine the required monthly TOC per cent removal (from either the table in paragraph (F)(2) of this rule or from paragraph (F)(3) of this rule).

(3) Divide the value determined according to paragraph (G)(1) of this rule by the value determined according to paragraph (G)(2) of this rule.

(4) Add together the results of paragraph (G)(3) of this rule for the last twelve months and divide by twelve.

(5) If the value calculated in paragraph (G)(4) of this rule is less than 1.00, the system is not in compliance with the TOC per cent removal requirements.

(6) Systems may use the provisions in paragraphs (G)(7) to (G)(11) of this rule in lieu of the calculations in paragraphs (G)(1) to (G)(5) of this rule to

determine compliance with TOC per cent removal requirements.

(7) In any month that the system's treated or source water TOC level, measured according to rule 3745-81-27 of the Administrative Code, 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 (G)(3) of this rule).

(8) In any month that a system practicing softening removes at least 10.0 mg/l of magnesium hardness (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(9) In any month that the system's source water SUVA, prior to any treatment and measured according to rule 3745-81-27 of the Administrative Code, is ≤ 2.0 l/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(10) In any month that the system's finished water SUVA, measured according to rule 3745-81-27 of the Administrative Code , is ≤ 2.0 l/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(11) In any month that a system practicing enhanced softening lowers alkalinity below 60.0 mg/l (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(12) Surface water systems using conventional treatment may also comply with the requirements of this rule by meeting the criteria in paragraph (D) or (E) of this rule.

(H) Treatment technique requirements for DBP precursors. The director identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: for surface water systems using conventional treatment, enhanced coagulation or enhanced softening.

(I) Each public water system required to monitor under this rule shall develop and implement a monitoring plan. The public water system shall maintain the plan and make it available for inspection by the director and the general public no later than thirty days following the applicable compliance dates in this rule. All surface water systems serving more than three thousand three hundred people

shall submit a copy of the monitoring plan to the director no later than the date of the first report required under paragraph (G) of rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements to ensure monitoring will be adequate for required compliance determinations. The public water system shall modify the plan as required by the director. The plan shall include how the public water system will calculate compliance with the treatment technique for disinfection byproduct precursors. Failure to sample according to the monitoring plans is monitoring violation.

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Prior Effective Dates: 01/01/02, 01/01/04

3745-81-79 **Filter backwash recycling.**

A surface water system that uses conventional filtration treatment or direct filtration treatment and that recycles spent filter backwash water, thickener supernatant, or liquid from a dewatering process shall meet the following:

(A) Surface water systems shall notify the director in writing if spent filter backwash water, thickener supernatant, or liquid from a dewatering process is recycled prior to initiation of recycling if the notification requirements of this paragraph have not been completed previously. This notification must include at least the following information:

(1) A plant schematic showing the origin of all flows which are recycled that may include, but are not limited to:

(a) Spent filter backwash water.

(b) Thickener supernatant.

(c) Liquid from a dewatering process.

(d) Filter to waste.

(e) The hydraulic conveyance used to transport them.

(f) The location where they are mixed in the water treatment process.

(2) The typical recycle flow, the highest observed plant flow during the previous twelve months and the state approved design capacity. All flows shall be reported in gallons per minute.

(B) Surface water systems which recycle spent filter backwash water, thickener supernatant, or a liquid from a dewatering process shall return these flows through the existing conventional filtration treatment or direct filtration treatment, or through an alternative location that is approved by the director. Failure to comply with this paragraph is a treatment technique violation.

(C) Surface water systems which recycle spent filter backwash water, thickner supernatant, or liquid from a dewatering process shall collect and retain on file the following recycle flow information for review and evaluation:

(1) A copy of the recycle notification and information that was submitted to the director in accordance to paragraph (A)(1) of this rule:

(2) A list of all recycle flows and the frequency with which they are returned.

(3) The average and maximum backwash flow rates through the filters and the average and maximum durations of the filter backwash in minutes.

(4) The typical filter run length and a written summary of how filter run length is determined.

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

(6) Data on the physical dimensions of the equilization and treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used and average dose and frequency of use, and, if applicable, frequency that solids are removed.

Effective: 10/05/2013

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Prior Effective Dates: 08/03/04

3745-81-80 Control of lead and copper - general requirements.

(A) Applicability. The requirements of rules 3745-81-80 to 3745-81-90 of the Administrative Code are based on the national primary drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of these rules applies to community water systems and nontransient noncommunity water systems (hereinafter referred to as "water systems" or "systems").

(B) Scope. These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. Lead and copper action levels, measured in samples collected at consumers' taps, may trigger these requirements.

(C) Lead and copper action levels, and lead threshold levels.

(1) The lead action level is exceeded if, at any time during the monitoring period, the concentration of lead in more than ten per cent of tap water samples collected during any monitoring period conducted in accordance with rule 3745-81-86 of the Administrative Code is greater than 0.015 milligram per liter, i.e., if the ninetieth percentile lead level is greater than 0.015 milligram per liter.

(2) The copper action level is exceeded if, at any time during the monitoring period, the concentration of copper in more than ten percent of tap water samples collected during any monitoring period conducted in accordance with rule 3745-81-86 of the Administrative Code is greater than 1.3 milligrams per liter, i.e., if the ninetieth percentile copper level is greater than 1.3 milligrams per liter.

(3) The ninetieth percentile lead and copper levels shall be computed as follows:

(a) The analytical 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 analytical result shall be assigned a consecutive whole number, beginning with the number one for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be that of the total number of samples analyzed.

(i) If less than the minimum number of samples required by rule 3745-81-86 of the Administrative Code have been taken, the minimum number of samples shall be used in calculations.

(ii) If greater than or equal to the minimum number of samples required by rule 3745-81-86 of the Administrative Code have been taken, the total number of samples shall be used in calculations.

(b) The number of samples taken during the monitoring period shall be multiplied by 0.9.

(c) The contaminant concentration in the numbered sample with the number yielded by the calculation in paragraph (C)(3)(b) of this rule is the ninetieth percentile contaminant level.

If the result of the calculation in paragraph (C)(3)(b) of this rule is not a whole number, the concentrations for the samples above and below the result shall be iterated to yield the ninetieth percentile contaminant level.

(d) For public water systems that monitor five samples per monitoring period, the ninetieth percentile is computed by taking the average for the two samples with highest concentrations.

(e) For public water systems that have been allowed by the director to collect fewer than five samples under rule 3745-81-86 of the Administrative Code, the sample result with the highest concentration is considered the ninetieth percentile value.

(4) The lead threshold level is exceeded at 0.015 milligrams per liter concentration of lead in an individual tap water sample.

(D) Corrosion control treatment requirements.

(1) All water systems shall install and operate optimal corrosion control treatment as defined in rule 3745-81-01 of the Administrative Code.

(2) Any water system that complies with the applicable corrosion control treatment requirements approved by the director under rules 3745-81-81 and 3745-81-82 of the Administrative Code shall be deemed in compliance with the treatment requirement contained in paragraph (D)(1) of this rule.

(E) Source water treatment requirements. Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the director under rule 3745-81-83 of the Administrative Code.

(F) Lead service line requirements. Any system that replaces lead service lines, replaces water mains in areas that contain or are likely to contain lead service lines or exceeds the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the requirements contained in rule 3745-81-84 of the Administrative Code.

(G) Consumer notification, lead public notification and public education requirements.

(1) Consumer notification. Pursuant to rule 3745-81-85 of the Administrative Code, the owner or operator of a public water system shall provide a consumer notice of lead tap water monitoring results to persons served at the sites (taps) that are sampled.

(2) Lead public notification. Any system with results of lead tap water monitoring that show an exceedance of the lead action level shall provide lead public notification in accordance with rule 3745-81-85 of the Administrative Code.

(3) Public education. Any system exceeding the lead action level shall implement the public education requirements contained in rule 3745-81-85 of the Administrative Code.

(H) Monitoring and analytical requirements. Monitoring of tap water for lead and copper, monitoring for water quality parameters, monitoring of source water at each entry point to the distribution system for lead and copper, and analyses of these monitoring samples shall be completed in compliance with rules 3745-81-86 to 3745-81-89 of the Administrative Code and Chapter 3745-89 (laboratory approval) of the Administrative Code.

(I) Reporting requirements. Public water systems shall report to the director any information required by the treatment provisions of rules 3745-81-80 to 3745-81-90 of the Administrative Code.

(J) Recordkeeping requirements. Public water systems shall maintain records in accordance with rule 3745-81-90 of the Administrative Code.

(K) Violation of primary drinking water regulations. Failure to comply with the applicable requirements of rules 3745-81-80 to 3745-81-90 of the Administrative Code, including requirements established by the director pursuant to these provisions, shall constitute a violation of the Administrative Code primary drinking water regulations for lead or copper.

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3745-81-81 Control of lead and copper; applicability of corrosion control treatment steps to small, medium, and large water systems.

(A) Public water systems shall complete the applicable corrosion control treatment requirements described in rule 3745-81-82 of the Administrative Code by the deadlines established in this rule.

(1) A large system (serving more than fifty thousand persons) shall complete the corrosion control treatment steps specified in paragraph (D) of this rule, unless otherwise determined by the director.

(2) A small system (serving less than or equal to three thousand three hundred persons) and a medium system (serving more than three thousand three hundred and less than or equal to fifty thousand persons) shall complete the corrosion control treatment steps specified in paragraph (E) of this rule, unless otherwise determined by the director.

(B) A public water system is deemed to have optimized corrosion control and may not be required to complete the applicable corrosion control treatment steps identified in this rule if the system satisfies one of the criteria specified in paragraphs (B)(1) to (B)(3) of this rule. Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the director determines appropriate to ensure optimal corrosion control treatment is maintained.

(1) A small or medium water system is deemed to have optimized corrosion control if the lead or copper action level has not been exceeded.

(2) Any public water system may be deemed by the director to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the director that the system has conducted activities equivalent to the corrosion control steps applicable to such system under this rule. If the director makes this determination, the director shall provide the system with written notice explaining the basis for the director's decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with paragraph (F) of rule 3745-81-82 of the Administrative Code. Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the designated optimal water quality control parameters in accordance with paragraph (G) of rule 3745-81-82 of the Administrative Code and continue to conduct lead and copper tap and water quality parameter sampling in accordance with paragraph (D)(3) of rule 3745-81-86 and paragraph (D) of rule 3745-81-87 of the Administrative Code, respectively. A system shall provide the director with the following information in order to support a determination under this paragraph:

(a) The results of all test samples collected for each of the water quality parameters in paragraph (C)(3) of rule 3745-81-82 of the Administrative Code.

(b) A report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in paragraph (C)(1) of rule 3745-81-82 of the Administrative Code, the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment.

(c) A report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps.

(d) The results of tap water monitoring with samples collected in accordance with rule 3745-81-86 of the Administrative Code at least once every six months for one year after corrosion control has been installed.

(3) Any water system is deemed to have optimized corrosion control if, for two consecutive six-month monitoring periods, the difference between the ninetieth percentile tap water level computed under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code and the highest source water at the entry point to the distribution system lead concentration is less than the practical quantitation level (PQL) of 0.005 milligrams per liter. Monitoring shall be conducted in accordance with rules 3745-81-86 and 3745-81-88 of the Administrative Code.

(a) Those systems whose highest source water at the entry point to the distribution system lead level is below the method detection limit (MDL) may also be deemed to have optimized corrosion control under this paragraph if the ninetieth percentile tap water lead level is less than or equal to the PQL of 0.005 milligram per liter for two consecutive six-month monitoring periods.

(b) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall continue monitoring for lead and copper at the tap in accordance with paragraph (C) and paragraph (D) of rule 3745-81-86 of the Administrative Code.

(c) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall submit water quality information to the director with plan submittal, as required, for any change or modification in treatment or the addition of a new source in accordance with paragraph (A)(3) of rule 3745-81-90 of the Administrative Code. The director shall review and approve the addition of a new source or substantial change in treatment before it is implemented by the water system. The director may require any such water system to conduct additional monitoring, perform corrosion control studies or to take other action the director deems appropriate to ensure that minimal levels of corrosion in the distribution system are maintained.

(d) As of the effective date of this rule, a system is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment pursuant to paragraph (B)(3)(e) of this rule unless the system meets the lead and copper action level.

(e) 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 (E) of this rule. Any such large system shall adhere to the schedule specified in that paragraph for medium systems, with the time periods for completing each step being triggered by the date the system is no longer deemed to have optimized corrosion control under this paragraph.

(C) The requirement for any water system to implement corrosion control treatment steps in accordance with paragraph (D) of this rule for large systems and paragraph (E) of this rule for small or medium systems, including systems previously deemed to have optimized corrosion control under paragraph (B) of this rule, is triggered whenever monitoring exceeds the lead or copper action level.

(D) Treatment steps for large systems. Except as provided in paragraphs (B)(2) and (B)(3) of this rule, large systems shall complete the following corrosion control treatment steps (described in the referenced portions of rules 3745-81-82, 3745-81-86, and 3745-81-87 of the Administrative Code):

(1) Step one: The system shall conduct initial monitoring (in accordance with paragraph (D)(1) of rule 3745-81-86 and paragraph (B) of rule 3745-81-87 of the Administrative Code) during two consecutive six-month monitoring periods.

(2) Step two: The system shall complete corrosion control studies and submit plans for approval for optimal corrosion control treatment (in accordance with paragraph (C) of rule 3745-81-82 of the Administrative

Code) within eighteen months after the director requires that such studies be conducted. The system shall submit interim status reports of action taken to complete the studies once every six months from the initiation of the corrosion control studies.

(3) Step three: The director shall complete the review and approval of optimal corrosion control treatment plans (in accordance with paragraph (D) of rule 3745-81-82 of the Administrative Code).

(4) Step four: The system shall install optimal corrosion control treatment (in accordance with paragraph (E) of rule 3745-81-82 of the Administrative Code) within six months after the director approves plans unless an alternative schedule is approved by the director.

(5) Step five: The system shall complete follow-up monitoring after installation of treatment (in accordance with paragraph (D)(2) of rule 3745-81-86 of the Administrative Code and paragraph (C) of rule 3745-81-87 of the Administrative Code).

(6) Step six: The director shall review installation of treatment and specify optimal water quality parameters (in accordance with paragraph (F) of rule 3745-81-82 of the Administrative Code) after completion of step five.

(7) Step seven: The system shall operate in compliance with the director-specified optimal water quality control parameters (in accordance with paragraph (G) of rule 3745-81-82 of the Administrative Code) and continue to conduct tap sampling (in accordance with paragraph (D)(3) of rule 3745-81-86 of the Administrative Code and paragraph (D) of rule 3745-81-87 of the Administrative Code).

(E) Treatment steps and deadlines for small and medium systems. Except as provided in paragraph (B) of this rule, small and medium systems shall complete the following corrosion control treatment steps (described in the referenced portions of rules 3745-81-82, 3745-81-86, and 3745-81-87 of the Administrative Code) within the indicated time periods:

(1) Step one: The system shall conduct initial tap monitoring (in accordance with paragraph (D)(1) of rule 3745-81-86 of the Administrative Code and paragraph (B) of rule 3745-81-87 of the Administrative Code) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under paragraph (D)(4) of rule 3745-81-86 of the Administrative Code, as follows:

(a) A small system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (in accordance with paragraph (A) of rule 3745-81-82 of the Administrative Code), and submit plans if required by Chapter 3745-91 of the Administrative Code, within six months after the end of the monitoring period during which it exceeds one of the action levels.

(b) A medium system exceeding the lead or copper action level shall proceed to step two, paragraph (E)(2) of this rule, requiring corrosion control studies (in accordance with paragraph (B) of rule 3745-81-82 of the Administrative Code).

(2) Step two: Within twelve months after the end of the monitoring period during which a small system exceeds the lead or copper action level, the director may require the system to perform corrosion control studies (in accordance with paragraph (B) of rule 3745-81-82 of the Administrative Code). If the director does not require the small system to perform such studies, the director shall complete the review and approval of optimal corrosion control treatment plans (in accordance with paragraph (D) of rule 3745-81-82 of the Administrative Code) within twelve months after the end of the monitoring period during which the system exceeds the lead or copper action level.

Any medium system exceeding the lead or copper action level is required to perform corrosion control studies (in accordance with paragraph (B) of rule 3745-81-82 of the Administrative Code).

(3) Step three: When the director requires a system to perform corrosion control studies under step two, the system shall complete the studies and submit approvable plans for optimum corrosion control treatment (in accordance with paragraph (C) of rule 3745-81-82 of the Administrative Code) within eighteen months after the director requires that such studies be conducted. The system shall submit interim status reports of action taken to complete the studies once every six months from the initiation of the corrosion control studies.

(4) Step four: If the system has performed corrosion control studies under step two, the director shall complete the review and approval of optimal corrosion control treatment plans (in accordance with paragraph (D) of rule 3745-81-82 of the Administrative Code) after completion of step three.

(5) Step five: The system shall install optimal corrosion control treatment (in accordance with paragraph (E) of rule 3745-81-82 of the Administrative Code) within six months after the director approves plans unless an alternative schedule is approved by the director.

(6) Step six: The system shall complete follow-up monitoring after installation of treatment (in accordance with paragraphs (D)(2) of rule 3745-81-86 and (C) of rule 3745-81-87 of the Administrative Code).

(7) Step seven: The director shall review the system's installation of treatment and specify optimal water quality control parameters (in accordance with paragraph (F) of rule 3745-81-82 of the Administrative Code) after completion of step six.

(8) Step eight: The system shall operate in compliance with the director-specified optimal water quality control parameters (in accordance with paragraph (G) of rule 3745-81-82 of the Administrative Code) and continue to conduct tap sampling (in accordance with paragraphs (D)(3) of rule 3745-81-86 and (D) of rule 3745-81-87 of the Administrative Code).

(F) New or updated treatment recommendations, studies or plans.

(1) The owner or operator of a water system shall provide a new or update an existing corrosion control treatment recommendation, study or submit plans in accordance with paragraph (A) of this rule if any of the following occur:

(a) The system changes its water source or adds a new water source. The owner or operator shall notify the director prior to changes to the water system source and complete the recommendation, study or submit plans within eighteen months.

(b) The system makes a substantial change in water treatment. The owner or operator shall notify the director prior to changes in the water system treatment and complete the recommendation, study or submit plans within eighteen months.

(c) The system operates out of previously-approved acceptable ranges for lead, copper, pH or other corrosion control indicators, as determined by the director. The owner or operator of the water system shall complete the recommendation, study or submit plans within eighteen months after the system operates out of acceptable ranges.

If the system exceeds the lead or copper action level while operating out of previously-approved acceptable ranges for pH or other corrosion control indicators, the owner or operator of the water system shall review the corrosion control study. If the water quality has not changed, the owner or

operator of the water system shall submit an updated treatment recommendation. If the water quality has changed, the owner or operator of the water system shall complete a new study. The updated treatment recommendation or new study shall be completed within eighteen months after the system operates out of acceptable ranges.

(d) Any other event determined by the director to have the potential to impact the water quality or corrosiveness of water in the system. The owner or operator of the water system shall complete the recommendation, study or submit plans within eighteen months from the date the director provides written notice to the system of such event.

(2) An owner or operator of a system required to provide a treatment recommendation, complete a corrosion control treatment study or submit a plan in accordance with paragraph (F)(1) of this rule, shall notify any consecutive or wholesale system of their new or updated treatment recommendation, corrosion control treatment study or plan.

(3) An owner or operator of a system required to provide a treatment recommendation, complete a corrosion control treatment study or submit a plan in accordance with paragraph (F)(1) of this rule, shall complete the recommendation, study or submit the plan to the director for approval even if sampling results conducted subsequent to the initiation of the study and plan do not exceed the lead action level.

(G) The director may waive the requirement to conduct a new or updated corrosion control recommendation, study or submit plans as required in paragraph (F) of this rule upon demonstration by the system that items under paragraphs (F)(1)(a) to (F)(1)(c) of this rule will not have the potential to or will not impact the water quality or corrosiveness of the system.

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Prior Effective Dates:	04/01/96, 10/17/03, 07/24/09, 2/23/15

3745-81-82 **Control of lead and copper; description of corrosion control treatment requirements.**

Each public water system shall complete the corrosion control treatment requirements described below which are applicable to such system under rule 3745-81-81 of the Administrative Code.

(A) Small public water system recommendation regarding corrosion control treatment. Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small water systems exceeding the lead or copper action level shall recommend installation of and submit plans for one or more of the corrosion control treatments listed in paragraph (C)(1) of this rule which the system believes constitute optimal corrosion control for that system. The director may require the small system to conduct additional water quality parameter monitoring in accordance with paragraph (B) of rule 3745-81-87 of the Administrative Code to assist the director in reviewing the system's recommendation.

(B) Studies of corrosion control treatment by small and medium systems. The director may require any small system that exceeds the lead or copper action level to perform corrosion control studies under paragraph (C) of this rule to identify optimal corrosion control treatment for the system. Any medium system that exceeds the lead or copper action level shall perform corrosion control studies under paragraph (C) of this rule in order to identify optimal corrosion control treatment for the system.

(C) Performance of corrosion control studies.

(1) Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:

(a) Alkalinity and pH adjustment;

(b) Calcium hardness adjustment; and

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

(2) The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other

systems of similar size, water chemistry, and distribution system configuration.

(3) The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:

(a) Lead;

(b) Copper;

(c) pH;

(d) Alkalinity;

(e) Calcium;

(f) Conductivity;

(g) Orthophosphate (when an inhibitor containing a phosphate compound is used);

(h) Silicate (when an inhibitor containing a silicate compound is used); and

(i) Water temperature.

(4) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:

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

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

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

(6) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the director in writing the treatment

option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system, and submit approvable plans therefor in accordance with Chapter 3745-91 of the Administrative Code. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in paragraphs (C)(1) to (C)(5) of this rule.

(D) Director approval of optimal corrosion control treatment plans.

(1) Based upon consideration of available information, including, where applicable, studies performed under paragraph (C) of this rule and a system's recommended treatment alternative, the director shall review the corrosion control treatment plan submitted by the system. When reviewing the submitted optimal treatment plan the director shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(2) The director shall notify the system of the decision on the optimal corrosion control treatment plan in writing and explain the basis for this determination. If the director requests additional information to aid the review, the water system shall provide the information.

(E) Installation of optimal corrosion control. Each public water system shall properly install and operate throughout its distribution system the optimal corrosion control treatment approved by the director under paragraph (D) of this rule.

(F) Director review of treatment and specification of optimal water quality control parameters. The director shall evaluate the results of all lead and copper tap monitoring and water quality parameter monitoring submitted by the public water system and determine whether the system has properly installed and operated the optimal corrosion control treatment plan approved by the director in paragraph (D) of this rule. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the director shall specify values for the applicable water quality control parameters listed in paragraphs (F)(1) to (F)(5) of this rule to reflect optimal corrosion control treatment for the system. The director may specify values for additional water quality control parameters determined by the director to reflect optimal corrosion control for the system. The director shall notify the system in writing of these determinations and explain the basis for the decisions. Common water quality control parameters include:

(1) A minimum value or a range of values for pH measured at each entry point to the distribution system;

(2) A minimum value for pH measured in all tap samples taken for water quality parameter determinations. Such value shall be equal to or greater than 7.0, unless the director determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;

(3) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the director determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

(4) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples; and

(5) If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or range of concentrations for calcium, measured in all tap samples.

(G) Continued operation and monitoring. All public water systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the director under paragraph (F) of this rule, in accordance with this paragraph for all samples collected under paragraphs (D) to (F) of rule 3745-81-87 of the Administrative Code. Compliance with the requirements of this paragraph shall be determined every six months, as specified under paragraph (D) of rule 3745-81-87 of the Administrative Code. A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any director-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at the sampling location is below the minimum value or outside the range designated by the director. Daily values are calculated as follows. The director has discretion to delete results of obvious sampling errors from this calculation.

(1) On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both.

(2) On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

(3) On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the site.

(H) Modification of the director's treatment decisions. Upon the director's own initiative or in response to a request by a public water system, the director may modify the approval of the optimal corrosion control treatment plans under paragraph (D) of this rule or optimal water quality control parameters under paragraph (F) of this rule. A request for modification by a system shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The director may modify the approval where the director concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised approval shall be made in writing, set forth the new treatment requirements, explain the basis for the director's decision, and provide an implementation schedule for completing the treatment modifications.

Effective: 07/24/2009

R.C. 119.032 review dates: 07/24/2014 and 04/24/2019

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Statutory Authority: 6109.04
Rule Amplifies: 6109.04
Prior Effective Dates: 09/13/93, 10/17/03

3745-81-83 **Control of lead and copper; source water treatment requirements.**

Public water systems shall complete the applicable source water at the entry point to the distribution system monitoring and treatment requirements (described in the referenced portions of paragraph (B) of this rule and in rules 3745-81-86 and 3745-81-88 of the Administrative Code) by the deadlines in paragraphs (A)(1) to (A)(6) of this rule.

(A) Deadlines for completing source water treatment steps.

(1) Step one: a system exceeding the lead or copper action level shall complete source water at the entry point to the distribution system monitoring for lead and copper (in accordance with paragraph (B) of rule 3745-81-88 of the Administrative Code), make a treatment recommendation, and submit approvable plans, if needed, to the director (in accordance with paragraph (B)(1) of this rule) no later than one hundred eighty days after the end of the monitoring period during which the lead or copper action level was exceeded.

If monitoring is required annually, triennially, or less frequently, the end of the monitoring period is September thirtieth of the calendar year in which the sampling occurs. If the director has established an alternate period, then the end of the monitoring period will be the last day of that period.

(2) Step two: the director shall complete the review and approval of plans regarding source water treatment (in accordance with paragraph (B)(2) of this rule) within six months after submission of monitoring results under step one.

(3) Step three: if the director requires installation of source water treatment, the system shall install the treatment (in accordance with paragraph (B)(3) of this rule) within twenty-four months after completion of step two.

(4) Step four: the system shall complete follow-up tap water monitoring (in accordance with paragraph (D)(2) of rule 3745-81-86 of the Administrative Code) and source water at the entry point to the distribution system monitoring (in accordance with paragraph (C) of rule 3745-81-88 of the Administrative Code) within thirty-six months after completion of step two.

(5) Step five: the director shall review the system's installation and operation of source water treatment and specify maximum permissible source water at the entry point to the distribution system levels (in accordance

with paragraph (B)(4) of this rule) within six months after completion of step four.

(6) Step six: the system shall operate in compliance with the director-specified maximum permissible lead and copper source water at the entry point to the distribution system levels (in accordance with paragraph (B)(4) of this rule) and continue monitoring (in accordance with paragraph (D) of rule 3745-81-88 of the Administrative Code).

(B) Description of source water treatment requirements.

(1) System treatment recommendation. Any system which exceeds the lead or copper action level shall recommend in writing to the director the installation and operation of one of the source water treatments listed in paragraph (B)(2) of this rule. 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 user's taps.

(2) Director determination regarding source water treatment. The director shall complete an evaluation of the results of all source water at the entry point to the distribution system monitoring submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the director determines that treatment is needed, the system shall submit approvable plans for source water treatment selected from ion exchange, reverse osmosis, lime softening, or coagulation/filtration. If the director requests additional information to aid in the review, the water system shall provide the information by the date specified in the director's request. The director shall notify the system in writing of the determination and set forth the basis for the decision.

(3) Installation of source water treatment. Each system shall properly install and operate the source water treatment approved by the director under paragraph (B)(2) of this rule.

(4) Director's review of source water treatment and specification of maximum permissible levels of lead and copper at source water at the entry points to the distribution system. The director shall review the source water at the entry point to the distribution system monitoring completed 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 approved by the director. Based upon the review, the director shall specify the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal

capability of the treatment properly operated and maintained. The director shall notify the system in writing and explain the basis for the decision.

(5) Continued operation and maintenance. Each water system shall maintain lead and copper levels below the maximum permissible concentrations specified by the director at each sampling point monitored in accordance with rule 3745-81-88 of the Administrative Code. 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 specified by the director.

(6) Modification of director treatment decisions. Upon the director's initiative or in response to a request by a water system, the director may modify the approval of the source water treatment plans under paragraph (B)(2) of this rule, or maximum permissible lead and copper concentrations for finished water entering the distribution system under paragraph (B)(4) of this rule. A request for modification by a system shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The director may modify the approval where the director concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water at the entry point to the distribution system. A revised approval shall be made in writing, set forth the new treatment requirements, explain the basis for the director's decision, and provide an implementation schedule for completing the treatment modifications.

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3745-81-84 Control of lead and copper - lead service line requirements.

All water systems that replace lead service lines, replace water mains in areas that contain or are likely to contain lead service lines, or exceed the lead action level after the implementation of corrosion control or source water treatment shall comply with all applicable requirements in this rule.

(A) Requirements for public water systems that exceed the lead action level in tap water monitoring pursuant to paragraph (D)(2) of rule 3745-81-86 of the Administrative Code, after installing corrosion control or source water treatment (whichever sampling occurs later).

(1) The water system shall identify the initial number of lead service lines in its distribution system, including an identification of the portion owned by the system, based on a materials evaluation, including the evaluation required under paragraph (A) of rule 3745-81-86 of the Administrative Code and relevant legal authorities regarding the portion owned by the system (e.g., contracts and local ordinances).

(2) The water system shall replace annually at least seven per cent 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 first year of lead service line replacement shall begin on the first day following the end of the monitoring period in which the action level was exceeded under paragraph (A) of this rule. If monitoring is required annually, or triennially, the end of the monitoring period is September thirtieth of the calendar year in which the sampling occurs. If the director has established an alternate period, then the end of the monitoring period will be the last day of that period.

The director shall require a public water system to replace lead service lines on a shorter schedule than that required by this rule, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The director shall make this determination in writing and notify the system of the finding within six months after the system is required to commence lead service line replacement based on monitoring referenced in this paragraph.

(3) If the water system is in violation of rule 3745-81-81 or rule 3745-81-83 of the Administrative Code for failure to install source water treatment or corrosion control treatment, the director may require the system to commence lead service line replacement under this rule after the date by which the system was required to conduct monitoring under paragraph (D)(2) of rule 3745-81-86 of the Administrative Code has passed.

(4) Any public water system may cease replacing lead service lines whenever first-draw samples collected pursuant to paragraph (B)(2) of rule 3745-81-86 of the Administrative Code meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the director. If first-draw tap samples monitored in any such water system thereafter exceed the lead action level, the system shall recommence replacing lead service lines, pursuant to paragraph (C) of this rule.

(5) Any water system resuming a lead service replacement program after the cessation of its lead service line replacement program, as allowed by paragraph (A)(4) of this rule, shall update its inventory of lead service lines. The system will then divide the updated number of remaining lead service lines by the number of remaining years in the program to determine the number of lines that must be replaced per year (seven per cent lead service line replacement is based on a fifteen year replacement program: e.g., systems resuming lead service line replacement after previously conducting two years of replacement would divide the updated inventory by thirteen). For those systems that have completed a fifteen year lead service line replacement program, the director will determine a schedule for replacing or retesting lines that were previously tested out under the replacement program when the system re-exceeds the action level

(6) The water system shall replace lead service lines in accordance with the requirements of paragraph (C) of this rule.

(7) The water system shall report to the director the information specified in paragraph (E) of rule 3745-81-90 of the Administrative Code.

(B) Beginning October 1, 2018, systems conducting a water main replacement in an area with known lead service lines or in an area that is likely to contain lead service lines shall do so in accordance with this paragraph.

(1) The water system shall provide notice of the work to be performed by the system to consumers in the impacted area at least forty-five days prior to commencing the replacement. The director may allow the owner or operator of a water system to provide notice under the previous sentence less than forty-five days prior to commencing the replacement where such replacement is in conjunction with emergency repairs. The notice shall shall include language, acceptable to the director, that explains that work being performed may cause a temporary increase in lead levels in drinking water, provides instructions on filter use required to be offered in paragraph (D) of this rule, and guidance on measures the consumer can take to reduce lead levels at their tap.

(2) The water system shall comply with the requirements in paragraph (D) of this rule.

(C) Beginning October 1, 2018, except in conjunction with action level exceedence, any system performing a lead service line replacement shall do so in accordance with this paragraph. A public 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 shall maintain a record of a full or partial lead service line replacement with an acknowledgment from the owner of the line of the work performed by the water system, for a minimum of twelve years. A water system that does not replace the entire length of the service line shall complete the following tasks and the requirements in paragraph (D) of this rule:

(1) At least forty-five days prior to commencing with the partial replacement of a lead service line, the owner or operator of a water system shall provide notice to the residents of all buildings served by the line. The notice shall shall include language, acceptable to the director, that explains that work being performed may cause a temporary increase in lead levels in drinking water, provides instructions on filter use required to be offered in paragraph (D) of this rule, and guidance on measures the consumer can take to reduce lead levels at their tap. The director may allow the owner or operator of a water system to provide notice under the previous sentence less than forty-five 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 residents serviced 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 paragraph (B)(3) of rule 3745-81-86 of the Administrative Code, within seventy-two 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 residents served by the line within two business days of receiving the laboratory results. Mailed notices post-marked within two business days of receiving the laboratory results shall be considered "on time."

(2) The water system shall provide the information required by paragraph (C)(1) of this rule to the residents of individual dwellings by mail or by other methods approved by the director. In instances where multi-family dwellings are served by the line, the water system shall have the option to post information at a conspicuous location. In instances where a school, hospital or other non-residential building is served by the line, the water system shall notify the building administrator. In the case of public water systems that are schools, day cares, nursing homes or correctional institutions, the parents, legal guardians or power of attorney shall be directly notified.

(D) Prior to beginning a partial lead service line replacement in accordance with paragraph (C) of this rule or a water main replacement in accordance with paragraph (B) of this rule, a water system shall offer and provide drinking water treatment unit filters up to a period of three months to consumers in the area impacted by the replacement. The filters shall meet NSF/ANSI standard 53 for "Drinking Water Treatment Units - Health Effects."

(E) In lieu of completing lead service line replacement as required under this rule, the director may use sole discretion to allow a public water system to use an alternative method to eliminate exposure to lead from lead service lines when, at a minimum, the following conditions are met:

(1) The alternative method has been approved by U.S. EPA as an acceptable alternative for lead service line replacement pursuant to the Safe Drinking Water Act.

(2) The director grants approval to the public water system to use the alternative method.

When using the alternative method under this paragraph, a public water system shall comply with all the other substantive requirements of this rule and with the reporting requirements under paragraph (E) of rule 3745-81-90 of the Administrative Code.

[Comment: NSF/ANSI Standard 53, Drinking Water Treatment Units - Health Effects, October 1, 2015, Document Number NSF/ANSI 53-2010. This rule incorporates this standard by reference. Copies may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48105," (734) 769-8010, http://www.nsf.org. This standard is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH 43215.]"

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3745-81-85 Control of lead and copper - response to lead monitoring results.

All public water systems collecting tap water samples in accordance with rule 3745-81-86 of the Administrative Code shall comply with all applicable requirements in this rule.

(A) Consumer notice of results.

A water system shall complete all applicable notice requirements in this rule for the results of tap water monitoring collected in accordance with rule 3745-81-86 of the Administrative Code, as follows:

(1) Provide notice of the lead results, from each individual tap water sample to the owner and persons served at the residence or other structure where the tap was sampled as soon as practical but no later than two business days after receipt of the laboratory results.

(2) The consumer notice shall include the results of lead tap water monitoring for the tap that was tested, an explanation of health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water and contact information for the system. The notice shall also provide the maximum contaminant level goal, the action level for lead, the lead threshold level, and definitions from rule 3745-81-01 of the Administrative Code.

(3) Consumer notice of tap water monitoring results shall be provided to persons served at the tap that was tested, by the following methods accepted by the director:

(a) For results below the lead threshold level, notice may include hand-delivery, mail, electronic mail, and phone calls.

(b) For results above the lead threshold level, notice may include hand-delivery, electronic mail, and documented phone calls followed by written notice that is mailed.

The system shall provide the notice to customers at sample taps tested, including consumers who do not receive water bills. In the case of schools, day cares, nursing homes or correctional institutions, legal guardians or power of attorney shall be notified by a method accepted by the director.

(4) If the results of lead tap water monitoring show that a sample from an individual tap is above the lead threshold level, the following, as applicable shall be completed:

(a) Provide information on the availability of health screening and blood lead level testing to the owner and persons served at the residence or other structure where the tap was sampled no later than two business days after receipt of the laboratory results.

(b) Provide notice of the laboratory results to the applicable board of health no later than two business days after receipt of the laboratory results.

(c) The owner and operator of a nontransient noncommunity water system shall immediately remove from service all fixtures identified as contributing to elevated lead levels.

(B) Supplemental monitoring and consumer notice of results.

A water system that exceeds the lead action level on the basis of tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code shall provide information on the availability of tap water monitoring to 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. Water systems shall complete applicable consumer notice requirements in paragraph (A) of this rule for all samples collected or analyzed

by the water system.

(C) Lead public notification.

(1) If the results of lead tap water monitoring show an exceedance of the lead action level, the water system shall provide lead public notification of lead action level exceedance to all of the system's water consumers no later than two business days after receipt of the laboratory results.

A water system that exceeds the action level prior to the end of the monitoring period may collect additional samples that meet the criteria established in rule 3745-81-86 of the Administrative Code.

(a) If the ninetieth percentile lead level falls below the lead action level prior to the deadlines established in paragraphs (C)(2) and (C)(3) of this rule, the water system does not have to complete the requirements of paragraphs (C)(2) and (C)(3) of this rule.

(b) If the water system subsequently exceeds the lead action level the requirements in paragraphs (C)(2) and (C)(3) of this rule will be required.

(c) A second lead public notification shall be issued at the end of the monitoring period with updated results.

(2) Community water systems shall provide information on the availability of tap water testing for lead to all consumers served by the system no later than five business days after receipt of the laboratory results.

(3) Comply with public education requirements as established in paragraph (F) of this rule no later than thirty business days after receipt of the laboratory results.

(D) Content of public notification.

Lead public notification shall include the ninetieth percentile lead level, number of samples used to compute the ninetieth percentile lead level, an explanation of the health effects of lead, a list of the steps consumers can take to reduce exposure to lead in drinking water, and contact information for the water system.

(E) Delivery of public notification.

(1) Lead public notification shall be provided by a method accepted by the director, including broadcast media (e.g., radio and television), social media, delivering the notification by hand, delivering the notification by electronic mail or posting the notice in conspicuous locations throughout the area served by the water system.

(2) A community water system shall repeat the lead public notification twice every twelve months on a schedule agreed upon with the director.

(F) Content of public education.

A water system that exceeds the lead action level based on tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code, shall deliver public education material in accordance with paragraph (G) of this rule using the following content:

(1) The content of written public education materials shall be in print (e.g., brochures and pamphlets) and include the exact language in paragraphs (F)(1)(a), (F)(1)(b) and (F)(1)(f) of this rule, except for the text in brackets in these paragraphs for which the water system shall include system-specific information. Any additional information presented by a system shall be consistent with the information below and be

in plain language that can be understood by the general public. All written public education material content shall be acceptable to the director prior to delivery.

(a) "IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER.

[INSERT NAME OF WATER SYSTEM] found elevated levels of lead in drinking water in some homes / buildings. Lead can cause serious health problems, especially for pregnant women and young children. Please read this information closely to see what you can do to reduce lead in your drinking water."

(b) "HEALTH EFFECTS OF LEAD.

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development."

(c) Sources of lead:

(i) Explain what lead is.

(ii) Explain possible sources of lead in drinking water and how lead enters drinking water. Include information on home or building plumbing material and service lines that may contain lead.

(iii) Discuss other important sources of lead exposure in addition to drinking water (e.g., paint).

(d) Discuss the steps the consumer can take to reduce their exposure to lead in drinking water.

(i) Encourage running the water to flush out the lead.

(ii) Explain concerns using hot water from the tap and specifically caution again the use of hot water for preparing baby formula.

(iii) Explain that boiling water does not reduce lead levels.

(iv) Discuss other options consumers can take to reduce exposure to lead in drinking water, such as alternative sources or treatment of water.

(v) Note that the centers for disease control and prevention (CDC) recommends children and pregnant women use bottled water or water from a filtration system has been certified by an independent testing organization to reduce or eliminate lead for cooking, drinking and baby formula preparation in homes.

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

(vii) Provide information about the availability of health screenings and blood lead level testing in the areas served by the system.

(viii) Explain that parents can have their drinking water tested for lead. Provide a list of Ohio EPA

approved laboratories that test for lead, including their names and phone numbers.

(e) Explain why there are elevated levels of lead in the system's drinking water (if known) and what the water system is doing to reduce the lead levels in homes or buildings in this area.

(f) Provide an analysis of laboratory results.

(g) "For more information call us at [INSERT YOUR PHONE NUMBER] [(if applicable) or visit our web site at [INSERT YOUR WEB SITE HERE]]. For more information on reducing lead exposure around your home / building and the health effects of lead, visit EPA's web site at http://www.epa.gov/lead or contact your local health care provider."

(2) Community water system. In addition to including the elements specified in paragraph (F)(1) of this rule, community water systems shall discuss lead in plumbing components and the difference between low lead and lead free.

(G) Delivery of public education materials.

(1) In the case of public water systems that are schools, day cares, nursing homes or correctional institutions, legal guardians or power of attorney shall be directly notified.

(2) For public water systems serving a large population of non-English speaking consumers, as determined by the director, the public education material must contain information in the appropriate language regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the public education materials or to request assistance in the appropriate language.

(3) Community water systems.

A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code, and that is not already conducting public education tasks under this rule, shall conduct the following public education tasks within thirty business days after receipt of the laboratory results:

(a) Deliver printed materials meeting the content requirements of paragraph (F) of this rule to all bill paying customers.

(b) Contact customers who are most at risk by doing the following:

(i) Delivering education materials that meet the content requirements of paragraph (F) of this rule to local public health agencies even if they are not located within the service area of the public water system, along with an informational notice that encourages distribution to all potentially affected customers of the organization or users of the community water system. The water system shall contact the local public health agencies directly by phone or in person. The local public health agencies may provide a specific list of additional community based organizations serving target populations, which may include organizations outside the service area of the water system. If such lists are provided, systems shall deliver education materials that meet the content requirements of paragraph (F) of this rule to all organizations on the provided lists.

(ii) Delivering materials that meet the content of paragraph (F) of this rule to the organizations listed below that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or

community water system's users:

(a) Public and private schools or school boards.

(b) Women, infant and children (WIC) and head start programs.

(c) Public and private hospitals and medical clinics.

(d) Pediatricians.

(e) Family planning clinics.

(f) Local welfare agencies and jobs and family services.

(iii) Make a good faith effort to locate the following organizations within the service area and deliver materials that meet the content requirements of paragraph (F) of this rule to them, along with an informational notice that encourages distribution to all potentially affected customers or users. The good faith effort to contact at-risk customers may include requesting a specific contact list of the following organizations from the local public health agencies, even if the agencies are not located within the water system's service area:

(a) Licensed childcare centers.

(b) Public and private preschools.

(c) Obstetricians, gynecologists and midwives.

(c) No less often than quarterly, provide information on or in each water bill as long as the system exceeds the action level of lead. The message on the water bill shall include the following statement exactly as written except for the text in brackets for which the water system shall include system-specific information: "[INSERT NAME OF WATER SYSTEM] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information please call [INSERT YOUR NUMBER] (or visit [INSERT YOUR WEB SITE HERE])." The message or delivery mechanism can be modified in consultation with the director; specifically, the director may allow a separate mailing of public education materials to customers if the water system cannot place the information on water bills.

(d) Post material meeting the content requirements of paragraph (F) of this rule on the water system's web site if the system serves a population greater than one hundred thousand.

(e) In addition to paragraphs (G)(3)(a) to (G)(3)(d) of this rule, systems shall implement at least three of the following activities:

(i) Public service announcements.

(ii) Paid advertisements.

(iii) Public area information displays.

(iv) E-mails to customers.

(v) Public meetings.

(vi) Household deliveries.

(vii) Targeted individual customer contact.

(viii) Direct material distribution to all multi-family homes and institutions.

(ix) Other methods approved by the director.

The educational content and selection of these activities shall be determined in consultation with the director.

(4) Frequency of delivery for community water systems. As long as a community water system exceeds the action level, the activities shall be repeated pursuant to paragraph (G)(3) of this rule as follows:

(a) A community water system shall repeat the tasks contained in paragraphs (G)(3)(a), (G)(3)(b), and (G)(3)(e) of this rule every twelve months.

(b) A community water system shall repeat tasks contained in paragraph (G)(3)(c) of this rule with each billing cycle.

(c) A community water system serving a population greater than one hundred thousand shall post and retain material on a publically accessible web site pursuant to paragraph (G)(3)(d) of this rule.

(5) Nontransient noncommunity water systems.

Frequency of delivery for nontransient noncommunity water systems. Within thirty days after receipt of the laboratory results [unless it already is repeating public education tasks pursuant to paragraph (G)(6) of this rule], a nontransient noncommunity water system shall deliver the public education materials specified by paragraph (F) of this rule as follows:

(a) Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system.

(b) Distribute information via pamphlets, brochures or electronic transmission on lead in drinking water to each person served by the nontransient noncommunity water system.

(6) A nontransient noncommunity water system shall repeat the tasks contained in paragraph (G)(5) of this rule at least once during each calendar year in which the system exceeds the lead action level.

(7) A water system may discontinue delivery of public education materials if the system has not exceeded the lead action level during the most recent six-month monitoring period conducted pursuant to rule 3745-81-86 of the Administrative Code. Such a system shall recommence public education in accordance with this rule if the system subsequently exceeds the lead action level during any monitoring period.

(8) A community water system may only perform the tasks listed in paragraphs (G)(5) and (G)(6) of this rule in lieu of the tasks in paragraphs (G)(3) and (G)(4) of this rule if the following criteria are met:

(a) The system is a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing.

(b) The system provides water as part of the cost of services provided and does not separately charge for water consumption.

(9) A community water system serving thirty-three hundred or fewer people may limit certain aspects of the

public education programs as follows:

(a) The water system shall implement at least one of the activities listed in paragraph (G)(3)(e) of this rule.

(b) The water system may limit the distribution of the public education materials required in paragraph (G)(3)(b) of this rule to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children, unless the system is notified by the director in writing that the system shall make a broader distribution.

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3745-81-86 Control of lead and copper - monitoring requirements for lead and copper in tap water.

(A) Sample site location and mapping requirements.

(1) Each public water system shall complete a materials evaluation of the distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this rule and is sufficiently large to ensure that the public water system can collect the number of lead and copper tap samples required in paragraph (C) of this rule. All sites from which first-draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include taps that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

(2) A public water system shall use any information on lead, copper, and galvanized steel that the system has collected in corrosivity monitoring when conducting a materials evaluation. When such information is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in paragraph (A) of this rule, the public water system shall review the following sources of information in order to identify a sufficient number of sampling sites:

(a) All plumbing codes, permits, and records in the files of the building department which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system.

(b) Inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system.

(c) All existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.

In addition, the system shall seek to collect such information where possible in the course of normal operations (e.g., checking service line materials while reading water meters or performing maintenance activities).

(3) The sampling sites selected for a community public water system's sampling pool ("tier one sampling sites") shall consist of single family structures that meet one of the following:

(a) Contain copper pipes with lead solder installed after 1982 and before 1989 or contain lead pipes; or.

(b) Are served by a lead service line. When multiple-family residences comprise at least twenty per cent of the structures served by a public water system, the system may include these types of structures in the sampling pool.

(4) Any community public water system with insufficient tier one sampling sites shall complete the sampling pool with "tier two sampling sites", consisting of buildings, including multiple-family residences, that meet one of the following:

(a) Contain copper pipes with lead solder installed after 1982 and before 1989 or contain lead pipes; or.

(b) Are served by a lead service line.

(5) Any community public water system with insufficient tier one and tier two sampling sites shall complete the sampling pool with "tier three sampling sites", consisting of single family structures that contain copper pipes with lead solder installed before 1983. A community public water system with insufficient

tier 1, tier 2, and tier 3 sampling sites shall complete the 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 public water system.

(6) The sampling sites selected for a nontransient noncommunity public water system ("tier one sampling sites") shall consist of buildings that meet one of the following:

(a) Contain copper pipes with lead solder installed after 1982 and before 1989 or contain lead pipes.

(b) Are served by a lead service line.

(7) A nontransient noncommunity public water system with insufficient tier one sites that meet the targeting criteria in paragraph (A)(6) of this rule shall complete the 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 nontransient noncommunity 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 public water system.

(8) Any public water system whose distribution system contains lead service lines shall draw fifty per cent of the samples collected during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and fifty per cent of those samples from sites served by a lead service line. A public water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first-draw samples from all of the sites identified as being served by such lines.

(9) Mapping requirements.

The owner or operator of a community or nontransient noncommunity water system shall do all of the following, as applicable:

(a) Community water systems.

The owner or operator shall identify and map areas of the system that are known or likely to contain lead service lines, and identify characteristics of buildings served by the system that may have solder, fixtures or pipes that contain lead. Characteristics of buildings may be described in a narrative referenced in paragraph (A)(9)(d) of this rule.

(b) Single building community water systems and nontransient noncommunity water systems.

The owner or operator shall identify and map areas of the system with solder, fixtures or pipes containing lead in buildings served by the system. Characteristics of the system may be described in a narrative referenced in paragraph (A)(9)(d) of this rule.

(c) Submit a copy of the applicable map to the Ohio department of health and the Ohio department of job and family services.

(d) The applicable map, and a list of sampling site locations identified in paragraphs (A)(1) to (A)(8) of this rule including the contact information for the owner and occupant for each sampling site shall be submitted to the director. Water systems may submit a narrative providing additional detail (e.g., description of the building and the plumbing materials) with the map and list of sampling site locations. The documentation submitted shall be acceptable and complete.

(e) The owner or operator of an existing community or nontransient noncommunity water system shall complete the initial submission of the information specified in paragraphs (A)(9)(a) or (A)(9)(b) of this rule in accordance with section 6109.121 of the Revised Code. The owner or operator of a new community or nontransient noncommunity water system shall complete the initial submission of the information specified in paragraph (A)(9)(a) or (A)(9)(b) of this rule when applying for plan approval in accordance with Chapter 3745-91 of the Administrative Code.

(f) The water system owner or operator shall update and resubmit information required in paragraphs (A)(9)(a) to (A)(9)(d) of this rule once every five years, beginning five years after March 9, 2017.

(B) Sample collection methods.

(1) All tap samples for lead and copper collected in accordance with rules 3745-81-80 to 3745-81-89 of the Administrative Code, with the exception of lead service line samples collected under paragraph (C)(1) of rule 3745-81-84 of the Administrative Code and samples collected under paragraph (B)(3) of this rule, shall be first-draw samples.

(2) Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of its sampling site for at least six hours. First-draw samples from residential housing shall be collected from the cold-water kitchen tap or bathroom sink tap. First-draw samples from a non-residential building shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to paragraph (B)(5) of this rule 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 public water 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 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 public water system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

(3) Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Each lead service line sample shall be collected in one of the following three ways:

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

(b) Tapping directly into the lead service line.

(c) If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

(4) A public water system shall collect each first-draw tap sample from the same sampling site from which a previous sample was collected. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria and is within reasonable proximity of the original site.

(5) A nontransient noncommunity water system, or a community water system that meets the criteria of paragraph (G)(8) of rule 3745-81-85 of the Administrative Code, that does not have enough taps that can supply first-draw samples, as defined in rule 3745-81-01 of the Administrative Code may apply to the director in writing to substitute non-first-draw samples. Such public water systems shall collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites.

(C) Number of samples. Public water systems shall collect at least one sample during each monitoring period specified in paragraph (D) of this rule from the number of sites listed in the second column ("standard monitoring") of the table in this paragraph. A system conducting reduced monitoring under paragraph (D)(4) of this rule shall collect at least one sample from the number of sites specified in the third column ("reduced monitoring") of the table in this paragraph during each monitoring period specified in paragraph (D)(4) of this rule. Such reduced monitoring sites shall be representative of the sites required for standard monitoring. A public water system that has fewer than five drinking water taps that can be used for human consumption meeting the sample site criteria of paragraph (A) of this rule to reach the required number of sample sites listed in paragraph (C) of this rule, shall collect at least one sample from each tap and then shall collect additional samples from those taps on different days during the monitoring period to meet the required number of sites. Alternately, the director may allow these public water systems to collect a number of samples less than the number of sites specified in paragraph (C) of this rule, provided that one hundred per cent of all taps that can be used for human consumption are sampled. The director shall approve this reduction of the minimum number of samples in writing based on a request from the system or onsite verification by the director. The director may specify sampling locations when a public water system is conducting reduced monitoring. The table is as follows:

System size (number of people served)	Number of sites (standard monitoring)	Number 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
<101	5	5

(D) Timing of monitoring.

(1) Initial tap sampling. The first six-month monitoring period for new community or nontransient noncommunity water systems shall begin on either January first or July first, whichever comes first after activation as a water system.

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

(b) All small and medium systems shall monitor during each six-month monitoring period until one of the following occurs:

(i) The public water system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under rule 3745-81-81 of the Administrative Code, in which case the system shall continue monitoring in accordance with paragraph (D)(2) of this rule.

(ii) The public water system monitoring results do not exceed the lead or copper action level during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with paragraph (D)(4) of this rule.

(2) Monitoring after installation of corrosion control and source water treatment.

(a) Any large system which installs optimal corrosion control treatment pursuant to paragraph (D)(4) of rule 3745-81-81 of the Administrative Code shall monitor during two consecutive six-month monitoring periods in accordance with paragraph (D)(5) of rule 3745-81-81 of the Administrative Code.

(b) Any small or medium system which installs optimal corrosion control treatment pursuant to paragraph (E)(5) of rule 3745-81-81 of the Administrative Code shall monitor during two consecutive six-month monitoring periods in accordance with paragraph (E)(6) of rule 3745-81-81 of the Administrative Code.

(c) Any public water system which installs source water treatment pursuant to paragraph (A)(3) of rule 3745-81-83 of the Administrative Code shall monitor during two consecutive six-month monitoring periods by the date specified in paragraph (A)(4) of rule 3745-81-83 of the Administrative Code.

(3) Monitoring after the director specifies water quality parameter values for optimal corrosion control. After the director specifies the values for water quality control parameters under paragraph (F) of rule 3745-81-82 of the Administrative Code, the public water system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the director specifies the optimal values under paragraph (F) of rule 3745-81-82 of the Administrative Code.

(4) Reduced monitoring.

(a) A small or medium water system that does not exceed either the lead or copper action level during two consecutive six-month monitoring periods may reduce the number of samples according to paragraph (C) of this rule, and reduce the frequency of sampling to one monitoring period per year. A small or medium public water system collecting fewer than five samples as specified in paragraph (C) of this rule, that does not exceed either the lead or copper action level during two consecutive six-month monitoring periods may reduce the frequency of sampling to one monitoring period per year. In no case can this public water system reduce the number of samples required below the minimum of one sample per available tap. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.

(b) Reduced annual monitoring. Any public water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment approved by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code 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 (C) of this rule if it receives written approval from the director. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. The director shall review monitoring, treatment, and other relevant information submitted by the public water system in accordance with rule 3745-81-90 of the Administrative Code, and shall notify the system in writing, when the director determines the system is eligible to commence reduced monitoring pursuant to this paragraph. The director shall review, and where appropriate, revise such a determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling become available.

(c) Reduced triennial monitoring. As of the effective date of this rule, no water systems are eligible to monitor for lead and copper once every three years without applying for and obtaining written approval from the director. Any public water system that exceeds the lead action level or fails to maintain the range of values for the water quality control parameters reflecting optimal corrosion control treatment approved by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code during five consecutive monitoring periods will not be eligible to reduce the frequency of monitoring from annually to once every three years. To apply for approval, an eligible water system shall provide the director with documentation that at least one of the criteria listed in paragraphs (D)(4)(c)(i) to (D)(4)(c)(iii) of this rule were met. Samples collected once every three years shall be collected no later than every third calendar year. In addition to reviewing information submitted pursuant to paragraphs (D)(4)(c)(i) to (D)(4)(c)(iii) of this rule, the director shall review monitoring, treatment and other relevant information submitted by the public water system in accordance with rule 3745-81-90 of the Administrative Code, as part of the monitoring frequency determination. Any water systems that did not receive written approval from the director and were conducting triennial monitoring prior the effective date of this rule, shall conduct annual lead and copper monitoring. When the water system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available, the director shall review, and where appropriate, revise the determination.

(i) The water system shall demonstrate that the tap water lead level computed under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code is less than or equal to 0.005 milligrams per liter and the tap water copper level computed under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code is less than or equal to 0.65 milligrams per liter for five consecutive monitoring periods.

(ii) The water system shall demonstrate that the system has maintained the range of values for water quality control parameters reflecting optimal corrosion control treatment approved by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code, if applicable, during five consecutive monitoring periods.

(iii) The water system shall demonstrate that the system does not own service lines, fixtures, pipe or solder that contain lead.

(d) A public water system that reduces the number of sampling sites and the frequency of monitoring shall collect these samples from representative sites included in the pool of targeted sampling sites identified in paragraph (A) of this rule. Public water systems monitoring annually or less frequently shall conduct the lead and copper tap water monitoring during the months of June through September unless the director has approved a different sampling period in accordance with paragraph (D)(4)(d)(i) of this rule.

(i) The director may approve a different period for conducting the lead and copper tap sampling for public water systems collecting a reduced number of samples. Such a period shall be no longer than four consecutive months and shall represent a time of normal operation where the highest levels of lead are most likely to occur. For a nontransient noncommunity water system that does not operate during the months of June through September, and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the director shall designate a period that represents a time of normal operation for the system. This sampling shall begin during the period approved by the director in the calendar year immediately following the end of the second consecutive six-month monitoring period for systems initiating annual monitoring and during the three-year period following the end of the third consecutive

year of annual monitoring for systems initiating triennial monitoring.

(ii) Public water systems monitoring annually, that have been collecting samples during the months of June through September and that receive the director's approval to alter their sample collection period under paragraph (D)(4)(d)(i) of this rule, shall collect their next round of samples during a time period that ends no later than twenty-one months after the previous round of sampling. Public water systems monitoring triennially that have been collecting samples during the months of June through September, and receive the director's approval to alter the sampling collection period in accordance with paragraph (D)(4)(d)(i) of this rule, shall collect their next round of samples during a time period that ends no later than forty-five months after the previous round of sampling. Subsequent rounds of sampling shall be collected annually or triennially, as required by this rule.

(5) Action level exceedance while on reduced monitoring.

(a) A small or medium water system subject to reduced monitoring that exceeds the lead or copper action level shall resume tap water monitoring in accordance with paragraph (D)(3) of this rule and collect the number of samples specified for standard monitoring under paragraph (C) of this rule. Such a public water system shall also conduct water quality parameter monitoring in accordance with paragraph (B), (C), or (D), as appropriate, of rule 3745-81-87 of the Administrative Code during the monitoring period in which the system exceeded the action level. Any such public water system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (C) of this rule after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of paragraph (D)(4)(a) of this rule or may resume triennial monitoring for lead and copper after it demonstrates that it meets the criteria of paragraph (D)(4)(c) of this rule.

(b) Any public water system subject to the reduced monitoring frequency that exceeds the lead or copper action level during any four-month monitoring period or fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code for more than nine days in any six-month period specified in paragraph (D) of rule 3745-81-87 of the Administrative Code shall conduct tap water sampling for lead and copper at the frequency specified in paragraph (D)(3) of this rule, collect the number of samples specified for standard monitoring for lead and copper under paragraph (C) of this rule, and shall resume monitoring for water quality parameters within the distribution system in accordance with paragraph (D) of rule 3745-81-87 of the Administrative Code. This standard tap water monitoring shall begin no later than the six-month period beginning January first or July first, whichever comes first, following the lead or copper action level exceedance or water quality parameter excursion. Such a public water system may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:

(i) The public water system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (C) of this rule after it has completed two subsequent six-month rounds of monitoring that meet the criteria of paragraph (D)(4)(b) of this rule and the system has received written acceptance from the director that it is appropriate to resume reduced monitoring on an annual frequency. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.

(ii) The system may resume triennial monitoring for lead and copper after it demonstrates that it meets the criteria of paragraph (D)(4)(c) of this rule and the public water system has received written acceptance from the director.

(iii) The public water system may reduce the number of water quality parameter tap water samples required in accordance with paragraph (E)(1) of rule 3745-81-87 of the Administrative Code and the frequency with which the system collects such samples in accordance with paragraph (E)(2) of rule 3745-81-87 of the Administrative Code. Such a system may not resume triennial monitoring for water quality parameters at the tap until the system demonstrates, in accordance with the requirements of paragraph (E)(3) of rule 3745-81-87 of the Administrative Code, that the system has re-qualified for triennial monitoring.

(6) Reduced monitoring and changes in water quality, treatment or water source. Any public water system subject to a reduced monitoring frequency under paragraph (D)(4) of this rule shall notify the director, and any consecutive or wholesale system, in writing in accordance with paragraph (A)(3) of rule 3745-81-90 of the Administrative Code of any of the following including, but not limited to changes in water quality that has the potential to affect or is affecting optimal corrosion control, upcoming substantial change in treatment, or an addition of a new source. The director shall review and approve the addition of a new source or substantial change in water treatment before it is implemented by the water system. The director may require the public water system to resume sampling in accordance with paragraph (D)(3) of this rule and collect the number of samples specified for standard monitoring under paragraph (C) of this rule or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation of its corrosion control treatment given the potentially different water quality considerations.

(E) Additional monitoring by public water systems.

The results of any monitoring conducted in addition to the minimum requirements of this rule shall be considered by the public water system and the director in making any determinations, i.e., calculating the ninetieth percentile lead or copper level, under rule 3745-81-80 of the Administrative Code. Samples meeting any of the criteria in paragraphs (E)(1) to (E)(5) of this rule will be identified as special purpose and not be considered for compliance with rules 3745-81-80 to 3745-81-90 of the Administrative Code. Water systems shall comply with the requirements for consumer notice of special purpose sample results per paragraph (A) of rule 3745-81-85 of the Administrative Code.

(1) Samples taken outside the required monitoring period.

(2) Samples taken from a tier site lower than the required tier.

(3) Repeat samples taken from the same site during the same monitoring period (i.e. investigatory samples) unless the water system has fewer than five taps as described in paragraph (C) of this rule.

(4) Samples not collected in accordance with the approved sampling methodology of this rule.

(5) Samples taken after lead service line replacement in accordance with rule 3745-81-84 of the Administrative Code.

(F) Invalidation of lead or copper tap water samples.

A sample invalidated under this paragraph does not count toward determining lead or copper ninetieth percentile levels under paragraph (C)(3) of rule 3745-81-80 of the Administrative Code or toward meeting

the minimum monitoring requirements of paragraph (C) of this rule.

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

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

(b) The director determines that the sample was taken from a site that did not meet the site selection criteria of this rule.

(c) The sample container was damaged in transit.

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

(2) The public water system shall report the results of all samples to the director and all supporting documentation for samples the system believes should be invalidated.

(3) To invalidate a sample under paragraph (F)(1) of this rule, the decision and the rationale for the decision shall be documented in writing. The director may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.

(4) The public water system shall collect replacement samples for any samples invalidated under paragraph (F)(1) of this rule if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of paragraph (C) of this rule. Any such replacement samples shall be taken as soon as possible, but no later than twenty days after the date the director invalidates the sample or by the end of the applicable sampling period, whichever occurs later. Replacement samples taken after the end of the applicable sampling period shall not also be used to meet the sampling requirements of a subsequent sampling 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 sampling period.

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3745-81-87 Control of lead and copper; monitoring requirements for water quality parameters.

All large public water systems shall monitor water quality parameters in addition to lead and copper in accordance with this rule. All small and medium public water systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this rule. For performing the analyses of water quality parameters set forth in this rule, laboratories are exempt from the requirements of rule 3745-89-02 of the Administrative Code. The requirements of this rule are summarized in the table at the end of this rule.

(A) General requirements.

(1) Sample collection methods.

(a) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the public water system, and seasonal variability. Tap sampling under this rule is not required to be conducted at taps targeted for lead and copper sampling under paragraph (A) of rule 3745-81-86 of the Administrative Code.

(b) Samples collected at the entry points to the distribution system shall be from locations representative of each water source after treatment. If a public water system draws water from more than one water source and the sources are combined before distribution, the system shall monitor at each sampling point during periods of normal operating conditions, that is, when water is representative of all sources being used.

(2) Number of samples.

(a) Public water systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under paragraphs (B) to (E) of this rule from the following number of sites.

System size (number of people served)	Number of sites for water quality parameters
> 100,000	25
10,001 - 100,000	10
3,301 - 10,000	3
501 - 3,300	2
101 - 500	1
< 101	1

(b) Except as provided in paragraph (C)(3) of this rule, public water systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in paragraph (B) of this rule. During each monitoring period specified in paragraphs (C) to (E) of this rule, systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system.

(B) Initial sampling. All large public water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month period specified in paragraph (D)(1) of rule 3745-81-86 of the Administrative Code. All small and medium public water systems shall measure the applicable water quality parameters at the locations specified below during

each six month monitoring period specified in paragraph (D)(1) of rule 3745-81-86 of the Administrative Code during which the system exceeds the lead or copper action level.

(1) At taps, measure the following:

(a) pH.

(b) Alkalinity.

(c) Orthophosphate, when an inhibitor containing a phosphate compound is used.

(d) Silica, when an inhibitor containing a silicate compound is used.

(e) Calcium.

(f) Conductivity.

(g) Water temperature.

(2) At each entry point to the distribution system: all of the applicable parameters listed in paragraph (B)(1) of this rule.

(C) Monitoring after installation of corrosion control. Any large public water system which installs optimal corrosion control treatment pursuant to paragraph (D)(4) of rule 3745-81-81 of the Administrative Code shall measure the water quality parameters at the locations and frequencies specified in paragraphs (C)(1) and (C)(2) of this rule during each six-month monitoring period specified in paragraph (D)(2)(a) of rule 3745-81-86 of the Administrative Code. Any small or medium public water system which installs optimal corrosion control treatment shall conduct water quality parameter monitoring specified in paragraphs (C)(1) and (C)(2) of this rule during each six-month monitoring period specified in paragraph (D)(2)(b) of rule 3745-81-86 of the Administrative Code.

(1) At taps, two samples for the following:

(a) pH.

(b) Alkalinity.

(c) Orthophosphate, when an inhibitor containing a phosphate compound is used.

(d) Silica, when an inhibitor containing a silicate compound is used.

(e) Calcium, when calcium carbonate stabilization is used as part of corrosion control.

(2) Except as provided in paragraph (C)(3) of this rule, at each entry point to the distribution system, at least one sample no less frequently than every two weeks for the following:

(a) pH.

(b) Alkalinity concentration when alkalinity is adjusted as part of optimal corrosion control. A reading of the dosage rate of the chemical used to adjust alkalinity shall also be included.

(c) The concentration of orthophosphate or silica, whichever is applicable, when a corrosion inhibitor is used as part of optimal corrosion control. A reading of the dosage rate of the inhibitor used shall also be included.

(3) Any ground water system can limit entry point sampling described in paragraph (C)(2) of this rule 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 water sources, the public water system shall monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of monitoring under this paragraph, the public water system shall provide to the director written information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(D) Monitoring after the director specifies water quality parameter values for optimal corrosion control. After the director specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under paragraph (F) of rule 3745-81-82 of the Administrative Code, all large public water systems shall measure the applicable water quality parameters in accordance with paragraph (C) of this rule and determine compliance with the requirements of paragraph (G) of rule 3745-81-82 of the Administrative Code for every six-month period to begin on either January first or July first, whichever comes first, after the director specifies the optimal values under paragraph (F) of rule 3745-81-82 of the Administrative Code.

Any small or medium public water system shall conduct such monitoring during each six-month period specified in this paragraph. For any such small or medium public water system that is subject to a reduced monitoring frequency pursuant to paragraph (D)(4) of rule 3745-81-86 of the Administrative Code, at the time of the action level exceedance, the start of the applicable six-month period under this paragraph shall coincide with the start of the applicable monitoring period under paragraph (D)(4) of rule 3745-81-86 of the Administrative Code. Compliance with director-designated optimal water quality parameter values shall be determined as specified under paragraph (G) of rule 3745-81-82 of the Administrative Code.

Upon the determination of an action level exceedance, any public water system that is subject to a reduced monitoring frequency pursuant to paragraph (D)(4) of rule 3745-81-86 of the Administrative Code shall report applicable water quality parameters in accordance with this rule within thirty days or by the end of the water quality parameter monitoring period, whichever is sooner.

(E) Reduced monitoring.

(1) Any public water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods under paragraph (D) of this rule shall continue monitoring at the entry points to the distribution system as specified in paragraph (C)(2) of this rule. Such system may monitor with two tap samples for applicable water quality parameters from each of the following reduced number of sites during each six-month monitoring period. A water system monitoring from a reduced number of sites prior to the effective date of this rule may continue with the reduced number of monitoring sites except as modified by paragraph (E)(5) of this rule.

System size (number of people served)	Reduced number of sites for water quality parameters
> 100,000	10
10,001 - 100,000	7
3,301 - 10,000	3
501 - 3,300	2

101 - 500	1
< 101	1

(2) Reduced annual water quality parameter monitoring. In order to reduce the monitoring frequency to annual monitoring of the number of tap samples for applicable water quality parameters, the water system shall submit a request to the director for approval. This request shall demonstrate the system maintains the ranges of values for the water quality parameters reflecting optimal corrosion control treatment specified by the director under paragraph (F) of rule 3745-81-82 of the Admininstrative Code during three consecutive years of monitoring. If approved by the director, this sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of six-month monitoring occurs.

(3) Reduced triennial water quality parameter monitoring. As of the effective date of this rule, no water systems are eligible to continue to conduct or reduce to triennial monitoring of the number of tap samples for applicable water quality parameters specified in paragraph (E)(1) of this rule without meeting criteria in paragraph (E)(3)(a) or (E)(3)(b) of this rule and receiving written approval from the director. Any water systems that did not receive approval from the director and were conducting triennial monitoring prior to the effective date of this rule, shall conduct water quality parameter monitoring, at a minimum, annually.

(a) In order to conduct triennial monitoring of the number of tap samples for applicable water quality parameters, the water system shall demonstrate the system maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code during three consecutive years of annual monitoring. If approved by the director, this sampling begins no later than the third calendar year following the end of the monitoring period in which the third consecutive year of monitoring occurs.

(b) In order to conduct triennial monitoring of the number of tap samples for applicable water quality parameters specified in paragraph (E)(1) of this rule, the water system shall demonstrate during two consecutive monitoring periods that its tap water lead level at the ninetieth percentile is less than or equal to the practical quantitation limit (PQL) for lead specified in paragraph (B)(2) of rule 3745-81-89 of the Administrative Code, that its tap water copper level at the ninetieth percentile is less than or equal to 0.65 milligrams per liter in paragraph (C)(2) of rule 3745-81-80 of the Administrative Code, and that it has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code. If approved by the director, triennial monitoring shall be done no later than every third calendar year.

(4) A public water system that conducts monitoring annually shall collect samples evenly throughout the year so as to reflect seasonal variability.

(5) Any public water system subject to annual or triennial monitoring that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the director under paragraph (F) of rule 3745-81-82 of the Administrative Code for more than nine days in any six-month period specified in paragraph (G) of rule 3745-81-82 of the Administrative Code shall resume tap water sampling in accordance with the number and frequency requirements in paragraph (D) of this rule. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in paragraph (E)(1) of this rule after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of that paragraph 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 (E)(2) or (E)(3) of this rule.

(F) Additional monitoring by public water systems. The results of any monitoring conducted in addition to the minimum requirements of this rule shall be considered by the system and the director in making any determinations, i.e., determining concentrations of water quality parameters, under this rule or rule 3745-81-82 of the Administrative Code.

Summary of Monitoring Requirements for Water Quality Parameters [1]

Monitoring Period	Parameters	Location	Frequency
Initial monitoring.	pH, alkalinity, orthophosphate or silica[2], 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[2], calcium[3].	Taps.	Every 6 months.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate[4] and orthophosphate or silica[2].	Entry point(s) to distribution system[5].	No less frequently than every two weeks.
After director specifies parameter values for optimal corrosion control.	pH, alkalinity, orthophosphate or silica[2], calcium[3].	Taps.	Every 6 months.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate[4] and orthophosphate or silica[2].	Entry point(s) to distribution system[5].	No less frequently than every two weeks.
Reduced monitoring.	pH, alkalinity, orthophophate or silica[2], calcium[3].	Taps.	Every 6 months, annually[6] or every 3 years[7]; reduced

Summary of Monitoring Requirements for Water Quality Parameters [1]

			number of sites.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate[4] and orthophosphate or silica[2].	Entry point(s) to distribution system[5].	No less frequently than every two weeks.

[1] Table is for illustrative purposes; consult the text of this rule for precise regulatory requirements.

[2] Orthophosphate shall be measured only when an inhibitor containing a phosphate compound is used. Silica shall be measured only when an inhibitor containing silicate compound is used.

[3] Calcium shall be measured only when calcium carbonate stabilization is used as part of corrosion control.

[4] Inhibitor dosage rates (orthophosphate or silica) shall be measured only when an inhibitor is used.

[5] Ground water systems may limit monitoring to representative locations throughout the public water system.

[6] Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if the system meets the requirements in paragraph (E)(2) of this rule.

[7] Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every three years if the system meets the requirements in paragraph (E)(2) or (E)(3) of this rule.

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3745-81-88 **Control of lead and copper - monitoring requirements for lead and copper in source water at the entry point to the distribution system.**

(A) Sampling point locations, collection methods, and number of samples.

(1) A public water system that exceeds the lead or copper action level on the basis of tap water samples collected in accordance with rule 3745-81-86 of the Administrative Code shall monitor for lead and copper in source water at the entry point to the distribution system in accordance with the following requirements regarding sampling point locations, collection methods, and number of samples:

(a) Ground water 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). The public water system shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(b) Surface water systems shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The public water 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 water sources.

(c) If a public water system draws water from more than one source and the sources are combined before distribution, the public water system shall sample at an entry point to the distribution system during periods of normal operating conditions, i.e., when water is representative of all sources being used.

(d) The director may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples shall be done by certified laboratory personnel. Composite samples from a maximum of five samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 milligram per liter or the copper concentration is greater than or equal to 0.160 milligram per liter, then either:

(i) A follow-up sample shall be taken and analyzed within fourteen days at each sampling point included in the composite; or

(ii) If duplicates of or sufficient quantities from the original samples from each sampling point used in the composite are available, the public water system may use these instead of resampling.

(2) Where the results of monitoring indicate an exceedance of maximum permissible levels in the source water at the entry point to the distribution system established under paragraph (B)(4) of rule 3745-81-83 of the Administrative Code, the director may require that the public water system monitor with one additional sample as soon as possible after the initial monitoring (but not to exceed two weeks) at the same sampling point. If a director-required confirmation sample is taken for lead or copper, then the results of the initial and confirmation monitoring shall be averaged in determining compliance with the director-specified maximum permissible levels. Any sample value below the method detection limit (MDL) shall be considered to be zero. Any lead value above the MDL but below the practical quantitation level (PQL) of 0.005 milligram per liter shall be considered as the measured value. Any copper value above the MDL but below the PQL of 0.050 milligram per liter shall be considered as the measured value.

(B) Monitoring frequency after public water system exceeds tap water action level. Any system which exceeds the lead or copper action level at the tap shall monitor one sample from each source water at the entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September thirtieth of the calendar year in which the sampling occurs, or if the director established an alternate period, the last day of that period.

(C) Monitoring frequency after installation of source water treatment. Any public water system which installs source water treatment pursuant to paragraph (A)(3) of rule 3745-81-83 of the Administrative Code shall collect an additional sample from each source water at the entry point to the distribution system during each of two consecutive six-month monitoring periods by the deadline specified in paragraph (A)(4) of rule 3745-81-83 of the Administrative Code.

(D) Monitoring frequency after the director specifies maximum permissible lead and copper levels in source water at entry points to the distribution system or determines that source water treatment is not needed.

(1) A public water system shall monitor at the frequency specified in paragraph (D)(1)(a) or (D)(1)(b) of this rule in cases where the director specifies maximum permissible source water at the entry point to the distribution system levels under paragraph (B)(4) of rule 3745-81-83 of the Administrative Code or determines that the public water system is not required to install source water treatment under paragraph (B)(2) of rule 3745-81-83 of the Administrative Code.

(a) A public water system using only ground water shall monitor once during the three-year compliance period (as that term is defined in rule 3745-81-01 of the Administrative Code) in effect when the applicable director's determination under paragraph (D)(1) of this rule is made. Such public water systems shall monitor once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.

(b) A public water system using surface water (or a combination of surface water and ground water) shall monitor once during each year, the first annual monitoring period to begin during the year in which the applicable director's determination is made under paragraph (D)(1) of this rule.

(2) A public water system is not required to conduct source water at the entry point to the distribution system sampling for lead and/or copper if the system does not exceed the action level for the specific contaminant in tap water samples at any time during the sampling period applicable to the system under paragraph (D)(1)(a) or (D)(1)(b) of this rule.

(E) Reduced monitoring frequency.

(1) A public water system using only ground water may reduce the monitoring frequency for lead and copper in source water at the entry point to the distribution system once during each nine-year compliance cycle (as that term is defined in rule 3745-81-01 of the Administrative Code) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

(a) The public water system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the director in paragraph (B)(4) of rule 3745-81-83 of the Administrative Code during at least three consecutive compliance periods under paragraph (D)(1) of this rule; or

(b) The director 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 (D)(1) of this rule, the concentration of lead in source water at the entry point to the distribution system was less than or equal to 0.005 milligram per liter and the concentration of copper was less than or equal to 0.65 milligram per liter.

(2) A public water system using surface water (or a combination of surface water and ground water) may reduce the monitoring frequency in paragraph (D)(1) of this rule to once during each nine-year compliance cycle (as that term is defined in rule 3745-81-01 of the Administrative Code) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

(a) The public water system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the director under paragraph (B)(4) of rule 3745-81-83 for at least three consecutive years; or

(b) The director has determined that source water treatment is not needed and the public water system demonstrates that, during at least three consecutive years, the concentration of lead in source water at the entry point to the distribution system was less than or equal to 0.005 milligram per liter and the concentration of copper at the entry point was less than or equal to 0.65 milligram per liter.

(3) A public 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 director under paragraph (A)(5) of rule 3745-81-83 of the Administrative Code.

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3745-81-89 Analytical methods.

(A) Analyses for pH, conductivity, calcium, alkalinity, orthophosphate, silica and temperature shall be performed using analytical methods as specified in rule 3745-81-27 of the Administrative Code.

(B) Analyses for lead and copper shall be performed using analytical methods as specified in rule 3745-81-27 of the Administrative Code and shall only be conducted by laboratories certified by the director and meet all requirements specified in rule 3745-89-03 of the Administrative Code. Laboratories performing these analyses shall do the following:

(1) Achieve the method detection limit (MDL) for lead of 0.001 milligrams per liter according to the procedures in rule 3745-89-03 of the Administrative Code. This need only be accomplished if the laboratory will be processing source water at the entry point to the distribution system composite samples under paragraph (A)(1)(d) of rule 3745-81-88 of the Administrative Code.

(2) Use the practical quantitation level (PQL) for lead of 0.005 milligrams per liter.

(3) Use the PQL for copper of 0.050 milligrams per liter.

(4) Complete analysis of lead or copper sample not later than thirty business days after receipt of the sample.

(C) The director may allow the use of previously collected monitoring data for purposes of monitoring if the data were collected and analyzed in accordance with the requirements of this rule.

(D) All lead and copper levels measured between the PQL and MDL, as specified in paragraph (B) of this rule, must be reported as measured. Any samples below the MDL shall be reported as zero.

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3745-81-90 Control of lead and copper - reporting and record keeping requirements.

All water systems shall report all of the following information to the director in accordance with this rule.

(A) Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.

(1) Except as provided in paragraph (A)(1)(g) of this rule, a public water system shall report the information specified below for all tap water samples and all water quality parameter samples within ten days following the end of the month in which the system receives the sample results, as specified in rules 3745-81-86 and 3745-81-87 of the Administrative Code.

(a) The results from all tap samples for lead and copper including the location of each site and the criteria under paragraphs (A)(3) to (A)(7) of rule 3745-81-86 of the Administrative Code under which the site was selected for the public water system's sampling pool and the name and certification number of the laboratory which analyzed the samples.

(b) Documentation for each tap water lead or copper sample for which the public water system requests invalidation pursuant to paragraph (F)(2) of rule 3745-81-86 of the Administrative Code.

(c) The ninetieth percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with paragraph (C)(3) of rule 3745-81-80 of the Administrative Code), unless the director calculates the system's ninetieth percentile lead and copper levels under paragraph (I) of this rule.

(d) With the exception of initial tap monitoring conducted pursuant to paragraph (D)(1) of rule 3745-81-86 of the Administrative Code, the public water system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed.

(e) The results of all tap monitoring for pH and, where applicable, temperature, alkalinity, calcium, conductivity, and orthophosphate or silica collected under paragraphs (B) to (E) of rule 3745-81-87 of the Administrative Code.

(f) The results of all monitoring at the entry point(s) to the distribution system for applicable water quality parameters under paragraphs (B) to (E) of rule 3745-81-87 of the Administrative Code.

(g) A water system shall report the results of all water quality parameter samples collected under paragraphs (C) to (F) of rule 3745-81-87 of the Administrative Code during each six-month monitoring period specified in paragraph (D) of rule 3745-81-87 of the Administrative Code within ten days after the month in which the sample was analyzed, unless the director has specified a more frequent reporting requirement.

(2) For a nontransient noncommunity water system, or a community water system meeting the criteria of paragraphs (G)(8)(a) and (G)(8)(b) of rule 3745-81-85 of the Administrative Code, that does not have enough taps that can provide first-draw samples, the public water system shall do one of the following:

(a) Provide written documentation to the director identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under paragraph (B)(5) of rule 3745-81-86 of the Administrative Code by the start of the first applicable monitoring period under paragraph (D) of rule 3745-81-86 of the Administrative Code that commences after April 11, 2000, unless the director has waived prior director approval of non-first-draw sample sites selected by the system

pursuant to paragraph (B)(5) of rule 3745-81-86 of the Administrative Code.

(b) If the director has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to paragraph (B)(5) of rule 3745-81-86 of the Administrative Code and include this information with the lead and copper tap sample results required to be submitted pursuant to paragraph (A)(1)(b) of this rule.

(3) At a time specified by the director, or if no specific time is designated, then as early as possible, water systems shall notify the director of changes in water quality that could affect corrosion control treatment, in accordance with paragraph (F) of rule 3745-81-81 of the Administrative Code.

(4) Each ground water system that limits water quality parameter monitoring to a subset of entry points under paragraph (C)(3) of rule 3745-81-87 of the Administrative Code shall provide, by the commencement of such monitoring, written correspondence to the director that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(B) Reporting requirements for source water at the entry point to the distribution system.

(1) A public water system shall report the monitoring results for all samples of source water at the entry point to the distribution system collected in accordance with rule 3745-81-88 of the Administrative Code within the first ten days following the end of each entry-point water monitoring period (i.e., per six-month period, annually, per compliance period, per compliance cycle) for which a sample was collected as specified in rule 3745-81-88 of the Administrative Code.

(2) With the exception of the first round of source water at the entry point to the distribution system monitoring conducted pursuant to paragraph (B) of rule 3745-81-88 of the Administrative Code, the public water system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

(C) Corrosion control treatment reporting requirements. By the applicable dates under rule 3745-81-81 of the Administrative Code, public water systems shall report the following information:

(1) For systems demonstrating that they have already optimized corrosion control, information required in paragraph (B)(2) or (B)(3) of rule 3745-81-81 of the Administrative Code.

(2) For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under paragraph (A) of rule 3745-81-82 of the Administrative Code.

(3) For systems required to evaluate the effectiveness of corrosion control treatments under paragraph (C) of rule 3745-81-82 of the Administrative Code, the information required by that paragraph.

(4) For systems required to install optimal corrosion control approved by the director under paragraph (D) of rule 3745-81-82 of the Administrative Code, a letter certifying that the system has completed installing that treatment.

(D) Source water treatment reporting requirements. By the applicable dates in rule 3745-81-83 of the Administrative Code, systems shall provide the following information to the director:

(1) If required under paragraph (B)(1) of rule 3745-81-83 of the Administrative Code, their recommendation regarding source water treatment.

(2) For systems required to install source water treatment under paragraph (B)(2) of rule 3745-81-83 of the Administrative Code, a letter certifying that the system has completed installing the treatment approved by the director within twenty-four months after the director approved the treatment.

(E) Lead service line replacement reporting requirements. Public water systems shall report the following information to the director to demonstrate compliance with the requirements of rule 3745-81-84 of the Administrative Code.

(1) No later than twelve months after the end of a monitoring period in which a public water system exceeds the lead action level in monitoring referred to in paragraph (A) of rule 3745-81-84 of the Administrative Code, the system shall submit in written documentation to the director the material evaluation, conducted as required in paragraph (A) of rule 3745-81-86 of the Administrative Code, identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level, and provide the system's schedule for annually replacing at least seven per cent of the initial number of lead service lines in the distribution system.

(2) No later than twelve months after the end of a monitoring period in which a system exceeds the lead action level in monitoring referred to in paragraph (A) of rule 3745-81-84 of the Administrative Code, and every twelve months thereafter, the system shall demonstrate to the director in writing that the system has replaced in the previous twelve months at least seven per cent of the initial lead service lines (or a greater number of lines specified by the director in accordance with rule 3745-81-84 of the Administrative Code) in the distribution system.

(3) The annual letter submitted to the director under paragraph (E)(2) of this rule shall contain the following information:

(a) The number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule.

(b) The number and location of each lead service line replaced during the previous year of the system's replacement schedule.

(c) If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

(4) Any system which collects lead service line samples following partial lead service line replacement required by rule 3745-81-84 of the Administrative Code shall report the results to the director within two business days of receiving the laboratory results, or as specified by the director. The director has the discretion to eliminate this requirement to report these monitoring results. Systems shall also report any additional information as specified by the director, in a time and manner prescribed by the director, to verify that all lead service line replacement activities have taken place.

(F) Reporting requirements for consumer notice and public notification.

The water system shall certify to the director no later than five business days after receipt of the laboratory results that the system has complied with the requirements of paragraphs (A)(1), (A)(3)(a), (A)(3)(b), (C)(1), (C)(2) and (E) of rule 3745-81-85 of the Administrative Code, as applicable. Certification shall be submitted on a form and in a manner approved by the director.

(G) Public education program reporting requirements.

(1) Any public water system that is subject to the public education requirements in rule 3745-81-85 of the

Administrative Code shall, within five business days of delivering the public education in accordance with paragraph (G) of rule 3745-81-85 of the Administrative Code, send written documentation to the director that contains the following:

(a) A demonstration that the system has delivered the public education materials that meet the content requirements in paragraph (F) of rule 3745-81-85 of the Administrative Code and the delivery requirements in paragraph (G) of rule 3745-81-85 of the Administrative Code.

(b) A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the system delivered public education materials during the period in which the system was required to perform public education tasks.

(2) Unless required by the director, a public water system that previously has submitted the information required by paragraph (G)(1)(b) of this rule need not resubmit the information required by paragraph (G)(1)(b) of this rule, 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.

(H) Reporting of additional monitoring data.

Any public water system which collects monitoring data in addition to that required by rules 3745-81-80 to 3745-81-88 of the Administrative Code shall report the results to the director within the first ten days following the end of the month in which the system receives the sample results, as specified in rules 3745-81-86 to 3745-81-88 of the Administrative Code.

(I) Reporting of ninetieth percentile lead and copper concentrations where the director calculates a system's ninetieth percentile concentrations.

A public water system is not required to report the ninetieth percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by paragraph (A)(1)(d) of this rule if the following occurs:

(1) The director has previously notified the water system that the director will calculate the water system's ninetieth percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to paragraph (I)(2)(a) of this rule, and has specified a date before the end of the applicable monitoring period by which the public water system shall provide the results of lead and copper tap water samples.

(2) The public water system has provided the following information to the director by the date specified in paragraph (I)(1) of this rule:

(a) The results of all tap samples for lead and copper including the location of each site and the criteria in paragraphs (A)(3), (A)(4), (A)(5), (A)(6), and (A)(7) of rule 3745-81-86 of the Administrative Code under which the site was selected for the system's sampling pool, pursuant to paragraph (A)(1)(b) of this rule.

(b) An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed.

(3) The director has provided the results of the ninetieth percentile lead and copper calculations, in writing, to the water system before the end of the monitoring period.

(J) Any public water system subject to the requirements of rules 3745-81-80 to 3745-81-89 of the Administrative

Code shall retain on the premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, director's determinations, and any other information required by rules 3745-81-80 to 3745-81-89 of the Administrative Code. Each water system shall retain the records required by this rule for no fewer than twelve years.

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