

## **12 VAC 5-590-10. Definitions.**

As used in this chapter, the following words and terms shall have meanings respectively set forth unless the context clearly requires a different meaning:

"Action level" means the concentration of lead or copper in water specified in 12 VAC 5-590-410 E, which determines, in some cases, the treatment requirements contained in 12 VAC 5-590-420 C, D, E and F that a waterworks is required to complete.

"Air gap separation" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying pure water to a tank, plumbing fixture, or other device and the rim of the receptacle.

"Annual daily water demand" means the average rate of daily water usage over at least the most recent three-year period.

"Applied water" means water that is ready for filtration.

"Approved" means material, equipment, workmanship, process or method that has been accepted by the division as suitable for the proposed use.

"Auxiliary water system" means any water system on or available to the premises other than the waterworks. These auxiliary waters may include water from a source such as wells, lakes, or streams; or process fluids; or used water. They may be polluted or contaminated or objectionable, or constitute an unapproved water source or system over which the water purveyor does not have control.

"Backflow" means the flow of water or other liquids, mixtures, or substances into the distribution piping of a waterworks from any source or sources other than its intended source.

"Backflow prevention device" means any approved device, method, or type of construction intended to prevent backflow into a waterworks.

"Best available technology (BAT)" means the best technology, treatment techniques, or other means which the commissioner finds, after examination for efficacy under field conditions and not solely under laboratory conditions and in conformance with applicable EPA regulations, are available (taking cost into consideration).

"Board" means the State Board of Health.

"Breakpoint chlorination" means the addition of chlorine to water until the chlorine demand has been satisfied and further additions result in a residual that is directly proportional to the amount added.

"Chlorine" means dry chlorine.

"Chlorine gas" means dry chlorine in the gaseous state.

"Chlorine solution (chlorine water)" means a solution of chlorine in water. Note: the term chlorine solution is sometimes used to describe hypochlorite solutions. This use of the term is incorrect.

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

"Coliform bacteria group" means a group of bacteria predominantly inhabiting the intestines of man or animal but also occasionally found elsewhere. It includes all aerobic and facultative anaerobic, gram-negative, non-sporeforming bacilli that ferment lactose with production of gas. Also included are all bacteria that produce a dark, purplish-green colony with metallic sheen by the membrane filter technique used for coliform identification.

"Commissioner" means the State Health Commissioner.

"Community water system" means a waterworks which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

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

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

"Comprehensive performance evaluation" (CPE) is a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operational and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. For purposes of compliance with 12 VAC 5-590-530 C 1 b (2) (d), the comprehensive performance evaluation must consist of at least the following components: assessment of plant performance; evaluation of major unit processes; identification and prioritization of performance limiting factors; assessment of the applicability of comprehensive technical assistance; and preparation of a CPE report.

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

"Consecutive waterworks" means a waterworks which has no water production or source facility of its own and which obtains all of its water from another permitted waterworks.

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"Consumer" means any person who drinks water from a waterworks.

"Consumer's water system" means any water system located on the consumer's premises, supplied by or in any manner connected to a waterworks.

"Contaminant" means any objectionable or hazardous physical, chemical, biological, or radiological substance or matter in water.

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

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

"Cross connection" means any connection or structural arrangement, direct or indirect, to the waterworks whereby backflow can occur.

"CT" or "CTcalc" means the product of "residual disinfectant concentration" (C) in mg/L determined before or at the first customer, and the corresponding "disinfectant contact time" (T) in minutes, i.e., "C" x "T."

"Daily fluid intake" means the daily intake of water for drinking and culinary use and is defined as two liters.

"Dechlorination" means the partial or complete reduction of residual chlorine in water by any chemical or physical process at a waterworks with a treatment facility.

"Degree of hazard" means the level of health hazard, as derived from an evaluation of the potential risk to health and the adverse effect upon the waterworks.

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

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

"Disinfectant" means any oxidant (including chlorine) that is added to water in any part of the treatment or distribution process for the purpose of killing or deactivating pathogenic organisms.

"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 to the point where residual disinfectant concentration ("C") is measured.

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

"Disinfection profile" means a summary of daily *Giardia lamblia* inactivation through the treatment plant.

"Distribution main" means a water main whose primary purpose is to provide treated water to service connections.

"Division" means the Commonwealth of Virginia, Department of Health, Division of Drinking Water.

"Domestic or other nondistribution system plumbing problem" means a coliform contamination problem in a waterworks with more than one service connection that is limited to the specific service connection from which the coliform positive sample was taken.

"Domestic use or usage" means normal family or household use, including drinking, laundering, bathing, cooking, heating, cleaning and flushing toilets (see Article 2 (§ 32.1-167 et seq.) of Chapter 6 of Title 32.1 of the Code of Virginia).

"Double gate-double check valve assembly" means an approved assembly composed of two single independently acting check valves including tightly closing shutoff valves located at each end of the assembly and petcocks and test gauges for testing the watertightness of each check valve.

"Effective corrosion inhibitor residual," for the purpose of 12 VAC 5-590-420 C 1 only, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

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

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

"Entry point" means the place where water from the source after application of any treatment is delivered to the distribution system.

"Equivalent residential connection" means a volume of water used equal to a residential connection which is 400 gallons per day unless supportive data indicates otherwise.

"Exception" means an approved deviation from a "shall" criteria contained in Part III of this chapter.

"Exemption" means a conditional waiver of a specific PMCL or treatment technique requirement which is granted to a specific waterworks for a limited period of time.

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

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

"First draw sample" means a one-liter sample of tap water, collected in accordance with 12 VAC 5-590-370 B 6 a (2), that has been standing in plumbing pipes at least six hours and is collected without flushing the tap.

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

"Free available chlorine" means that portion of the total residual chlorine remaining in water at the end of a specified contact period which will react chemically and biologically as hypochlorous acid or hypochlorite ion.

"GAC10" means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days.

"Governmental entity" means the Commonwealth, a town, city, county, service authority, sanitary district or any other governmental body established under the Code of Virginia, including departments, divisions, boards or commissions.

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

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"Groundwater" means all water obtained from sources not classified as surface water (or surface water sources).

"Groundwater under the direct influence of surface water" means any water beneath the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or *Cryptosporidium*. It also means significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH that closely correlate to climatological or surface water conditions. The pathogen, *Cryptosporidium*, applies to all waterworks that use surface water or groundwater under the direct influence of surface water serving at least 10,000 people. The division in accordance with 12 VAC 5-590-430 will determine direct influence of surface water.

"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.

"Halogen" means one of the chemical elements chlorine, bromine, fluorine, astatine or iodine.

"Health hazard" means any condition, device, or practice in a waterworks or its operation that creates, or may create, a danger to the health and well-being of the water consumer.

"Health regulations" means regulations which include all primary maximum contaminant levels, treatment technique requirements, and all operational regulations, the violation of which would jeopardize the public health.

"Hypochlorite" means a solution of water and some form of chlorine, usually sodium hypochlorite.

"Initial compliance period" means for all regulated contaminants, the initial compliance period is the first full three-year compliance period beginning at least 18 months after promulgation with the exception of waterworks with 150 or more service connections for contaminants listed at Table 2.3, VOC 19-21; Table 2.3, SOC 19-33; and antimony, beryllium, cyanide (as free cyanide), nickel, and thallium which shall begin January 1993.

"Interchangeable connection" means an arrangement or device that will allow alternate but not simultaneous use of two sources of water.

"Karstian geology" means an area predominantly underlain by limestone, dolomite, or gypsum and characterized by rapid underground drainage. Such areas often feature sinkholes, caverns, and sinking or disappearing creeks. In Virginia, this generally includes all that area west of the Blue Ridge and, in Southwest Virginia, east of the Cumberland Plateau.

"Large waterworks," for the purposes of 12 VAC 5-590-370 B 6, 12 VAC 5-590-420 C through F, 12 VAC 5-590-530 D, and 12 VAC 5-590-550 D only, means a waterworks that serves more than 50,000 persons.

"Lead Free" when used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead; when used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead; and, when used with respect to plumbing fittings and fixtures intended by the plumbing manufacture to dispense water for human ingestion refers to fittings and fixtures that are in compliance with standards established in accordance with 42 U.S.C. 300g-6(e).

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

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

"Liquid chlorine" means a liquefied, compressed gas as shipped in commerce. Note: The term liquid chlorine is sometimes used to describe a hypochlorite solution often employed for swimming pool sanitation. This use of the term is incorrect.

"Log inactivation (log removal)" means that a 99.9% reduction is a 3-log inactivation; a 99.99% reduction is a 4-log inactivation.

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

"Maximum daily water demand" means the rate of water usage during the day of maximum water use.

"Maximum contaminant level (MCL)" means the maximum permissible level of a contaminant in water which is delivered to any user of a waterworks, except in the cases of turbidity and VOCs, where the maximum permissible level is measured at each entry point to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition. Maximum contaminant levels may be either "primary" (PMCL), meaning based on health considerations or "secondary" (SMCL) meaning based on aesthetic considerations.

"Maximum residual disinfectant level (MRDL)" means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a waterworks is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a waterworks is in compliance with the MRDL when daily samples are taken at the entrance to the

distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in Table 2.12, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

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

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

"Medium-size waterworks," for the purpose of 12 VAC 5-590-370 B 6, 12 VAC 5-590-420 C through F, 12 VAC 5-590-530, and 12 VAC 5-590-550 D only, means a waterworks that serves greater than 3,300 and less than or equal to 50,000 persons.

"Most probable number (MPN)" means that number of organisms per unit volume that, in accordance with statistical theory, would be more likely than any other number to yield the observed test result or that would yield the observed test result with the greatest frequency, expressed as density of organisms per 100 milliliters. Results are computed from the number of positive findings of coliform-group organisms resulting from multiple-portion decimal-dilution plantings.

"Noncommunity water system" means a waterworks that is not a community waterworks, but operates at least 60 days out of the year.

"Nonpotable water" means water not classified as pure water.

"Nontransient noncommunity water system (NTNC)" means a waterworks that is not a community waterworks and that regularly serves at least 25 of the same persons over six months out of the year.

"One hundred year flood level" means the flood elevation which will, over a long period of time, be equaled or exceeded on the average once every 100 years.

"Operator" means any individual employed or appointed by any owner, and who is designated by such owner to be the person in responsible charge, such as a supervisor, a shift operator, or a substitute in charge, and whose duties include testing or evaluation to control waterworks operations. Not included in this definition are superintendents or directors of public works, city engineers, or other municipal or industrial officials whose duties do not include the actual operation or direct supervision of waterworks.

"Optimal corrosion control treatment" means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while ensuring that the treatment does not cause the waterworks to violate any other section of this chapter.

"Owner" or "water purveyor" means an individual, group of individuals, partnership, firm, association, institution, corporation, governmental entity, or the federal government which supplies or proposes to supply water to any person within this state from or by means of any waterworks (see Article 2 (§ 32.1-167 et seq.) of Chapter 6 of Title 32.1 of the Code of Virginia).

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

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

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

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

"Pollution" means the presence of any foreign substance (chemical, physical, radiological, or biological) in water that tends to degrade its quality so as to constitute an unnecessary risk or impair the usefulness of the water.

"Pollution hazard" means a condition through which an aesthetically objectionable or degrading material may enter the waterworks or a consumer's water system.

"Post-chlorination" means the application of chlorine to water subsequent to treatment.

"Practical quantitation level (PQL)" means the lowest level achievable by good laboratories within specified limits during routine laboratory operating conditions.

"Prechlorination" means the application of chlorine to water prior to filtration.

"Process fluids" means any fluid or solution which may be chemically, biologically, or otherwise contaminated or polluted which would constitute a health, pollutional, or system hazard if introduced into the waterworks. This includes, but is not limited to:

1. Polluted or contaminated water,
2. Process waters,
3. Used waters, originating from the waterworks which may have deteriorated in sanitary quality,
4. Cooling waters,
5. Contaminated natural waters taken from wells, lakes, streams, or irrigation systems,
6. Chemicals in solution or suspension, and
7. Oils, gases, acids, alkalis, and other liquid and gaseous fluid used in industrial or other processes, or for fire fighting purposes.

"Pure water" or "potable water" means water fit for human consumption and domestic use which is sanitary and normally free of minerals, organic substances, and toxic agents in excess of reasonable amounts for domestic usage in the area served and normally adequate in quantity and quality for the minimum health requirements of the persons served (see Article 2 (§ 32.1-167 et seq.) of Chapter 6 of Title 32.1 of the Code of Virginia).

"Raw water main" means a water main which conveys untreated water from a source to a treatment facility.

"Reduced pressure principle backflow prevention device (RPZ device)" means a device containing a minimum of two independently acting check valves together with an automatically operated pressure differential relief valve located between the two check valves. During normal flow and at the cessation of normal flow, the pressure between these two checks shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, by discharging to the atmosphere, shall operate to maintain the pressure between the check valves at less than the supply pressure. The unit must include tightly closing shut-off valves located at each end of the device, and each device shall be fitted with properly located test cocks. These devices must be of the approved type.

"REM" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem" (MREM) is 1/1000 of a REM.

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

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

"Responsible charge" means designation by the owner of any individual to have duty and authority to operate or modify the operation of waterworks processes.

"Sanitary facilities" means piping and fixtures, such as sinks, lavatories, showers, and toilets, supplied with potable water and drained by wastewater piping.

"Sanitary survey" means an investigation of any condition that may affect public health.

"Secondary water source" means any approved water source, other than a waterworks' primary source, connected to or available to that waterworks for emergency or other nonregular use.

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

"Service connection" means the point of delivery of water to a customer's building service line as follows:

1. If a meter is installed, the service connection is the downstream side of the meter;
2. If a meter is not installed, the service connection is the point of connection to the waterworks;
3. When the water purveyor is also the building owner, the service connection is the entry point to the building.

"Service line sample" means a one-liter sample of water, collected in accordance with 12 VAC 5-590-370 B 6 a (2) (c), that has been standing for at least six hours in a service line.

"Sewer" means any pipe or conduit used to convey sewage or industrial waste streams.

"Single family structure," or the purpose of 12 VAC 5-590-370 B 6 (a) only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

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

"Small waterworks," for the purpose of 12 VAC 5-590-370 B 6, 12 VAC 5-590-420 C through F, 12 VAC 5-590-530 D and 12 VAC 5-590-550 D only, means a waterworks that serves 3,300 persons or fewer.

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

"Surface water" means all water open to the atmosphere and subject to surface runoff.

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

"Synthetic organic chemicals (SOC)" means one of the family of organic man-made compounds generally utilized for agriculture or industrial purposes.

"System hazard" means a condition posing an actual, or threat of, damage to the physical properties of the waterworks or a consumer's water system.

"Terminal reservoir" means an impoundment providing end storage of water prior to treatment.

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

"Total effective storage volume" means the volume available to store water in distribution reservoirs measured as the difference between the reservoir's overflow elevation and the minimum storage elevation. The minimum storage elevation is that elevation of water in the reservoir that can provide a minimum pressure of 20 psi at a flow as determined in 12 VAC 5-590-690 C to the highest elevation served within that reservoir's service area under systemwide maximum daily water demand.

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

"Total trihalomethanes (TTHM)" means the sum of the concentrations of the trihalomethanes expressed in milligrams per liter (mg/L) and rounded to two significant figures.

For the purpose of these regulations, the TTHMs shall mean trichloromethane (chloroform), dibromochloromethane, bromodichloromethane, and tribromomethane (bromoform).

"Transmission main" means a water main whose primary purpose is to move significant quantities of treated water among service areas.

"Treatment technique requirement" means a requirement which specifies for a contaminant a specific treatment technique(s) demonstrated to the satisfaction of the division to lead to a reduction in the level of such contaminant sufficient to comply with these regulations.

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

"Uncovered finished water storage facility" is 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.

"Unregulated contaminant (UC)" means a contaminant for which a monitoring requirement has been established, but for which no MCL or treatment technique requirement has been established.

"Used water" means any water supplied by a water purveyor from the waterworks to a consumer's water system after it has passed through the service connection.

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

"Variance" means a conditional waiver of a specific regulation which is granted to a specific waterworks. A PMCL Variance is a variance to a Primary Maximum Contaminant Level, or a treatment technique requirement. An Operational Variance is a variance to an operational regulation or a Secondary Maximum Contaminant Level. Variances for monitoring, reporting and public notification requirements will not be granted.

"Volatile synthetic organic chemical (VOC)" means one of the family of manmade organic compounds generally characterized by low molecular weight and rapid vaporization at relatively low temperatures or pressures.

"Waterborne disease outbreak" means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a waterworks which is deficient in treatment, as determined by the commissioner or the State Epidemiologist.

"Water purveyor" (same as owner).

"Water supply" means water that shall have been taken into a waterworks from all wells, streams, springs, lakes, and other bodies of surface waters (natural or impounded), and the tributaries thereto, and all impounded groundwater, but the term "water supply" shall not include any waters above the point of intake of such waterworks (see Article 2 (§ 32.1-167 et seq.) of Chapter 6 of Title 32.1 of the Code of Virginia).

"Water supply main" or "main" means any water supply pipeline that is part of a waterworks distribution system.

"Water Well Completion Report" means a report form published by the State Water Control Board entitled "Water Well Completion Report" which requests specific information pertaining to the ownership, driller, location, geological formations penetrated, water quantity and quality encountered as well as construction of water wells. The form is to be completed by the well driller.

"Waterworks" means a system that serves piped water for drinking or domestic use to (i) the public, (ii) at least 15 connections, or (iii) an average of 25 individuals for at least 60 days out of the year. The term "waterworks" shall include all structures, equipment and appurtenances used in the storage, collection, purification, treatment and distribution of pure water except the piping and fixtures inside the building where such water is delivered (see Article 2 (§ 32.1-167 et seq.) of Chapter 6 of Title 32.1 of the Code of Virginia).

"Waterworks with a single service connection" means a waterworks which supplies drinking water to consumers via a single service line.

**VAC5-590-370. Sampling frequency.**

The commissioner may exempt consecutive waterworks that obtain potable water from another water system for distribution from all monitoring requirements in this section except for bacteriological (subsection A of this section), disinfectant residuals, byproducts and disinfection byproduct precursors (subdivision B 3 of this section), and lead and copper (subdivision B 6 of this section). The required sampling frequencies are as follows:

A. Bacteriological.

1. The waterworks owner shall collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting report. The report shall be established or approved by the division after investigation of the source, method of treatment and storage, and protection of the water concerned. The report must include, but is not limited to, the following:

- a. The frequency of sampling distributed evenly throughout the month/quarter.
- b. Distribution map showing the generalized location where specific sampling sites will be selected.
- c. Supporting statement explaining how specific individual sites are selected, how sampling will be rotated among the sites, how repeat samples will be collected and other information demonstrating that sampling will be conducted in a manner to comply with this chapter.
- d. Adequate sampling points to provide sampling representative of all the conditions in the system.
- e. For small systems (less than 3,301 population), sample sites must also be identified by address and code number location.
- f. Minimum of three sample locations for each sample required monthly so repeat sample locations are previously ascertained as being adequate in number and five customer service connections upstream and downstream. (See Appendix J for an example.)
- g. The sampling point required to be repeat sampled shall not be eliminated from future collections based on a history of questionable water quality unless the sampling point is unacceptable as determined by the division.

2. The minimum number of bacteriological samples for total coliform evaluation to be collected and analyzed monthly from the distribution system of a community or nontransient noncommunity waterworks shall be in accordance with Table 2.1. All noncommunity waterworks that use a surface water source or a groundwater source under the direct influence of surface

water, and all large noncommunity (serving 1,000 or more persons per day) waterworks, shall collect and submit samples monthly for analysis in accordance with Table 2.1. All other noncommunity waterworks shall submit samples for analysis each calendar quarter in accordance with Table 2.1.

3. The samples shall be taken at reasonably evenly spaced time intervals throughout the month or quarter.

If the results of a sanitary survey or other factors determine that some other frequency is more appropriate than that stated above, a modified sampling program report may be required. The altered frequency shall be confirmed or changed on the basis of subsequent surveys.

TABLE 2.1.

POPULATION SERVED PER DAY	MINIMUM NUMBER OF SAMPLES (See 12VAC5-590-370 A 2)
25 to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390

4. All bacteriological analyses shall be performed in accordance with 12VAC5-590-440 by the DCLS or by a laboratory certified by DCLS for drinking water samples.

B. Chemical.

The location of sampling points, the chemicals measured, the frequency, and the timing of sampling within each compliance period shall be established or approved by the commissioner. The commissioner may increase required monitoring where necessary to detect variations within the waterworks. Analysis of field composite samples shall not be allowed. Samples for contaminants that may exhibit seasonal variations shall be collected during the period of the year when contamination is most likely to occur. Failure to comply with the sampling schedules in this section will require public notification pursuant to 12VAC5-590-540.

1. Inorganic chemical. Community and nontransient noncommunity waterworks owners shall conduct monitoring to determine compliance with the MCLs in Table 2.2 in accordance with this section. All other noncommunity waterworks owners shall conduct monitoring to determine compliance with the nitrate and nitrite PMCLs in Table 2.2 (as appropriate) in accordance with this section. Monitoring shall be conducted as follows:

a. The owner of any groundwater source waterworks with 150 or more service connections shall take a minimum of one sample at each entry point to the distribution system which is representative of each source, after treatment, unless a change in condition makes another sampling point more representative of each source or treatment plant (hereafter called a sampling point) starting in the compliance period beginning January 1, 1993. The owner of any groundwater source waterworks with fewer than 150 service connections shall take a minimum of one sample at each sampling point for asbestos, barium, cadmium, chromium, fluoride, mercury, nitrate, nitrite, and selenium in the compliance period beginning January 1, 1993, and for antimony, beryllium, cyanide (as free cyanide), nickel, and thallium in the compliance period beginning January 1, 1996.

b. The owner of any waterworks which uses a surface water source in whole or in part with 150 or more service connections shall take a minimum of one sample at each entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source, after treatment, unless a change in conditions makes another sampling point more representative of each source or treatment plant (hereafter called a sampling point) beginning January 1, 1993. The owner of any waterworks which use a surface water source in whole or in part with fewer than 150 service connections shall take a minimum of one sample at each sampling point for asbestos, barium, cadmium, chromium, fluoride, mercury, nitrate, nitrite, and selenium beginning January 1, 1993, and for antimony, beryllium, cyanide (as free cyanide), nickel, and thallium beginning January 1, 1996.

c. If a waterworks draws water from more than one source and the sources are combined before distribution, the waterworks owner 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 frequency of monitoring for asbestos shall be in accordance with subdivision B 1 d (1) of this section; the frequency of monitoring for barium, cadmium, chromium, fluoride, mercury, and selenium shall be in accordance with subdivision B 1 d (2) of this section; the frequency of monitoring for antimony, beryllium, cyanide (as free cyanide), nickel, and thallium shall be in accordance with subdivision B 1 d (3) of this section; the frequency of monitoring for nitrate shall be in accordance with subdivision B 1 d (4) of this section; the frequency of monitoring for nitrite shall be in accordance with subdivision B 1 d (5) of this section; and the frequency of monitoring for arsenic shall be in accordance with subdivision B 1 d (6) of this section.

(1). The frequency of monitoring conducted to determine compliance with the PMCL for asbestos specified in Table 2.2 shall be conducted as follows:

(a). The owner of each community and nontransient noncommunity waterworks is required to monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period starting January 1, 1993.

(b). If the waterworks owner believes the waterworks is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, the owner may apply to the commissioner for a waiver of the monitoring requirement in subdivision B 1 d (1) (a) of this section. If the commissioner grants the waiver, the waterworks owner is not required to monitor.

(c). The commissioner may grant a waiver based on a consideration of the following factors:

(i). Potential asbestos contamination of the water source, and

(ii). The use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.

(d). A waiver remains in effect until the completion of the three-year compliance period. Waterworks not receiving a waiver shall monitor in accordance with the provisions of subdivision B 1 d (1) (a) of this section.

(e). The owner of a waterworks vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

(f). The owner of a waterworks vulnerable to asbestos contamination due solely to source water shall monitor sampling points in accordance with subdivision B 1 of this section.

(g). The owner of a waterworks vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

(h). The owner of a waterworks which exceeds the PMCL as determined in 12VAC5-590-410 B 1 shall monitor quarterly beginning in the next quarter after the violation occurred.

(i). The commissioner may decrease the quarterly monitoring requirement to the frequency specified in subdivision B 1 d (1) (a) of this section provided the commissioner has determined that the waterworks is reliably and consistently below the PMCL. In no case can the commissioner make this determination unless the owner of a groundwater source waterworks takes a minimum of two quarterly samples or the owner of a waterworks which uses a surface water source in whole or in part takes a minimum of four quarterly samples.

(j). If monitoring data collected after January 1, 1990, are generally consistent with the requirements of subdivision B 1 d (1) of this section, then the commissioner may allow waterworks owner to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.

(2). The frequency of monitoring conducted to determine compliance with the MCLs in Table 2.2 for barium, cadmium, chromium, fluoride, mercury, and selenium shall be as follows:

(a). The owner of a groundwater source waterworks shall take one sample at each sampling point during each compliance period beginning in the compliance period starting January 1, 1993.

(b). The owner of a waterworks which uses a surface water source in whole or in part shall take one sample annually at each sampling point beginning January 1, 1993.

(c). A waterworks owner may apply to the commissioner for a waiver from the monitoring frequencies specified in subdivision B 1 d (2) (a) or (b) of this section.

(d). A condition of the waiver shall require that the waterworks owner shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (i.e., nine years).

(e). The commissioner may grant a waiver provided the owner of a waterworks which uses a surface water source in whole or in part has monitored annually for at least three years and groundwater waterworks have conducted a minimum of three rounds of monitoring. (At least one sample shall have been taken since January 1, 1990.) The owner of any waterworks which uses a surface water source in whole or in part or a groundwater source waterworks shall demonstrate that all previous analytical results were less than the PMCL. Waterworks that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.

(f). In determining the appropriate reduced monitoring frequency, the commissioner shall consider:

(i). Reported concentrations from all previous monitoring;

(ii). The degree of variation in reported concentrations; and

(iii). Other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the waterworks configuration, changes in the waterworks operating procedures, or changes in stream flows or characteristics.

(g). A decision by the commissioner to grant a waiver shall be made in writing and shall set forth the basis for the determination. The request for a waiver may be initiated by the commissioner or upon an application by the

waterworks owner. The owner shall specify the basis for the request. The commissioner shall review and, where appropriate, revise the determination of the appropriate monitoring frequency when the waterworks owner submits new monitoring data or when other data relevant to the waterworks appropriate monitoring frequency become available.

(h). Owners of waterworks which exceed the PMCLs as calculated in 12VAC5-590-410 shall monitor quarterly beginning in the next quarter after the violation occurred.

(i). The commissioner may decrease the quarterly monitoring requirement to the frequencies specified in subdivision B 2 d (2) (a), (b) or (c) of this section provided a determination has been made that the waterworks is reliably and consistently below the PMCL. In no case can the commissioner make this determination unless the owner of a groundwater source waterworks takes a minimum of two quarterly samples or the owner of a waterworks which uses a surface water source in whole or in part takes a minimum of four quarterly samples.

(3). The frequency of monitoring conducted to determine compliance with the PMCLs in Table 2.2 for antimony, beryllium, cyanide (as free cyanide), nickel, and thallium shall be as follows:

(a). The owner of a groundwater source waterworks with 150 or more service connections shall take one sample at each sampling point during each compliance period beginning in the compliance period starting January 1, 1993. The owner of a groundwater source waterworks with fewer than 150 service connections shall take one sample at each sampling point during each compliance period beginning in the compliance period starting January 1, 1996.

(b). The owner of a waterworks which uses a surface water source in whole or in part with 150 or more service connections shall take one sample annually at each sampling point beginning January 1, 1993. The owner of a waterworks which uses a surface water source in whole or in part with fewer than 150 service connections shall take one sample annually at each sampling point beginning January 1, 1996.

(c). A waterworks owner may apply to the commissioner for a waiver from the monitoring frequencies specified in subdivision B 2 d (3) (a) or (b) of this section.

(d). A condition of the waiver shall require that the waterworks owner shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (i.e., nine years).

(e). The commissioner may grant a waiver provided the owner of a waterworks which uses a surface water source in whole or in part has monitored annually for at least three years and groundwater waterworks have conducted a minimum of three rounds of monitoring. (At least one sample shall have been taken since January 1, 1990.) The owner of any waterworks which uses a surface water source in whole or in part or a groundwater source waterworks shall demonstrate that all previous analytical results were less than the PMCL. Waterworks that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.

(f). In determining the appropriate reduced monitoring frequency, the commissioner shall consider:

(i). Reported concentrations from all previous monitoring;

(ii). The degree of variation in reported concentrations; and

(iii). Other factors which may affect contaminant concentrations such as changes in groundwater pumping rates, changes in the waterworks configuration, changes in the waterworks operating procedures, or changes in stream flows or characteristics.

(g). A decision by the commissioner to grant a waiver shall be made in writing and shall set forth the basis for the determination. The request for a waiver may be initiated by the commissioner or upon an application by the waterworks owner. The owner shall specify the basis for the request. The commissioner shall review and, where appropriate, revise the determination of the appropriate monitoring frequency when the waterworks owner submits new monitoring data or when other data relevant to the waterworks appropriate monitoring frequency become available.

(h). Owners of waterworks which exceed the PMCLs as calculated in 12VAC5-590-410 shall monitor quarterly beginning in the next quarter after the violation occurred.

(i). The commissioner may decrease the quarterly monitoring requirement to the frequencies specified in subdivision B 2 d (3) (a), (b) or (c) of this section provided a determination has been made that the waterworks is reliably and consistently below the PMCL. In no case can the commissioner make this determination unless the owner of a groundwater source waterworks takes a minimum of two quarterly samples or the owner of a waterworks which uses a surface water source in whole or in part takes a minimum of four quarterly samples.

(4). All community, nontransient noncommunity and noncommunity waterworks owners shall monitor to determine compliance with the PMCL for nitrate in Table 2.2.

(a). Owners of community and nontransient noncommunity waterworks which use a groundwater source shall monitor annually beginning January 1, 1993.

(b). Owners of community and nontransient noncommunity waterworks which use a surface water source in whole or in part shall monitor quarterly beginning January 1, 1993.

(c). For community and nontransient noncommunity waterworks which use groundwater, the repeat monitoring frequency shall be quarterly for at least one year following any one sample in which the concentration is  $\geq 50\%$  of the PMCL. The commissioner may allow the owner of a waterworks, which uses groundwater, to reduce the sampling frequency to annually after four consecutive quarterly samples are reliably and consistently less than the PMCL.

(d). For community and nontransient noncommunity waterworks, the commissioner may allow the owner of a waterworks which uses a surface water source in whole or in part, to reduce the sampling frequency to annually if all analytical results from four consecutive quarters are <50 % of the PMCL. Such waterworks shall return to quarterly monitoring if any one sample is  $\geq 50$  % of the PMCL.

(e). The owners of all other noncommunity waterworks shall monitor annually beginning January 1, 1993.

(f). After the initial round of quarterly sampling is completed, the owner of each community and nontransient noncommunity waterworks which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.

(5). All community, nontransient noncommunity and noncommunity waterworks owners shall monitor to determine compliance with the PMCL for nitrite in Table 2.2.

(a). All waterworks owners shall take one sample at each sampling point in the compliance period beginning January 1, 1993.

(b). After the initial sample, the owner of any waterworks where an analytical result for nitrite is <50 % of the PMCL shall monitor at the frequency specified by the commissioner.

(c). The repeat monitoring frequency for any waterworks owner shall be quarterly for at least one year following any one sample in which the concentration is  $\geq 50$  % of the PMCL. The commissioner may allow a waterworks owner to reduce the sampling frequency to annually after determining the analysis results are reliably and consistently less than the PMCL.

(d). Owners of waterworks which are monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.

(6). The frequency of monitoring conducted to determine compliance with the PMCLs in Table 2.2 for arsenic shall be as follows:

(a). The owner of each community waterworks which use a surface water source in whole or in part shall take one sample annually at each sampling point beginning June 1, 1978.

(b). The owner of each community groundwater waterworks shall take one sample at each sampling point within a three year period starting June 1, 1979.

(c). Owners of waterworks which exceed the PMCL listed in Table 2.2 shall report to the commissioner within seven days and initiate three additional samples at the same sampling point within one month.

(d). For initial analyses required by subdivision B 1 d (6) (a) or (b) of this section, data for waterworks which use surface water source in whole or in part acquired within one year prior to the effective date for arsenic monitoring and

data for groundwater waterworks acquired within three years prior to the effective date for arsenic monitoring may be substituted at the discretion of the commissioner.

2. Organic chemicals. Owners of all community and nontransient noncommunity waterworks shall sample for organic chemicals in accordance with their water source. Where two or more sources are combined before distribution, the waterworks owner shall sample at the entry point for the combined sources during periods of normal operating conditions.

a. Owners of waterworks which use groundwater shall take a minimum of one sample at each entry point to the distribution system which is representative of each source, after treatment (hereafter called a sampling point).

b. Owners of waterworks which use a surface water source in whole or in part shall take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system, after treatment (hereafter called a sampling point).

c. The owner of each community and nontransient noncommunity waterworks shall take four consecutive quarterly samples for each contaminant listed in Table 2.3-VOC 2 through 21 and SOC during each compliance period, beginning in the compliance period starting January 1, 1993.

d. Reduced monitoring.

(1). VOC.

(a). If the initial monitoring for contaminants listed in Table 2.3-VOC 1 through 8 and the monitoring for the contaminants listed in Table 2.3-VOC 9 through 21 as allowed in subdivision B 2 d (1) (c) of this section has been completed by December 31, 1992, and the waterworks did not detect any contaminant listed in Table 2.3-VOC 1 through 21, then the owner of each groundwater waterworks and waterworks which use a surface water source in whole or in part shall take one sample annually beginning January 1, 1993.

(b). After a minimum of three years of annual sampling, the commissioner may allow the owner of a groundwater waterworks with no previous detection of any contaminant listed in Table 2.3-VOC 2 through 21 to take one sample during each compliance period.

(c). The commissioner may allow the use of monitoring data collected after January 1, 1988, for purposes of initial monitoring compliance. If the data are generally consistent with the other requirements in this section, the commissioner may use these data (i.e., a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement of subdivision B 2 c of this section. Waterworks which use grandfathered samples and did not detect any contaminants listed in Table 2.3-VOC, 2 through 21, shall begin monitoring annually in accordance with subdivision B 2 d (1) (a) of this section beginning January 1, 1993.

(2). SOC.

(a). Waterworks serving more than 3,300 persons which do not detect a contaminant listed in Table 2.3-SOC in the initial compliance

period, may reduce the sampling frequency to a minimum of two quarterly samples in one year during each repeat compliance period.

(b). Waterworks serving less than or equal to 3,300 persons which do not detect a contaminant listed in Table 2.3-SOC in the initial compliance period may reduce the sampling frequency to a minimum of one sample during each repeat compliance period.

e. Waiver application.

(1). For VOCs. The owner of any community and nontransient noncommunity groundwater waterworks which does not detect a contaminant listed in Table 2.3-VOC may apply to the commissioner for a waiver from the requirements of subdivisions B 2 d (1) (a) and (b) of this section after completing the initial monitoring. A waiver shall be effective for no more than six years (two compliance periods). The commissioner may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene.

(2). For SOCs. The owner of any community and nontransient noncommunity waterworks may apply to the commissioner for a waiver from the requirement of subdivisions B 2 c and d (2) of this section. The waterworks owner shall reapply for a waiver for each compliance period.

f. A commissioner may grant a waiver after evaluating the following factors: Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the source. If a determination by the commissioner reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.

(1). Previous analytical results.

(2). The proximity of the waterworks to a potential point or nonpoint source of contamination. Point sources include spills and leaks of chemicals at or near a waterworks or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Nonpoint sources for SOCs include the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.

(3). The environmental persistence and transport of the contaminants listed in Table 2.3 VOC and SOC.

(4). How well the water source is protected against contamination, such as whether it is a waterworks which uses a surface water source in whole or in part or whether it is a groundwater source waterworks. Groundwater source waterworks shall consider factors such as depth of the well, the type of soil, wellhead protection, and well structure integrity. Waterworks which use surface water in whole or in part shall consider watershed protection.

(5). Special factors.

(a). For VOCs. The number of persons served by the waterworks and the proximity of a smaller waterworks to a larger waterworks.

(b). For SOCs. Elevated nitrate levels at the waterworks supply source.

(c). For SOCs. Use of PCBs in equipment used in the production, storage, or distribution of water (i.e., PCBs used in pumps, transformers, etc.).

g. Condition for waivers.

(1). As a condition of the VOC waiver the owner of a groundwater waterworks shall take one sample at each sampling point during the time the waiver is effective (i.e., one sample during two compliance periods or six years) and update its vulnerability assessment considering the factors listed in subdivision B 2 f of this section. Based on this vulnerability assessment the commissioner shall reconfirm that the waterworks owner is nonvulnerable. If the commissioner does not make this reconfirmation within three years of the initial determination, then the waiver is invalidated and the waterworks is required to sample annually as specified in subdivision B 2 d (1) (a) of this section.

(2). The owner of any community and nontransient noncommunity waterworks which use surface water in whole or in part which does not detect a contaminant listed in Table 2.3-VOC may apply to the commissioner for a waiver from the requirements of subdivision B 2 d (1) (a) of this section after completing the initial monitoring. Waterworks meeting this criteria shall be determined by the commissioner to be nonvulnerable based on a vulnerability assessment during each compliance period. Each waterworks receiving a waiver shall sample at the frequency specified by the commissioner (if any).

(3). There are no conditions to SOC waivers.

h. If a contaminant listed in Table 2.3-VOC 2 through 21 or SOC 1 through 33 is detected then (NOTE: Detection occurs when a contaminant level exceeds the current detection limit as defined by EPA.):

(1). Each waterworks owner shall monitor quarterly at each sampling point which resulted in a detection.

(2). The commissioner may decrease the quarterly monitoring requirement specified in subdivision B 2 h (1) of this section provided it has determined that the waterworks is reliably and consistently below the PMCL. In no case shall the commissioner make this determination unless a groundwater waterworks takes a minimum of two quarterly samples and a waterworks which use surface water in whole or in part takes a minimum of four quarterly samples.

(3). If the commissioner determines that the waterworks is reliably and consistently below the PMCL, the commissioner may allow the waterworks to monitor annually. Waterworks which monitor annually shall monitor during the quarter(s) which previously yielded the highest analytical result.

(4). Waterworks which have three consecutive annual samples with no detection of a contaminant may apply to the commissioner for a waiver for VOC as specified in subdivision B 2 e (1) or to SOC as specified in subdivision B 2 e (2) of this section.

(5). Subsequent monitoring due to contaminant detection.

(a). Groundwater waterworks which have detected one or more of the following two-carbon organic compounds: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene shall monitor quarterly for vinyl chloride. A vinyl chloride sample shall be taken at each sampling point at which one or more of the two-carbon organic compounds was detected. If the results of the first analysis do not detect vinyl chloride, the commissioner may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one sample during each compliance period. Waterworks which use surface water in whole or in part are required to monitor for vinyl chloride as specified by the commissioner.

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

i. Waterworks which violate the requirements of Table 2.3 for VOCs or SOCs, as determined by 12VAC5-590-410 C, shall monitor quarterly. After a minimum of four consecutive quarterly samples which show the waterworks is in compliance as specified in 12VAC5-590-410 C and the commissioner determines that the waterworks is reliably and consistently below the PMCL, the waterworks may monitor at the frequency and time specified in subdivision B 2 h (3) of this section.

3. Disinfectant residuals, disinfection byproducts and disinfection byproduct precursors.

a. The requirements in subdivisions B 3 a (1) through (10) (e) of this section apply to community or nontransient noncommunity waterworks that use a surface water or a groundwater under the direct influence of surface water and serve a population of 10,000 or more until December 31, 2001. The requirements in subdivisions B 3 a (1) through (10) (e) of this section apply to community waterworks that use only groundwater not under the direct influence of surface water that add a disinfectant (oxidant) in any part of the treatment process and serve a population of 10,000 or more until December 31, 2003. After December 31, 2003, subdivisions B 3 a (1) through (10) (e) of this section are no longer applicable.

(1). Samples for TTHM analyses shall be collected quarterly from all community and nontransient noncommunity waterworks which disinfect and serve 10,000 or more individuals. At least four samples for each treatment plant used by the waterworks must be collected using the following criteria: at least 25% of the samples shall be taken at locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75% shall be taken at representative locations in the distribution system, taking into account the number of persons served, different sources of water and different treatment methods employed. Sample locations shall be approved by the commissioner.

(2). Community and nontransient noncommunity waterworks utilizing surface water in whole or in part, may, upon written request, have the monitoring

frequency reduced by the division to a minimum of one sample per quarter taken at a point of maximum residence time of the water in the distribution system. The division must make a written determination that data from at least one year of monitoring and local conditions indicate that TTHM concentrations will be consistently below the PMCL.

If at any time in the reduced monitoring program the results from any analysis exceed the PMCL for TTHMs and such results are confirmed by at least one check sample taken promptly after such results are received, or if the waterworks makes any significant change to its source of water or treatment program, the waterworks shall immediately begin monitoring in accordance with subdivision B 3 of this section. Routine monitoring must continue for at least one year before a reduced monitoring frequency can be implemented again.

(3). Community and nontransient noncommunity waterworks utilizing groundwaters only may, upon written request, have the monitoring frequency reduced to a minimum of one sample per year for TTHM. This sample shall be collected at a point in the distribution system reflecting the maximum residence time of the water. The division must make a written determination that the data indicates the system has a TTHM concentration of less than the PMCL and local conditions indicate that TTHM concentrations will be consistently below the PMCL.

If at any time in the reduced monitoring program the results from any TTHM exceed or equal the PMCL and such results are confirmed by at least one check sample taken promptly after such results are received, the waterworks shall immediately begin monitoring in accordance with subdivision B 3 of this section. Routine monitoring must continue for at least one year before a reduced monitoring frequency can be implemented again.

If any significant change occurs in the raw water or if the waterworks treatment process is altered, an additional sample for TTHM shall be analyzed immediately to determine whether the waterworks must comply with the monitoring requirements of subdivision B 3 of this section. The sample shall be collected at a point in the distribution system reflecting the maximum residence time of the water.

(4). Nothing shall prevent the division from requiring additional samples for TTHM or MTP analysis when conditions warrant.

(5). Nothing shall prevent the TTHM regulations from being applicable to waterworks serving less than 10,000 individuals when in the determination of the division, public health will be better served.

(6). With prior approval of the division, waterworks which utilize multiple wells from a common aquifer may consider these multiple sources as one treatment plant for determining the minimum number of samples to be collected for TTHM analysis.

(7). All samples for TTHM or MTP taken within an established frequency shall be collected within a 24-hour period.

(8). The results of all analyses per quarter shall be arithmetically averaged and reported to the division within 30 days of the owner's receipt of the results (when samples are not analyzed by the state). All samples collected shall be used in the computation of the average unless the results are invalidated for technical reasons.

(9). Analysis shall be conducted in accordance with 12VAC5-590-440.

(10). Before any modification to a waterworks is undertaken for the purposes of complying with this section, approval must be obtained in accordance with 12VAC5-590-200. In addition, the following information, as a minimum, may be required from the owner:

(a). An evaluation of the waterworks for sanitary defects and an evaluation of the source water for biological quality;

(b). Evaluation of existing treatment practices and indication of how proposed improvements will minimize disinfectant demand and optimize finished water quality;

(c). Provision of results of a baseline water quality survey. Parameters monitored should include coliform, fecal coliform, fecal streptococci, heterotrophic plate counts at 20°C and 35°C, phosphate, ammonia nitrogen and TOC. Virus studies may be necessary as determined by the division;

(d). Performance of additional monitoring to assure continued maintenance of optimal biological quality in the finished water;

(e). Consideration of a plan to maintain an active disinfectant residual throughout the distribution system at all times during and after proposed modifications.

b. Unless otherwise noted, all waterworks that use a chemical disinfectant must comply with the requirements of this section as follows:

(1). Community or nontransient noncommunity waterworks that use surface water or groundwater under the direct influence of surface water and serving 10,000 or more persons, must comply with this section beginning January 1, 2002.

(2). Community or nontransient noncommunity waterworks that use surface water or groundwater under the direct influence of surface water serving fewer than 10,000 persons and waterworks using only groundwater not under the direct influence of surface water must comply with this section beginning January 1, 2004.

(3). Transient noncommunity waterworks which use surface water or groundwater under the direct influence of surface water and serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this section beginning January 1, 2002.

(4). Transient noncommunity waterworks which use surface water or groundwater under the direct influence of surface water serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and waterworks using only groundwater not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this section beginning January 1, 2004.

c. Waterworks must take all samples during normal operating conditions.

(1). Analysis under this section for disinfection byproducts (TTHM, HAA5 and bromate) must be conducted by a laboratory that has received certification by EPA or the state.

(2). Measurement under this section of daily chlorite samples at the entry point to the distribution system, disinfection residuals (free chlorine, combined chlorine, total chlorine and chlorine dioxide), alkalinity, bromide, TOC, SUVA (DOC and UV254), and pH must be made by a party approved by the commissioner.

(3). DPD colorimetric test kits may be used to measure residual disinfectant concentrations for chlorine, chloramines and chlorine dioxide.

d. Failure to monitor in accordance with the monitoring plan required under subdivision B 3 k of this section is a monitoring violation. Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the waterworks' failure to monitor makes it impossible to determine compliance with PMCLs or MRDLs.

e. Waterworks may use only data collected under the provisions of this section or the US EPA Information Collection Rule, 40 CFR 141 Subpart M, Information Collection Requirements (ICR) for Public Water Systems, to qualify for reduced monitoring.

f. TTHM/HAA5 monitoring. Community or nontransient noncommunity waterworks must monitor TTHM and HAA5 at the frequency indicated below:

(1). Routine monitoring requirements.

(a). Waterworks using surface water or groundwater under the direct influence of surface water and serving at least 10,000 persons must collect four water samples per quarter per treatment plant. At least 25% of all samples collected each quarter must be at locations representing maximum residence time in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system and representative of the entire distribution system. When setting the sample locations the waterworks must take into account number of persons served, different sources of water, and different treatment methods.

(b). Waterworks using surface water or groundwater under the direct influence of surface water and serving from 500 to 9,999 persons must collect one sample per quarter per treatment plant. The sample location must represent maximum residence time in the distribution system.

(c). Waterworks using surface water or groundwater under the direct influence of surface water and serving fewer than 500 persons must collect one sample per year per treatment plant during the month of warmest water temperature. The sample location must represent maximum residence time in the distribution system. If the sample (or average of annual samples, if more than one sample is taken) exceeds PMCL in Table 2.13, the waterworks must increase monitoring

to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until waterworks meets reduced monitoring criteria.

(d). Waterworks using only groundwater not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons must collect one sample per quarter per treatment plant. The sample location must represent maximum residence time in the distribution system.

(e). Waterworks using only groundwater not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons must collect one sample per year per treatment plant during the month of warmest water temperature. The sample location must represent maximum residence time in the distribution system. If the sample (or average of annual samples, if more than one sample is taken) exceeds PMCL in Table 2.13, the waterworks must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the waterworks meets the criteria for reduced monitoring found in subdivision B 3 f (4) of this section.

(f). If a waterworks elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

(g). With prior approval of the commissioner, waterworks that utilize multiple wells from a common aquifer may consider these multiple sources as one treatment plant for determining the minimum number of samples to be collected for TTHM and HAA5 analysis.

(2). After one year of routine monitoring a waterworks may reduce monitoring, except as otherwise provided, as follows:

(a). Waterworks using surface water or groundwater under the direct influence of surface water and serving at least 10,000 persons that has a source water annual average TOC level, before any treatment, of equal to or less than 4.0 mg/L and a TTHM annual average equal to or less than 0.040 mg/L and HAA5 annual average equal to or less than 0.030 mg/L may reduce its monitoring to one sample per treatment plant per quarter at a distribution system location reflecting maximum residence time.

(b). Waterworks using surface water or groundwater under the direct influence of surface water serving from 500 to 9,999 persons that has a source water annual average TOC level, before any treatment, equal to or less than 4.0 mg/L and a TTHM annual average equal to or less than 0.040 mg/L and HAA5 annual average equal to or less than 0.030 mg/L may reduce its monitoring to one sample per treatment plant per year at a distribution system location reflecting maximum residence time during the month of warmest water temperature.

(c). Waterworks using only groundwater not under the direct influence of surface water, using chemical disinfectant and serving at least 10,000 persons that has a TTHM annual average of equal to or less than 0.040 mg/L and HAA5 annual average of equal to or less than 0.030 mg/L may reduce its monitoring to

one sample per treatment plant per year at a distribution system location reflecting maximum residence time during the month of warmest water temperature.

(d). Waterworks using only groundwater not under the direct influence of surface water, using chemical disinfectant and serving fewer than 10,000 persons that has a TTHM annual average equal to or less than 0.040 mg/L and HAA5 annual average equal to or less than 0.030 mg/L for two consecutive years or TTHM annual average equal to or less than 0.020 mg/L and HAA5 annual average of equal to or less than 0.015 mg/L for one year may reduce its monitoring to one sample per treatment plant per three-year monitoring cycle at a distribution system location reflecting maximum residence time during the month of warmest water temperature, with the three-year cycle beginning on January 1 following the quarter in which the system qualifies for reduced monitoring.

(e). Waterworks using surface water or groundwater under the direct influence of surface water serving fewer than 500 persons may not reduce its monitoring to less than one sample per treatment plant per year.

(3). Waterworks on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for waterworks that must monitor quarterly) or the result of the sample (for waterworks that must monitor no more frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Waterworks that do not meet these levels must resume monitoring at the frequency identified in subdivision B 3 f (1) of this section in the quarter immediately following the quarter in which the waterworks exceeds 0.060 mg/L or 0.045 mg/L for TTHMs or HAA5, respectively. For waterworks using only groundwater not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHMs annual average is greater than 0.080 mg/L or the HAA5 annual average is greater than 0.060 mg/L, the waterworks must go to increased monitoring identified in subdivision B 3 f (1) of this section in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHM or HAA5 respectively.

(4). Waterworks on increased monitoring may return to routine monitoring if, after at least one year of monitoring, their TTHM annual average is equal to or less than 0.060 mg/L and their HAA5 annual average is equal to or less than 0.045 mg/L.

(5). The commissioner may return a waterworks to routine monitoring at the commissioner's discretion.

g. Chlorite. Community and nontransient noncommunity waterworks using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.

(1). Routine monitoring.

(a). Daily monitoring. Waterworks must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite PMCL in Table 2.13, the waterworks must take additional samples in the distribution system the following day at the locations required by subdivision B 3 g (1) (c) of this section, in addition to the sample required at the entrance to the distribution system.

(b). Monthly monitoring. Waterworks must take a three-sample set each month in the distribution system. The waterworks must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The waterworks may use the results of additional monitoring conducted under subdivision B 3 g (1) (c) of this section to meet the requirement for monitoring in this paragraph.

(c). Additional monitoring requirements. On each day following a routine sample monitoring result that exceeds the chlorite PMCL in Table 2.13 at the entrance to the distribution system, the waterworks is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(2). Reduced monitoring.

(a). Chlorite monitoring at the entrance to the distribution system required by subdivision B 3 g (1) (a) of this section may not be reduced.

(b). Chlorite monitoring in the distribution system required by subdivision B 3 g (1) (b) of this section 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 subdivision B 3 g (1) (b) of this section has exceeded the chlorite PMCL in Table 2.13 and the waterworks has not been required to conduct monitoring under subdivision B 3 g (1) (c) of this section. The waterworks may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under subdivision B 3 g (1) (b) of this section exceeds the chlorite PMCL or the waterworks is required to conduct monitoring under subdivision B 3 g (1) (c) of this section, at which time the waterworks must revert to routine monitoring.

h. Bromate.

(1). Each community and nontransient noncommunity waterworks treatment plant using ozone, for disinfection or oxidation, must take one sample per month and analyze it for bromate. Waterworks must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.

(2). Waterworks required to analyze for bromate may reduce monitoring from monthly to once per quarter, if the waterworks demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly bromide measurements for one year. The waterworks may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/L based upon representative monthly measurements. If the running annual average source water bromide concentration is equal to or greater than 0.05 mg/L, the waterworks must resume routine monitoring required by subdivision B 3 h (1) of this section.

(3). Bromide. Waterworks required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the waterworks demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The waterworks must continue bromide monitoring to remain on reduced bromate monitoring.

i. Monitoring requirements for disinfectant residuals.

(1). Chlorine and chloramines.

(a). Waterworks that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in 12VAC5-590-370 A. Waterworks that use surface water or groundwater under the direct influence of surface water may use the results of residual disinfectant concentration sampling found in 12VAC5-590-370 B 7 c (1) in lieu of taking separate samples.

(b). Residual disinfectant level monitoring may not be reduced.

(2). Chlorine dioxide.

(a). Waterworks that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL in Table 2.12, the waterworks must take samples in the distribution system the following day at the locations required by subdivision B 3 i (2) (b) of this section, in addition to the sample required at the entrance to the distribution system.

(b). On each day following a routine sample monitoring result that exceeds the MRDL in Table 2.12, the waterworks is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the waterworks must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the waterworks must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(c). Chlorine dioxide monitoring may not be reduced.

j. Monitoring requirements for disinfection byproduct precursors (DBPP).

(1). Community or nontransient noncommunity waterworks using surface water or groundwater under the direct influence of surface water and using conventional filtration treatment (as defined in 12VAC5-590-10) must monitor each

treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All waterworks required to monitor under this subdivision (B 3 j (1)) must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all waterworks must monitor for alkalinity in the source water prior to any treatment. Waterworks must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

(2). Community or nontransient noncommunity waterworks that use surface water or groundwater under the direct influence of surface water with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The waterworks must revert to routine monitoring in the month following the quarter when the annual average treated water TOC equal to or greater than 2.0 mg/L.

k. Each waterworks required to monitor under subdivision B 3 of this section must develop and implement a monitoring plan. The waterworks must maintain the plan and make it available for inspection by the commissioner and the general public no later than 30 days following the applicable compliance dates in subdivision B 3 b of this section. All community or nontransient noncommunity waterworks that use surface water or groundwater under the direct influence of surface water serving more than 3,300 people must submit a copy of the monitoring plan to the commissioner no later than the date of the first report required under 12VAC5-590-530 A. The commissioner may also require the plan to be submitted by any other waterworks. After review, the commissioner may require changes in any plan elements. The plan must include at least the following elements:

(1). Specific locations and schedules for collecting samples for any parameters included in subdivision B 3 of this section.

(2). How the waterworks will calculate compliance with PMCLs, MRDLs, and treatment techniques.

(3). The sampling plan for a consecutive waterworks must reflect the entire consecutive distribution system.

4. Unregulated contaminants (UCs). All community and nontransient noncommunity waterworks shall sample for the contaminants listed in Table 2.6 and Table 2.7 as follows:

a. Table 2.6--Group A

(1). Owners of waterworks which use a surface water source in whole or in part shall sample at the entry points to the distribution system which is representative of each source, after treatment (hereafter called a sampling point). The minimum number of samples is one year of consecutive quarterly samples per sampling point beginning in accordance with Table 2.8.

(2). Owners of waterworks which use groundwater shall sample at points of entry to the distribution system which is representative of each source

(hereafter called a sampling point). The minimum number of samples is one sample per sampling point beginning in accordance with Table 2.8.

(3). The commissioner may require a confirmation sample for positive or negative results.

(4). Waterworks serving less than 150 connections may inform the commissioner, in writing, that their waterworks is available for sampling instead of performing the required sampling.

(5). All waterworks required to sample under this section shall repeat the sampling at least every five years.

b. Table 2.6--Group B and Table 2.7

(1). The owner of each community and nontransient noncommunity waterworks owner shall take four consecutive quarterly samples at the entry points to the distribution system which is representative of each source (hereafter called a sampling point) for each contaminant listed in Table 2.6 Group B and report the results to the commissioner. Monitoring shall be completed by December 31, 1995.

(2). The owner of each community and nontransient noncommunity waterworks shall take one sample at each sampling point for each contaminant listed in Table 2.7 and report the results to the commissioner. Monitoring shall be completed by December 31, 1995.

(3). The owner of each community and nontransient noncommunity waterworks may apply to the commissioner for a waiver from the monitoring requirements of subdivisions B 4 b (1) and (2) of this section for the contaminants listed in Table 2.6 Group B and Table 2.7.

(4). The commissioner may grant a waiver for the requirement of subdivision B 4 b (1) of this section based on the criteria specified in subdivision B 2 f of this section. The commissioner may grant a waiver from the requirement of subdivision B 4 b (2) of this section if previous analytical results indicate contamination would not occur, provided this data was collected after January 1, 1990.

(5). If the waterworks utilizes more than one source and the sources are combined before distribution, the waterworks 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).

(6). The commissioner may require a confirmation sample for positive or negative results.

(7). Instead of performing the monitoring required by this section, the owner of a community waterworks or nontransient noncommunity waterworks serving fewer than 150 service connections may send a letter to the commissioner stating that the waterworks is available for sampling. This letter shall be sent to the commissioner by January 1, 1994. The waterworks shall not send such samples to the commissioner unless requested to do so by the commissioner.

(8). All waterworks required to sample under this section shall repeat the sampling at least every five years.

5. Repealed.

6. ~~Lead and Copper~~ Monitoring Requirements for Lead and Copper. The owners of all community and nontransient noncommunity waterworks shall monitor for lead and copper in tap water (subdivision B 6 a of this section), water quality (corrosion) parameters in the distribution system and at entry points (subdivision B 6 b of this section), and lead and copper in water supplies (subdivision B 6 c of this section). The monitoring requirements contained in this section are summarized in Appendix M.

a. Monitoring requirements for lead and copper in tap water.

(1). Sample site location

(a). By the applicable date for commencement of monitoring under subdivision B 6 a (4) (a), each waterworks owner 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 section, and which is sufficiently large to ensure that the owner can collect the number of lead and copper tap samples required in subdivision B 6 a (3). All sites from which first draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

(b). A waterworks owner shall use the information on lead, copper, and galvanized steel that the owner is required to collect when conducting a materials evaluation (reference Appendix B Corrosion). When this evaluation is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria of this section, the owner shall review the sources of information listed below in order to identify a sufficient number of sampling sites. In addition, the owner shall seek to collect such information where possible in the course of its normal operations (e.g., checking service line materials when reading water meters or performing maintenance activities):

(i). All plumbing codes, permits, and records in the files of the building department(s) which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system;

(ii). All inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and

(iii). All existing water quality information, which includes the results of all prior analyses of the waterworks or individual structures connected to the waterworks, indicating locations that may be particularly susceptible to high lead or copper concentrations.

(c). The sampling sites selected for a community waterworks' sampling pool ("tier 1 sampling sites") shall consist of single family structures that:

(i). Contain copper pipes with lead solder installed between January 1983 and April 1986 or contain lead pipes; and/or

(ii). Are served by a lead service line.

NOTE: When multiple-family residences comprise at least 20% of the structures served by a waterworks, the waterworks may include these types of structures in its sampling pool.

(d). The owner of any community waterworks with insufficient tier 1 sampling sites shall complete the sampling pool with "tier 2 sampling sites," consisting of buildings, including multiple-family residences that:

(i). Contain copper pipes with lead solder installed between January 1983 and April 1986 or contain lead pipes; and/or

(ii). Are served by a lead service line.

(e). The owner of any community waterworks with insufficient tier 1 and tier 2 sampling sites shall complete the sampling pool with "tier 3 sampling sites," consisting of single family structures that contain copper pipes with lead solder installed before 1983. The owner of a community waterworks 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 waterworks.

(f). The sampling sites selected for a nontransient noncommunity waterworks ("tier 1 sampling sites") shall consist of buildings that:

(i). Contain copper pipes with lead solder installed between January 1983 and April 1986 or contain lead pipes; and/or.

(ii). Are served by a lead service line.

(g). The owner of a nontransient noncommunity waterworks with insufficient tier 1 sites that meet the targeting criteria in subdivision B 6 a (1) (f) of this section 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 owner of a non-transient non-community waterworks 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 waterworks.

~~(h). All waterworks owners shall notify the appropriate field office of the division in writing when the pool of sampling sites has been identified and indicate that a sufficient number of tier 1 sites were included in the pool to comply with the required number of sampling sites specified under subdivision B 6 a (3) of this section.~~

~~(i). The owner of any waterworks whose sampling pool does not consist exclusively of tier 1 sites shall demonstrate in a letter submitted to the field office under 12VAC5-590-530-D 1 b, why a review of the~~

~~information listed in subdivision B 6 a (1) (b) of this section was inadequate to locate a sufficient number of tier 1 sites.~~

~~(ii). — The owner of any community waterworks which includes tier 3 sampling sites in its sampling pool shall demonstrate in such a letter why it was unable to locate a sufficient number of tier 1 and tier 2 sampling sites.~~

~~(i) (h). The owner of any waterworks whose distribution system contains lead service lines shall draw 50% of the samples the owner collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50% of the samples the owner collects from sites served by a lead service line. Any owner who cannot identify a sufficient number of sampling sites served by a lead service line shall demonstrate in a letter submitted to the field office under 12VAC5-590-530 D 1 d why the owner was unable to locate a sufficient number of such sites. The owner of such a waterworks shall collect first draw tap samples from all of the sites identified as being served by such lines.~~

(2). Sample collection methods.

(a). All tap samples for lead and copper, with the exception of lead service line samples collected under 12VAC5-590-420 E 3 and samples collected under subdivision B 6 a (2) (e) of this section, shall be first draw samples.

(b). Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. First draw samples from residential housing shall be collected from the cold-water kitchen 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 subdivision B 6 a (2) (e) of this section shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. First draw samples may be collected by the waterworks owner or the owner 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 14 days after the sample is collected. ~~If the sample is not acidified immediately after collection, then the sample must stand in the original container for at least 28 hours after acidification. 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 an owner allows residents to perform sampling, the owner may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

(c). Each lead service line sample collected pursuant to 12VAC5-590-420 E 3 for the purpose of avoiding replacement shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:

(i). At the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line;

line; or (ii). Tapping directly into the lead service

(iii). if the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

(d). A waterworks owner shall collect each first draw tap sample from the same sampling site from which the owner collected a previous sample. If, for any reason, the owner cannot gain entry to a sampling site in order to collect a follow-up tap sample, the owner may collect the follow-up tap sample from another sampling site in the sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

(e). The owner of a non-transient non-community waterworks, or a community waterworks that meets the criteria of 12 VAC 5-590-420 F 3 g (1) and (2) that does not have enough taps that can supply first- draw samples, as defined in subdivision B 6 a (2) (b) of this section, may apply to the district engineer in writing to substitute non-first-draw samples. If approved by the commissioner such owners must collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites.

(3). Number of samples - Waterworks owners shall collect at least one sample during each monitoring period specified in subdivision B 6 a (4) of this section from the number of sites listed in the first column ~~below~~ ("standard monitoring") of the table in this paragraph. The owner of a waterworks conducting reduced monitoring under subdivision B 6 a (4) (d) of the section ~~may~~ shall collect at least one sample from the number of sites specified in the second column below ("reduced monitoring") of the table in this paragraph during each monitoring period specified in subdivision B 6 a (4) (d) of this section. Such reduced monitoring sites shall be representative of the sites required for standard monitoring. The commissioner may specify sampling locations when a waterworks owner is conducting reduced monitoring. The table is as follows:

of sites	System Size # Number of sites (# Number of People Served)	# Number	
Monitoring)	(Reduced Monitoring)	(Standard	
	>100,000	100	
	10,001-100,000		60
	3,301 to 10,000	40	
	501 to 3,300	20	
	101 to 500		10
	<=100		5

(4). Timing of monitoring.

(a). Initial tap sampling. The first six-month monitoring period for small (serving ≤ 3,300 population), medium-size (serving 3,301 to 50,000 population) and large waterworks (serving > 50,000 population) shall ~~begin on the following dates:~~ be established by the commissioner.

## ~~System Size (# People Served) First Six-Month Monitoring Period Begins On~~

<del>Large</del> >50,000	<del>January 1, 1992</del>
<del>Medium</del> 3,301 to 50,000	<del>July 1, 1992</del>
<del>Small</del> <=3,300	<del>July 1, 1993</del>

(i). All large waterworks shall monitor during two consecutive six-month periods.

(ii). All small and medium-size waterworks shall monitor during each six-month monitoring period until: the waterworks exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under 12VAC5-590-420 C, in which case the owner shall continue monitoring in accordance with subdivision B 6 a (4) (b) of this section, or the waterworks meets the lead and copper action levels during two consecutive six-month monitoring periods, in which case the owner may reduce monitoring in accordance with subdivision B 6 a (4) (d) of this section.

(b). Monitoring after installation of corrosion control and water supply (source water) treatment.

(i). The owner of any large waterworks which installs optimal corrosion control treatment pursuant to 12VAC5-590-420 C 2 d (4) shall monitor during two consecutive six-month monitoring periods by the date specified in 12VAC5-590-420 C 2 d (5).

(ii). The owner of any small or medium-size waterworks which installs optimal corrosion control treatment pursuant to 12VAC5-590-420 C 2 e (5) shall monitor during two consecutive six-month monitoring periods by the date specified in 12VAC5-590-420 C 2 e (6).

(iii). The owner of any waterworks which installs source water treatment pursuant to 12VAC5-590-420 D 1 c shall monitor during two consecutive six-month monitoring periods by the date specified in 12VAC5-590-420 D 1 d.

(c). Monitoring after the commissioner specifies water quality parameter values for optimal corrosion control. After the commissioner specifies the values for water quality control parameters under 12VAC5-590-420 C 1 f, the waterworks owner shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the commissioner specifies the optimal values under 12VAC5-590-420 C 1 f.

(d). Reduced monitoring.

(i). The owner of a small or medium-size waterworks that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the number of samples in accordance with

subdivision B 6 a (3) of this section, and reduce the frequency of sampling to once per year.

(ii). The owner of any waterworks that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the commissioner under 12VAC5-590-420 C 1 f during each of two consecutive six-month monitoring periods may ~~request that the commissioner allow the waterworks to~~ reduce the frequency of monitoring to once per year and ~~to~~ reduce the number of lead and copper samples in accordance with subdivision B 6 a (3) of this section. if the owner receives written approval from the commissioner. The commissioner shall review the monitoring, treatment, and other relevant information submitted by the waterworks owner in accordance with 12 VAC 5-590-530 D, and shall make a decision in writing, setting forth the basis for its determination. notify the waterworks owner in writing when a determination is made that the owner is eligible to commence reduced monitoring pursuant to this paragraph. The commissioner shall review, and where appropriate, revise its determination when the owner submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iii). The owner of a small or medium-size waterworks that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any waterworks that maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the commissioner under 12VAC5-590-420 C 1 f during three consecutive years of monitoring may ~~request that the Commissioner allow the waterworks to~~ reduce the frequency of monitoring from annually to once every three years if the owner receives written approval from the commissioner. The commissioner shall review the monitoring, treatment, and other relevant information submitted by the owner in accordance with 12 VAC 5-590-530 D and shall make a decision in writing, setting forth the basis for its determination. notify the waterworks owner in writing when a determination is made that the owner is eligible to commence reduced monitoring pursuant to this paragraph. The commissioner shall review, and where appropriate, revise its determination when the owner submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iv). The owner of a waterworks that reduces the number and frequency of sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in subdivision B 6 a (1) of this section. Waterworks owners sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August or September. For a non-transient non-community waterworks that does not operate during the months of June through September, the commissioner shall designate an alternate monitoring period that represents a time of normal operation for the waterworks.

(v). The owner of any waterworks that demonstrates for two consecutive 6- month monitoring periods that the tap water lead level computed under 12 VAC 5-590-410 5 c is less than or equal to 0.005 mg/L and the tap water copper level computed under 12 VAC 5-590-410 5 c is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with subdivision B 6 a (3) of this section and reduce the frequency of sampling to once every three calendar years.

~~(vi)~~ (vi) The owner of a small or medium-size waterworks subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling in accordance subdivision B 6 a (4) (c) of this section and collect

the number of samples specified for standard monitoring under subdivision B 6 a (3) of this section. Such waterworks owner shall also conduct water quality parameter monitoring in accordance with subdivision B 6 b (2), (3), or (4) of this section (as appropriate) during the monitoring period in which the action level is exceeded. Any waterworks subject to reduced monitoring frequency that fails to operate within the range of values for the water quality control parameters specified by the commissioner under 12VAC5-590-420 C 1 f shall resume tap water sampling in accordance with subdivision B 6 a (4) (c) of this section and collect the number of samples specified for standard monitoring under subdivision B 6 a (3) of this section. The owner of any such waterworks may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in subdivision B 6 a (3) of this section after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of subdivision B 6 a (4) (d) (i) of this section and/or may resume triennial monitoring for lead and copper at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either subdivision B 6 a (4) (d) (iii) or B 6 a (4) (d) (v) of this section.

(vii). The owner of any waterworks subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the commissioner under 12VAC5-590-420 C 1 f for more than nine days in any six-month period specified in subdivision B 6 b (4) of this section shall conduct tap water sampling for lead and copper at the frequency specified in subdivision B 6 a (4) (c) of this section, collect the number of samples specified for standard monitoring under subdivision B 6 a (3) of this section, and shall resume monitoring for water quality parameters within the distribution system in accordance with subdivision B 6 b (4) of this section. The owner of such a waterworks may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:

((a)). The waterworks owner may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in subdivision B 6 a (3) of this section after completion of two subsequent six-month rounds of monitoring that meet the criteria of subdivision B 6 a (4) (d) (ii) of this section and the owner has received written approval from the commissioner that it is appropriate to resume reduced monitoring on an annual frequency.

((b)). The waterworks owner may resume triennial monitoring for lead and copper at the tap at the reduced number of sites after demonstration through subsequent rounds of monitoring that it meets the criteria of either subdivision B 6 a (4) (d) (iii) or B 6 a (4) (d) (v) of this section and the owner has received written approval from the commissioner that it is appropriate to resume triennial monitoring.

((c)). The waterworks owner may reduce the number of water quality parameter tap water samples required in accordance with subdivision B 6 b (5) (a) of this section and the frequency with which it collects such samples in accordance with subdivision B 6 b (5) (b) of this section. The owner of such a waterworks may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of subdivision B 6 b (5) (b) of this section, that it has re-qualified for triennial monitoring.

(viii). The owner of any waterworks subject to a reduced monitoring frequency under subdivision B 6 a (4) (d) of this section that either adds a new source of water or changes any water treatment shall inform the district engineer in writing in accordance with 12VAC5-590-530 D 1 c. The commissioner may

require the waterworks owner to resume sampling in accordance with subdivision B 6 a (4) (c) of this section and collect the number of samples specified for standard monitoring under subdivision B 6 a (3) of this section or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation of its corrosion control treatment given the potentially different water quality considerations.

(5). Additional monitoring by waterworks owner. The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the waterworks owner and the commissioner in making any determinations (i.e., calculating the 90th percentile lead or copper level) under this subpart.

(6). Invalidation of lead or copper tap water samples. A sample invalidated under this paragraph does not count toward determining lead or copper 90th percentile levels under 12VAC5-590-410 (5) or toward meeting the minimum monitoring requirements of subdivision B 6 a (3) of this section.

(a). The commissioner may invalidate a lead or copper tap water sample if at least one of the following conditions is met.

(i). The laboratory establishes that improper sample analysis caused erroneous results.

(ii). The commissioner determines that the sample was taken from a site that did not meet the site selection criteria of this section.

(iii). The sample container was damaged in transit.

(iv). There is substantial reason to believe that the sample was subject to tampering.

(b). The waterworks owner must report the results of all samples to the district engineer and all supporting documentation for samples the owner believes should be invalidated.

(c). To invalidate a sample under subdivision B 6 a (6) (a) of this section, the decision and the rationale for the decision must be documented in writing. The commissioner may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.

(d). The waterworks owner must collect replacement samples for any samples invalidated under this section if, after the invalidation of one or more samples, the owner has too few samples to meet the minimum requirements of subdivision B 6 a (3) of this section. Any such replacement samples must be taken as soon as possible, but no later than 20 days after the date the commissioner invalidates the sample or by the end of the applicable monitoring period, whichever occurs later. Replacement samples taken after the end of the applicable monitoring period shall not also be used to meet the monitoring requirements of a subsequent monitoring period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the monitoring period.

(7). Monitoring waivers for small systems. The owner of any small waterworks that meets the criteria of this section may apply to the commissioner to reduce the frequency of monitoring for lead and copper to once every nine years (i.e., a "full waiver") if the owner meets all of the materials criteria specified in subdivision B 6 a (7) (a) of this section and all of the monitoring criteria specified in subdivision B 6 a (7) (b) of this section. The owner of any small system that meets the criteria in subdivisions B 6 a (7) (a) and B 6 a (7) (b) of this section only for lead, or only for copper, may apply to the commissioner for a waiver to reduce the frequency of tap water monitoring to once every nine years for that contaminant only (i.e., a "partial waiver").

(a). Materials criteria. The waterworks owner must demonstrate that the distribution system and service lines and all drinking water supply plumbing, including plumbing conveying drinking water within all residences and buildings connected to the waterworks, are free of lead-containing materials and/or copper-containing materials, as those terms are defined in this paragraph, as follows:

(i). Lead. To qualify for a full waiver, or a waiver of the tap water monitoring requirements for lead (i.e., a "lead waiver"), the waterworks owner must provide certification and supporting documentation to the commissioner that the waterworks is free of all lead-containing materials, as follows:

((a)). It contains no plastic pipes which contain lead plasticizers, or plastic service lines which contain lead plasticizers; and

((b)). It is free of lead service lines, lead pipes, lead soldered pipe joints, and leaded brass or bronze alloy fittings and fixtures, unless such fittings and fixtures meet the specifications of any standard established pursuant to 42 U.S.C. 300g-6(e) (SDWA section 1417(e)).

(ii). Copper. To qualify for a full waiver, or a waiver of the tap water monitoring requirements for copper (i.e., a "copper waiver"), the waterworks owner must provide certification and supporting documentation to the commissioner that the waterworks contains no copper pipes or copper service lines.

(b). Monitoring criteria for waiver issuance. The waterworks owner must have completed at least one 6-month round of standard tap water monitoring for lead and copper at sites approved by the commissioner and from the number of sites required by subdivision B 6 a (3) of this section and demonstrate that the 90th percentile levels for any and all rounds of monitoring conducted since the owner became free of all lead-containing and/or copper-containing materials, as appropriate, meet the following criteria.

(i). Lead levels. To qualify for a full waiver, or a lead waiver, the waterworks owner must demonstrate that the 90th percentile lead level does not exceed 0.005 mg/L.

(ii). Copper levels. To qualify for a full waiver, or a copper waiver, the waterworks owner must demonstrate that the 90th percentile copper level does not exceed 0.65 mg/L.

(c). Commissioner approval of waiver application. The commissioner shall notify the waterworks owner of its waiver determination, in writing, setting forth the basis of its decision and any condition of the waiver. As a condition of the waiver, the commissioner may require the owner to perform specific

activities (e.g., limited monitoring, periodic outreach to customers to remind them to avoid installation of materials that might void the waiver) to avoid the risk of lead or copper concentration of concern in tap water. The owner of a small waterworks must continue monitoring for lead and copper at the tap as required by subdivisions B 6 a (4) (a) through B 6 a (4) (d) of this section, as appropriate, until it receives written notification from the commissioner that the waiver has been approved.

(d). Monitoring frequency for waterworks owners with waivers.

(i). A waterworks owner with a full waiver must conduct tap water monitoring for lead and copper in accordance with subdivision B 6 a (4) (d) (iv) of this section at the reduced number of sampling sites identified in subdivision B 6 a (3) of this section at least once every nine years and provide the materials certification specified in subdivision B 6 a (7) (a) of this section for both lead and copper to the commissioner along with the monitoring results.

(ii). A waterworks owner with a partial waiver must conduct tap water monitoring for the waived contaminant in accordance with subdivision B 6 a (4) (d) (iv) of this section at the reduced number of sampling sites specified in subdivision B 6 a (3) of this section at least once every nine years and provide the materials certification specified in subdivision B 6 a (7) (a) of this section pertaining to the waived contaminant along with the monitoring results. Such a waterworks owner also must continue to monitor for the non-waived contaminant in accordance with requirements of subdivisions B 6 a (4) (a) through B 6 a (4) (d) of this section, as appropriate.

(iii). If a waterworks owner with a full or partial waiver adds a new source of water or changes any water treatment, the owner must notify the commissioner in writing in accordance with 12 VAC 5-590-530 D 1 c. The commissioner has the authority to require the owner to add or modify waiver conditions (e.g., require recertification that the waterworks is free of lead-containing and/or copper-containing materials, require additional round(s) of monitoring), if it deems such modifications are necessary to address treatment or source water changes at the waterworks.

(iv). If a waterworks owner with a full or partial waiver becomes aware that it is no longer free of lead-containing or copper-containing materials, as appropriate, (e.g., as a result of new construction or repairs), the owner shall notify the commissioner in writing no later than 60 days after becoming aware of such a change.

(e). Continued eligibility. If the waterworks owner continues to satisfy the requirements of subdivision B 6 a (7) (d) of this section, the waiver will be renewed automatically, unless any of the conditions listed in subdivisions B 6 a (7) (e) (i) through B 6 a (7) (e) (iii) of this section occurs. A waterworks owner whose waiver has been revoked may re-apply for a waiver at such time as it again meets the appropriate materials and monitoring criteria of subdivisions B 6 a (7) (a) and B 6 a (7) (b) of this section.

(i). A waterworks owner with a full waiver or a lead waiver no longer satisfies the materials criteria of subdivision B 6 a (7) (a) (i) of this section or has a 90th percentile lead level greater than 0.005 mg/L.

(ii). A waterworks owner with a full waiver or a copper waiver no longer satisfies the materials criteria of subdivision B 6 a (7) (a) (ii) of this section or has a 90th percentile copper level greater than 0.65 mg/L.

(iii). The commissioner notifies the waterworks owner, in writing, that the waiver has been revoked, setting forth the basis of the decision.

(f). Requirements following waiver revocation. A waterworks owner whose full or partial waiver has been revoked by the commissioner is subject to the corrosion control treatment and lead and copper tap water monitoring requirements, as follows:

(i). If the waterworks owner exceeds the lead and/ or copper action level, the owner must implement corrosion control treatment in accordance with the deadlines specified in 12 VAC 5-590-420 C 2 e and any other applicable requirements of this subpart.

(ii). If the waterworks owner meets both the lead and the copper action level, the owner must monitor for lead and copper at the tap no less frequently than once every three years using the reduced number of sample sites specified in subdivision B 6 a (3) of this section.

(g). Pre-existing waivers. Waivers for small waterworks approved by the commissioner in writing prior to April 11, 2000 shall remain in effect under the following conditions:

(i). If the waterworks owner has demonstrated that it is both free of lead-containing and copper-containing materials, as required by subdivision B 6 a (7) (a) of this section and that its 90th percentile lead levels and 90th percentile copper levels meet the criteria of subdivision B 6 a (7) (b) of this section, the waiver remains in effect so long as the owner continues to meet the waiver eligibility criteria of subdivision B 6 a (7) (e) of this section. The first round of tap water monitoring conducted pursuant to subdivision B 6 a (7) (d) of this section shall be completed no later than nine years after the last time the owner has monitored for lead and copper at the tap.

(ii). If the waterworks owner has met the materials criteria of subdivision B 6 a (7) (a) of this section but has not met the monitoring criteria of subdivision B 6 a (7) (b) of this section, the owner shall conduct a round of monitoring for lead and copper at the tap demonstrating that it meets the criteria of subdivision B 6 a (7) (b) of this section no later than September 30, 2000. Thereafter, the waiver shall remain in effect as long as the owner meets the continued eligibility criteria of subdivision B 6 a (7) (e) of this section. The first round of tap water monitoring conducted pursuant to subdivision B 6 a (7) (d) of this section shall be completed no later than nine years after the round of monitoring conducted pursuant to subdivision B 6 a (7) (b) of this section.

b. Monitoring requirements for water quality parameters. The owners of all large waterworks, and all small and medium-size waterworks that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this section. The requirements of this section are ~~in~~ summarized in Appendix M.

(1). General requirements.

(a). Sample collection methods.

(i). Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the waterworks, and seasonal variability. Tap sampling under this section is not required to be conducted at taps targeted for lead and copper sampling under subdivision B 6 (a) (1) of this section. Waterworks owners may find it convenient to conduct tap sampling for water quality parameters at sites approved for coliform sampling.

(ii). Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. If a waterworks draws water from more than one source and the sources are combined before distribution, the waterworks owner must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(b). Number of samples.

(i). Waterworks owners shall collect two tap samples for applicable water quality parameters during each monitoring period specified under subdivision B 6 b (2) through (5) of this section from the following number of sites.

System Size (# Number of People Served)	#
>100,000	
10,001-100,000	
3,301 to 10,000	
501 to 3,300	
101 to 500	
<=100	

(ii). Except as provided in subdivision B 6 b (3) (c) of this section, Waterworks waterworks owners shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in subdivision B 6 b (2) of this section. During each monitoring period specified in subdivision B 6 b (3) through (5) of this section, waterworks owners shall collect one sample for each applicable water quality parameter at each entry point to the distribution system.

(2). Initial sampling. The owners of all large waterworks shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in subdivision B 6 a (4) (a) of this section. The owners of all small and medium-size waterworks shall measure the applicable water quality parameters at the locations specified below during each six-month monitoring period specified in subdivision B 6 a (4) (a) of this section during which the waterworks exceeds the lead or copper action level.

(a). At taps:

- (i) pH;
- (ii) alkalinity;
- (iii) orthophosphate, when an inhibitor containing a phosphate compound is used;
- (iv) silica, when an inhibitor containing a silicate compound is used;
- (v) calcium;
- (vi) conductivity; and
- (vii) water temperature.

(b). At each entry point to the distribution system: all of the applicable parameters listed in subdivision B 6 b (2) (a) of this section.

(3). Monitoring after installation of corrosion control. The owner of any large waterworks which installs optimal corrosion control treatment pursuant to 12VAC5-590-420 C 2 d (4) shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in subdivision B 6 a (4) (b) (i) of this section. The owner of any small or medium-size waterworks which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in subdivision B 6 a (4) (b) (ii) in which the waterworks exceeds the lead or copper action level.

- (a). At taps, two samples for:
  - (i). pH;
  - (ii). alkalinity;
  - (iii). orthophosphate, when an inhibitor containing a phosphate compound is used;
  - (iv). silica, when an inhibitor containing a silicate compound is used;
  - (v). calcium, when calcium carbonate stabilization is used as part of corrosion control.

(b). Except as provided in subdivision B 6 b (3) (c) of this section, At each entry point to the distribution system, at least one sample no less frequently than every two weeks (bi-weekly) for:

- (i) pH;
- (ii) when alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and

(iii). when a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).

(c). The owner of any ground water waterworks can limit entry point sampling described in subdivision B 6 b (3) (b) of this section to those entry points that are representative of water quality and treatment conditions throughout the waterworks. If water from untreated ground water sources mixes with water from treated ground water sources, the owner must monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of any monitoring under this paragraph, the owner shall provide to the commissioner written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the waterworks.

(4). Monitoring after the commissioner specifies water quality parameter values for optimal corrosion control. After the commissioner specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under 12VAC5-590-420 C 1 f, the owners of all large waterworks shall measure the applicable water quality parameters in accordance with subdivision B 6 b (3) of this section ~~during each monitoring period specified in subdivision B 6 a (4) (c) of this section and determine compliance with the requirements of 12 VAC 5-590-420 C1g every six months with the first six-month period to begin on the date the commissioner specifies the optimal values under 12 VAC 5-590-420 C1f.~~ The owner of any small or medium-size waterworks shall conduct such monitoring during each six-month monitoring period specified in ~~subdivision B 6 a (4) (c) of this section~~ this subdivision in which the waterworks exceeds the lead or copper action level. ~~The owner may take a confirmation sample for any water quality parameter value no later than 3 days after the first sample. If a confirmation sample is taken, the result must be averaged with the first sampling result and the average must be used for any compliance determinations under 12 VAC 5-590-420 C 1 g. The commissioner has discretion to delete results of obvious sampling errors from this calculation.~~ For the owner of any such small and medium-size waterworks that is subject to a reduced monitoring frequency pursuant to subdivision B 6 a (4) (d) of this section at the time of the action level exceedance, the end of the applicable six-month period under this paragraph shall coincide with the end of the applicable monitoring period under subdivision B 6 a (4) (d) of this section. Compliance with the commissioner-designated optimal water quality parameter values shall be determined as specified under 12 VAC 5-590-420 C1g.

(5). Reduced monitoring.

(a). The owner of any waterworks 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 subdivision B 6 b (4) of this section shall continue monitoring at the entry point(s) to the distribution system as specified in subdivision B 6 b (3) (b) of this section. The owner of such waterworks may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period.

~~Reduced # of Sites (# People Served) \_\_\_\_\_ System Size for Water~~

<u>Number of WQP</u>	<u>Size of Water System</u>	<u>Reduced</u>
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<u>Monitoring Sites</u>	<u>Number of People Served</u>	
	>100,000	10
	10,001 to 100,000	7
	3,301 to 10,000	3
	501 to 3,300	2
	101 to 500	1
	<=100	1

(b). The owner of any waterworks that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the commissioner under 12VAC5-590-420 C 1f during three consecutive years of monitoring may reduce the frequency with which the owner collects the number of tap samples for applicable water quality parameters specified in ~~this~~ subdivision B 6 b (5) (a) of this section from every six months to annually. ~~Any~~ The owner of any waterworks that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the commissioner under 12VAC5-590-420 C 1 f during three consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in subdivision B 6 a (5) (a) of this section from annually to every three years.

(c). The owner of a waterworks may reduce the frequency with which tap samples are collected for applicable water quality parameters specified in subdivision B 6 b (5)(a) of this section to every three years if the owner demonstrates during two consecutive monitoring periods that the tap water lead level at the 90<sup>th</sup> percentile is less than or equal to the PQL for lead (0.005 mg/L), that the tap water copper level at the 90<sup>th</sup> percentile is less than or equal to 0.65 mg/L for copper, and that the owner also has maintained the range of values for water quality parameters reflecting optimal corrosion control treatment specified by the commissioner under 12 VAC 5-590-420 C1f.

~~(e)~~ (d). The owner of a waterworks that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

~~(d)~~ (e). The owner of any waterworks subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the commissioner under 12 VAC 5-590-420 C 1 f for more than nine days in any six-month period specified in 12 VAC 5-590-420 C1g shall resume distribution system tap water sampling in accordance with the number and frequency requirements in subdivision B 6 b (4) of this section. Such a waterworks owner may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in subdivision B 6 b (5) of this section after completion of two subsequent consecutive six-month rounds of monitoring that meet the criteria of that subdivision and/or may resume triennial monitoring for water quality parameters at the tap at the reduced number of sites after demonstration through subsequent rounds of monitoring that the criteria of either subdivision B 6 b (5) (b) or B 6 b (5) (c) of this section has been met.

(6). Additional monitoring by waterworks owners. The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the waterworks owner and the commissioner in making any determinations under this section or 12VAC5-590-420 C 1.

c. Monitoring requirements for lead and copper in water supplies (source water).

(1). Sample location, collection methods, and number of samples.

(a). ~~The owner of a waterworks that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with subdivision B 6 a of this section shall collect lead and copper water supply samples in accordance with the requirements regarding sample location, number of samples, and collection methods specified in subsection B 1 (inorganic chemical sampling). The timing of sampling for lead and copper in water supplies shall be in accordance with subdivision B 6 c (2) and B 6 c (3) of this section.~~

the following requirements regarding sample location, number of samples, and collection methods:

(i). The owner of a waterworks served by groundwater sources 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 waterworks owner shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(ii). The owner of a waterworks served by surface water sources shall take a minimum of one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point). The waterworks owner shall take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant. Note that for the purpose of this paragraph, a waterworks served by a surface water source includes waterworks served by a combination of surface and ground sources.

(iii). If a waterworks draws water from more than one source and the sources are combined before distribution, the waterworks owner must collect samples at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).

(iv). The commissioner may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples must be done by certified laboratory personnel. Composite samples from a maximum of five samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 mg/L or the copper concentration is greater than or equal to 0.160 mg/L, then either a follow-up sample shall be collected and analyzed within 14 days at each sampling point included in the composite or if duplicates of or sufficient quantities from the original samples from each sampling point used in the composite are available, the waterworks owner may use these instead of resampling.

(b). Where the results of sampling indicate an exceedance of maximum permissible water supply levels established under 12VAC5-590-420 D 4, the commissioner may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the

same sampling point. If a commissioner required confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the commissioner-specified maximum permissible levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL. The PQL for Lead is equal to 0.005 mg/l and the PQL for Copper is equal to 0.050 mg/l.

(2). Monitoring frequency after waterworks exceeds tap action level. The owner of any waterworks which exceeds the lead or copper action level at the tap shall collect one water supply sample from each entry point to the distribution system within six months after the exceedance.

(3). Monitoring frequency after installation of water supply treatment. The owner of any waterworks which installs water supply treatment pursuant to 12VAC5-590-420 D 1 c shall collect an additional water supply sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified in 12VAC5-590-420 D 1 d.

(4). Monitoring frequency after the commissioner specifies maximum permissible water supply lead and copper levels or determines that water supply treatment is not needed.

(a). A waterworks owner shall monitor at the frequency specified below in cases where the commissioner specifies maximum permissible water supply lead and copper levels under 12VAC5-590-420 D 4 or determines that the owner is not required to install water supply treatment under 12VAC5-590-420 D 2 (b).

(i). The owner of a waterworks using only groundwater shall collect samples once during the three-year compliance period in effect when the applicable commissioner determination under subdivision B 6 c (4) (a) of this section is made. Owners of such waterworks shall collect samples once during each subsequent compliance period.

(ii). The owner of a waterworks using surface water (or a combination of surface and groundwater) shall collect samples once during each year, the first annual monitoring period to begin on the date on which the applicable commissioner determination is made under subdivision B 6 c (4) (a) of this section.

(b). A waterworks owner is not required to conduct water supply sampling for lead and/or copper if the waterworks meets the action level for the specific contaminant in tap water samples during the entire water supply sampling period applicable to the waterworks under subdivision B 6 c (4) (a) (i) or (ii) of this section.

(5). Reduced monitoring frequency.

(a). The owner of a waterworks using only groundwater ~~which demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and/or copper concentrations specified by the commissioner in 12 VAC 5-590-420 D 4 during at least three consecutive compliance periods under subdivision B 6 c (4) of this section may~~

reduce the monitoring frequency for lead and/or copper to once during each nine-year compliance cycle. may reduce the monitoring frequency for lead and copper in water supplies to once during each nine-year compliance cycle if the waterworks owner meets one of the following criteria:

(i). The waterworks owner demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the commissioner under 12 VAC 5-590-420 D 4 during at least three consecutive compliance periods under subdivision B 6 c (4) (a) of this section; or

(ii). The commissioner has determined that water supply treatment is not needed and the waterworks owner demonstrates that, during the last three consecutive compliance periods in which sampling was conducted under subdivision B 6 c (4) (a) of this section, the concentration of lead in the water supply was less than or equal to 0.005 mg/L and the concentration of copper in the water supply was less than or equal to 0.65 mg/L.

(b). The owner of a waterworks using surface water (or a combination of surface and ground waters) ~~which demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the commissioner in 12 VAC 5-590-420 D 4 for at least three consecutive years~~ may reduce the monitoring frequency in 12 VAC 5-590-370 B 6 c (4) (a) to once during each nine-year compliance cycle. may reduce the monitoring frequency for lead and copper in water supplies to once during each nine-year compliance cycle if the waterworks owner meets one of the following criteria:

(i). The waterworks owner demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the commissioner under 12 VAC 5-590-420 D 4 for at least three consecutive years; or

(ii). The commissioner has determined that water supply treatment is not needed and the waterworks owner demonstrates that, during the last three consecutive years, the concentration of lead in the water supply was less than or equal to 0.005 mg/L and the concentration of copper in the water supply was less than or equal to 0.65 mg/L.

(c). A waterworks that uses a new water supply is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new supply during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the commissioner in 12VAC5-590-420 D 1 e.

## 7. Monitoring filtration and disinfection.

a. The owner of a waterworks that uses a surface water source or a groundwater source under the direct influence of surface water and provides filtration treatment must monitor in accordance with this section beginning June 29, 1993, or when filtration is installed, whichever is later.

b. Turbidity measurements as required by 12VAC5-590-410 F shall be performed on representative samples of the filtered water every four hours (or more

frequently) that the waterworks serves water to the public. A waterworks owner may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the division. For any waterworks using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the division may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For waterworks serving 500 or fewer persons, the division may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the division determines that less frequent monitoring is sufficient to indicate effective filtration performance.

(1). In addition to the above, a waterworks serving at least 10,000 people supplied by surface water or groundwater under the direct influence of surface water that provides conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter, using an approved method in 12VAC5-590-440, and must calibrate turbidimeters using the procedure specified by the manufacturer. Waterworks must record the results of individual filter monitoring every 15 minutes.

(2). If there is a failure in the continuous turbidity monitoring equipment, the waterworks must conduct grab sampling every four hours in lieu of continuous monitoring but for no more than five working days following the failure of the equipment.

c. The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment, and owners of waterworks serving 3,300 or fewer persons may take grab samples in lieu of continuous monitoring on an ongoing basis at the frequencies each day prescribed below:

population	Samples/Day <sup>1</sup>	Waterworks size by
less	1	500 or less
2		501 to 1,000
3		1,000 to 2,500
4		2,501 to 3,300

<sup>1</sup>The day's samples cannot be taken at the same time. The sampling intervals are subject to commissioner's review and approval.

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

(1). The residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in subsection A of this section, except that the division may allow a waterworks owner which uses both a surface water source or a groundwater source under direct influence of surface water, and a groundwater source to take disinfectant residual samples at points other than the total coliform sampling points if the division determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in 12VAC5-590-420 B may be measured in lieu of residual disinfectant concentration.

(2). If the division determines, based on site-specific considerations, that a waterworks has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions and that the waterworks is providing adequate disinfection in the distribution system, the requirements of subdivision B 7 (1) of this section do not apply to that waterworks.

d. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to 12VAC5-590-420 B shall be reported monthly to the division by the waterworks owner:

(1). Number of instances where the residual disinfectant concentration is measured;

(2). Number of instances where the residual disinfectant concentration is not measured but HPC is measured;

(3). Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(4). Number of instances where no residual disinfectant concentration is detected and where the HPC is greater than 500/mL;

(5). Number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500/mL.

(6). For the current and previous month the waterworks serves water to the public, the value of "V" in percent in the following formula:

$$V = (c + d + e) / (a + b) \times 100$$

where

a = the value in subdivision B 7 d (1) of this section,

b = the value in subdivision B 7 d (2) of this section,

c = the value in subdivision B 7 d (3) of this section,

d = the value in subdivision B 7 d (4) of this section,

e = the value in subdivision B 7 d (5) of this section,

(7). If the division determines, based on site-specific considerations, that a waterworks owner has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions and that the waterworks is providing adequate disinfection in the distribution system, the requirements of subdivision B 7 c (1) of this section do not apply.

e. A waterworks owner need not report the data listed in 12VAC5-590-530 C 2 a if all data listed in 12VAC5-590-530 C 2 a through c remain on file at the waterworks and the division determines that the waterworks owner has submitted all the information required by 12VAC5-590-530 C 2 a through c for at least 12 months.

8. Operational. Waterworks owners may be required by the division to collect additional samples to provide quality control for any treatment processes that are employed.

- C. Physical. All samples for turbidity analysis shall be taken at a representative entry point or points to the water distribution system unless otherwise specified. Turbidity samples shall be analyzed, at least once per day at all waterworks that use surface water sources or groundwater sources under the direct influence of surface water.
- D. Radiological. The frequency of radiological sampling shall be accordance with 12VAC5-590-400.

## **12VAC5-590-420. Treatment technique requirements.**

This section establishes treatment technique requirements in lieu of maximum contaminant levels for specified contaminants. Failure to meet any requirement of this section after the applicable date specified is a treatment technique violation.

A. Beginning June 29, 1993, the filtration and disinfection provisions of this section are required treatment techniques for any waterworks supplied by a surface water source and waterworks supplied by a groundwater source under the direct influence of surface water. Prior to that date, waterworks are governed by the disinfection requirements of 12VAC5-590-500. In addition, this section establishes treatment technique requirements in lieu of PMCLs for the following contaminants: *Giardia lamblia*, viruses, heterotrophic bacteria (HPC), *Legionella*, *Cryptosporidium* (for waterworks serving at least 10,000 people and using surface water or groundwater under the direct influence of surface water), and turbidity. Each waterworks with a surface water source or a groundwater source under the direct influence of surface water shall provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

1. At least 99.9% (3-log) removal and/or inactivation of *Giardia lamblia* cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and
2. At least 99.99% (4-log) removal and/or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.
3. Beginning January 1, 2002, waterworks serving at least 10,000 people shall also reliably achieve at least 99% (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

B. A waterworks using a surface water source or a groundwater source under the direct influence of surface water is considered to be in compliance with the requirements of subsection A of this section if it meets the following disinfection and filtration requirements:

1. Disinfection. Waterworks with a surface water source or a groundwater source under the direct influence of surface water must provide disinfection treatment in accordance with this section by June 29, 1993.

a. The disinfection treatment must be sufficient to ensure that the total treatment processes of that waterworks achieve at least 99.9% (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99% (4-log) inactivation and/or removal of viruses.

b. The residual disinfectant concentration in the water entering the distribution system cannot be less than 0.2 mg/L for more than four hours.

c. The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide cannot be undetectable in more than 5.0% of the samples each month, for any two consecutive months that the waterworks serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/mL, measured as heterotrophic plate count (HPC) is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in percent in the following formula cannot exceed 5.0% in one month, for any two consecutive months.

$$V = (c + d + e) / (a + b) \times 100$$

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

b = number of instances where the residual disinfectant concentration is not measured but HPC is measured;

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

d = number of instances where no residual disinfectant concentration is detected and where the HPC is greater than 500/mL; and

e = number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500/mL.

d. The division may determine, based on site-specific considerations, that a waterworks owner has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions and the waterworks is providing adequate disinfection in the distribution system, that the requirements of subdivision B 1 c of this section does not apply.

2. Filtration. (Also see 12VAC5-590-880.) All waterworks that use a surface water source or a groundwater source under the direct influence of surface water shall provide filtration treatment by June 29, 1993, by using one of the following methods:

a. Conventional filtration or direct filtration.

(1). The turbidity level of representative samples of a waterworks' filtered water shall be less than or equal to 0.5 NTU in at least 95% of the measurements taken each month, except that if the division determines that the system is capable of

achieving at least 99.9% removal (3-log) and/or inactivation of *Giardia lamblia* cysts at some turbidity level higher than 0.5 NTU in at least 95% of the measurements taken each month, the division may substitute this higher turbidity limit for that waterworks. However, in no case may the division approve a turbidity limit that allows more than one NTU in more than 5.0% of the samples taken each month.

(2). The turbidity level of representative samples of a waterworks' filtered water shall at no time exceed five NTU.

(3). Beginning January 1, 2002, waterworks serving at least 10,000 people that use conventional filtration treatment or direct filtration must:

(a). Achieve a filtered water turbidity of less than or equal to 0.3 NTU in at least 95% of the measurements taken each month. Samples must be representative of the waterworks' filtered water.

(b). The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU, measured as specified in 12VAC5-590-440.

(c). A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the commissioner.

b. Slow sand filtration.

(1). The turbidity level of representative samples of a waterworks' filtered water must be less than or equal to one NTU in at least 95% of the measurements taken each month, except that if the division determines there is no significant interference with disinfection at a higher turbidity level, the division may substitute this higher turbidity limit for that waterworks.

(2). The turbidity level of representative samples of a waterworks' filtered water shall at no time exceed five NTU.

c. Diatomaceous earth filtration.

(1). The turbidity level of representative samples of a waterworks' filtered water shall be less than or equal to one NTU in at least 95% of the measurements taken each month.

(2). The turbidity level of representative samples of a waterworks' filtered water shall at no time exceed five NTU.

d. Other filtration technologies. A waterworks owner may use a filtration technology not listed in subdivisions 2 a through c of this subsection if the owner

demonstrates to the division (by pilot plant studies or other means) that the alternative filtration technology, in combination with disinfection treatment, achieves 99.9% removal (3-log) and/or inactivation of *Giardia lamblia* cysts and 99.99% removal (4-log) and/or inactivation of viruses, and beginning January 1, 2002, for waterworks serving at least 10,000 people, 99% of *Cryptosporidium* oocysts. For a waterworks owner that makes this demonstration, a turbidity limit will be established by the commissioner, which the waterworks must meet at least 95% of the time. In addition, the commissioner will establish a maximum turbidity limit that the waterworks must not exceed at any time. These turbidity limits shall consistently achieve the removal rates and/or inactivation rates stated in this subdivision.

e. Each waterworks using a surface water source or groundwater source under the direct influence of surface water shall be operated by licensed operators of the appropriate classification as per the Virginia Board for Waterworks and Wastewater Works Operators Regulations (18VAC155-20-10 et seq.).

f. If the division has determined that a waterworks has a surface water source or a groundwater source under the direct influence of surface water, filtration is required. The waterworks shall provide disinfection during the interim before filtration is installed as follows:

(1). The residual disinfectant concentration in the distribution system cannot be less than 2.0 mg/L for more than four hours.

(2). The waterworks owner shall issue continuing boil water notices through the public notification procedure in 12VAC5-590-540 until such time as the required filtration equipment is installed.

(3). As an alternative to subdivisions B f 2 (1) and (2) of this section, the waterworks owner may demonstrate that the source can meet the appropriate C-T values shown in Appendix L and be considered to satisfy the requirements for 99.9% removal of *Giardia* cysts and virus, respectively. In addition, the waterworks owner must comply with the following:

(a). Justify that other alternative sources of supply meeting these regulations are not immediately available.

(b). Analysis of the source is performed quarterly for the contaminants listed in Tables 2.2, 2.3, and 2.4. The primary maximum contaminant levels shall not be exceeded.

(c). Daily turbidity monitoring and maintenance of the turbidity level not to exceed five NTU.

(d). MPN analysis of the raw water based on the minimum sample frequency chart below:

Samples/Week	Population Served	Coliform
1	less than or equal to 500	2
3	501 - 3,300	
4	3,301 - 10,000	
5	10,001 - 25,000	
	>25,000	

Note: Must be taken on separate days.

(e) Bacteriological sampling of the distribution system at a frequency of twice that required by Table 2.1.

C. ~~Lead and copper corrosion control techniques.~~ Lead and copper corrosion control treatment requirements.

1. ~~Corrosion control treatment requirements.~~ The owners of all community and nontransient noncommunity waterworks shall install and operate optimum corrosion control treatment by completing the corrosion control treatment requirements described below which are applicable to such waterworks owners under subdivision C 2 of this section.

a. Waterworks owners proposal regarding corrosion control treatment. Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, the owners of small and medium-size waterworks exceeding the lead or copper action level shall propose installation of one or more of the corrosion control treatments listed in subdivision C 1 c (1) of this section which the waterworks owner believes constitutes optimal corrosion control for that waterworks. The commissioner may require the waterworks owner to conduct additional water quality parameter monitoring in accordance with 12VAC5-590-370 B 6 b (2) of this section to assist the commissioner in reviewing the proposal.

b. Applicability of studies of corrosion control treatment (applicable to small and medium-size waterworks). The commissioner may require the owner of any small or medium-size waterworks that exceeds the lead or copper action level to perform corrosion control studies under subdivision C 1 c of this section to identify optimal corrosion control treatment for the waterworks.

c. Corrosion control studies.

(1). The owner of any waterworks required by the commissioner to perform corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that waterworks:

- (a). Alkalinity and pH adjustment;
- (b). Calcium hardness adjustment; and
- (c). The addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective corrosion inhibitor residual concentration in all test tap samples.

(2). The waterworks owner 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 waterworks of similar size, water chemistry and distribution system configuration.

(3). The waterworks owner 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);
- (i). Water temperature.

(4) The waterworks owner 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 waterworks with comparable water quality characteristics; and/or

(b). Data and documentation demonstrating that the waterworks 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 waterworks owner 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 waterworks owner shall propose to the field office in writing, the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that waterworks. The owner shall provide a rationale for its recommendation along with all supporting documentation specified in subdivision C 1 c (1) through (5) of this section.

d. Approval of optimal corrosion control treatment.

(1) Based upon consideration of available information including, where applicable, studies performed under subdivision C 1 c of this section and a waterworks' owner's proposed treatment alternative, the commissioner shall either approve the corrosion control treatment option recommended by the owner, or designate alternative corrosion control treatment(s) from among those listed in subdivision C 1 c (1) of this section. When approving optimal treatment the commissioner shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(2) The commissioner shall notify the waterworks owner of its determination on optimal corrosion control treatment in writing and explain the basis for this determination. If the commissioner requests additional information to aid a review, the owner shall provide the information.

e. Installation of optimal corrosion control. Each waterworks owner shall properly install and operate throughout the waterworks the optimal corrosion control treatment approved by the commissioner under subdivision C 1 d of this section and under 12VAC5-590-190.

f. Commissioner's review of treatment and specification of optimal water quality control parameters.

(1). The commissioner shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the waterworks owner and determine whether the owner has properly installed and operated the optimal corrosion control treatment approved by the commissioner in subdivision C 1 d of this section. Upon reviewing the results of tap water and water quality parameter monitoring by the owner, both before

and after the waterworks installs optimal corrosion control treatment, the commissioner shall designate:

- (a). A minimum value or a range of values for pH measured at each entry point to the distribution system;
- (b). A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the commissioner determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the waterworks owner to optimize corrosion control;
- (c). If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the commissioner determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;
- (d). If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples;
- (e). If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

(2). The values for the applicable water quality control parameters listed above shall be those that the commissioner determines to reflect optimal corrosion control treatment for the waterworks. The commissioner may designate values for additional water quality control parameters determined by the commissioner to reflect optimal corrosion control for the waterworks. The commissioner shall notify the waterworks owner in writing of these determinations and explain the basis for its decisions.

g. Continued operation and monitoring. ~~The owners of all waterworks shall maintain water quality parameter values at or above minimum values or within ranges designated by the Commissioner under subdivision C 1 f of this section in each sample collected under 12 VAC 5-590-370 B 6 b (4). If the water quality parameter value of any sample is below the minimum value or outside the range designated by the Commissioner, then the waterworks is out of compliance with this paragraph. As specified in 12 VAC 5-590-370 B 6 b (4), the waterworks owner may take a confirmation sample for any water quality parameter value no later than 3 days after the first sample. If a confirmation sample is taken, the~~

~~result must be averaged with the first sampling result and the average must be used for any compliance determinations under this paragraph. The Commissioner has the discretion to delete results of obvious sampling errors from this calculation. The owners of all waterworks 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 to commissioner under subdivision C 1f of this section, in accordance with this paragraph for all samples collected under 12 VAC - 5-590 - 370 B 6 b (4) through B 6 b (6). Compliance with the requirements of this paragraph shall be determined every six months, as specified under 12 VAC - 5-590 - 370 B 6 b (4). The owner of a waterworks is out of compliance with the requirements of this paragraph for a six-month period if excursions occur for any commissioner-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the commissioner. Daily values are calculated as follows. The commissioner 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 sample site.

h. Modification of the commissioner's treatment decisions. Upon his own initiative or in response to a request by a waterworks owner or other interested party, the commissioner may modify its determination of the optimal corrosion control treatment under subdivision C 1 d of this section or optimal water quality control parameters under subdivision C 1 f of this section. A request for modification by an owner or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The commissioner may modify the determination where it is concluded that such change is necessary to ensure that the waterworks continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the commissioner's decision, and provide an implementation schedule for completing the treatment modifications.

## 2. Corrosion control treatment steps.

a. Waterworks owners shall complete the applicable corrosion control treatment requirements described in subdivision C 1 of this section by the deadlines established in this section.

(1). The owner of a large waterworks (serving greater than 50,000 persons) shall complete the corrosion control treatment steps specified in subdivision C 2 d of this section, unless the owner is deemed to have optimized corrosion control under subdivision C 2 b (2) of this section or C 2 b (3) of this section.

(2). The owner of a small waterworks (serving less than 3,300 persons) and a medium-size waterworks (serving greater than 3,300 and less than 50,000 persons) shall complete the corrosion control treatment steps specified in subdivision C 2 e of this section, unless the owner is deemed to have optimized corrosion control under subdivision C 2 b (1) through (3) of this section.

b. A waterworks owner is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in this section if the waterworks satisfies ~~one of the following criteria:~~ one of the criteria specified in subdivisions C2b(1) through C2b(3) below. The owner of any such waterworks that is deemed to have optimized corrosion control, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the commissioner determines appropriate to ensure optimal corrosion control treatment is maintained.

(1). The owner of a small or medium-size waterworks is deemed to have optimized corrosion control if the waterworks meets the lead and copper action levels during each of two consecutive six-month monitoring periods conducted in accordance with 12VAC5-590-370 B 6 a.

(2). Any waterworks owner may be deemed by the commissioner to have optimized corrosion control treatment if the owner demonstrates to the satisfaction of the commissioner that the owner has conducted activities equivalent to the corrosion control steps applicable to such waterworks under this section. If the commissioner makes this determination, the owner shall be provided with a written notice explaining the basis for the decision and the notice shall specify the water quality control parameters representing optimal corrosion control in accordance with subdivision C 1 f of this section. Any waterworks owner deemed to have optimized corrosion control under this paragraph shall operate in compliance with the specified water quality control parameters in accordance with subdivision C 1 g of this section and continue to conduct lead and copper tap and water quality parameter sampling in accordance with 12 VAC 5-590-370 B 6 a (4) c and 12 VAC 5-590-370 B 6 b (4), respectively. A ~~The~~ waterworks owner shall provide the ~~Commissioner~~ District Engineer 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 subdivision C 1 c (3) of this section.

(b). A report explaining the test methods used by the waterworks owner to evaluate the corrosion control treatments listed in subdivision C 1 c (1) of this section, the results of all tests conducted, and the basis for the owner'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; and

(d). The results of tap water samples collected in accordance with 12VAC5-590-370 B 6 a at least once every six months for one year after corrosion control has been installed.

(3). Any waterworks is deemed to have optimized corrosion control if the owner submits results of tap water monitoring conducted in accordance with 12VAC5-590-370 B 6 a and source water monitoring conducted in accordance with 12VAC5-590-370 B 6 c that demonstrates for two consecutive six-month monitoring periods that the difference between the 90th percentile tap water lead level computed under 12VAC5-590-410 E, and the highest source water lead concentration, is less than the P Q L for lead (0.005 mg/L).

a. Any waterworks owner that submits monitoring results indicating that the highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if the 90<sup>th</sup> percentile tap water lead level is less than or equal to the PQL for lead for two consecutive 6-month monitoring periods.

b. Any waterworks owner deemed to have optimized corrosion control under this paragraph shall continue monitoring for lead and copper at the tap no less frequently than once every three calendar years using the reduced number of sites specified in 12 VAC 5-590-370 B 6 a (3) and collecting the samples at times and locations specified in 12 VAC 5-590-370 B 6 a (4) (d) (iv). Any such waterworks owner that has not conducted a round of monitoring pursuant to 12 VAC 5-590-370 B 6 a (4) since September 30, 1997, shall complete a round of monitoring pursuant to this paragraph no later than September 30, 2000.

c. Any waterworks owner deemed to have optimized corrosion control pursuant to this paragraph shall notify the District Engineer in writing pursuant to 12 VAC 5-590-530 D 1 c of

any change in treatment or the addition of a new water source. The commissioner may require the owner of any such waterworks to conduct additional monitoring or to take other actions the commissioner deems appropriate to ensure that minimum levels of corrosion control are being maintained in the distribution system.

d. As of July 12, 2001, a waterworks owner is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment specified in subdivision C 2 b(3) e of this section unless the copper action level is met.

e. Any waterworks owner triggered into corrosion control because the waterworks no longer is deemed to have optimized corrosion control under this paragraph shall implement corrosion control treatment in accordance with the deadlines in subdivision C 2 e of this section. The owner of any such large waterworks shall adhere to the schedule specified in that paragraph for medium-size systems, with the time period for completing each step being triggered by the date the waterworks owner is no longer deemed to have optimized corrosion control treatment under this paragraph.

c. The owner of any small or medium-size waterworks that is required to complete the corrosion control steps due to the exceedance of the lead or copper action level may cease completing the treatment steps whenever the waterworks meets both action levels during each of two consecutive monitoring periods conducted pursuant to 12VAC5-590-370 B 6 a and submits the results to the field office. If any such waterworks thereafter exceeds the lead or copper action level during any monitoring period, the owner shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The commissioner may require the owner to repeat treatment steps previously completed where the commissioner determines that this is necessary to properly implement the treatment requirements of this section. The commissioner shall notify the owner in writing of such a determination and explain the basis for its decision. The requirement for the owner of any small- or medium-sized waterworks to implement corrosion control treatment steps in accordance with subdivision 2 e of this subsection (including waterworks deemed to have optimized corrosion control under subdivision 2 b (1) of this subsection) is triggered whenever any small- or medium-sized waterworks exceeds the lead or copper action level.

d. Treatment steps and deadlines for large waterworks. Except as provided in subdivisions C 2 b (2) and (3) of this section, owners of large waterworks shall complete the following corrosion control treatment steps (described in the referenced portions of subdivision C 1 of this section, 12VAC5-590-370 B 6 a and b) by the indicated dates.

(1). Step 1: The waterworks owner shall conduct initial monitoring (12VAC5-590-370 B 6 a (4) (a) and B 6 b (2)) during two consecutive six-month monitoring periods by January 1, 1993.

(2). Step 2: The waterworks owner shall complete corrosion control studies (12VAC5-590-420 C 1 c) and submit the study and recommendations to the commissioner (12VAC5-590-200) by July 1, 1994.

(3). Step 3: The commissioner shall approve optimal corrosion control treatment (12VAC5-590-420 C 1 d) by January 1, 1995.

(4). Step 4: The waterworks owner shall install optimal corrosion control treatment (12VAC5-590-420 C 1 e) by January 1, 1997.

(5). Step 5: The waterworks owner shall complete follow-up sampling (12VAC5-590-370 B 6 a (4) (b) and B 6 b (3)) by January 1, 1998.

(6). Step 6: The commissioner shall review installation of treatment and designate optimal water quality control parameters (12VAC5-590-420 C 1 f) by July 1, 1998.

(7). Step 7: The waterworks owner shall operate the waterworks in compliance with the commissioner-specified optimal water quality control parameters (12VAC5-590-420 C 1 g) and continue to conduct tap sampling (12VAC5-590-370 B 6 a (4) (c) and B 6 b (4)).

e. Treatment steps and deadlines for small and medium-size waterworks. Except as provided in 12VAC5-590-420 C 2 b, owners of small- and medium-size waterworks shall complete the following corrosion control treatment steps (described in the referenced portions of 12VAC5-590-420 C 1, 12VAC5-590-370 B 6 a and b) by the indicated time periods.

(1). Step 1: The waterworks owner shall conduct initial tap sampling (12VAC5-590-370 B 6 a (4) (a) and B 6 b (2)) until the waterworks either exceeds the lead or copper action level or becomes eligible for reduced monitoring under 12VAC5-590-370 B 6 a (4) (d). The owner of a waterworks exceeding the lead or copper action level shall propose optimal corrosion control treatment (12VAC5-590-420 C 1 a) within six months after it exceeds one of the action levels.

(2). Step 2: Within 12 months after a waterworks exceeds the lead or copper action level, the commissioner may require the waterworks owner to perform corrosion control studies (12VAC5-590-420 C 1 b). If the commissioner does not require the owner to perform such studies, the commissioner shall specify optimal corrosion control treatment (12VAC5-590-420 C 1 d) within the following timeframes:

(a). For medium-size waterworks, within 18 months after such waterworks exceeds the lead or copper action level,

(b). For small waterworks, within 24 months after such waterworks exceeds the lead or copper action level.

(3). Step 3: If the commissioner requires a waterworks owner to perform corrosion control studies under Step 2, the waterworks owner shall complete the studies (12VAC5-590-420 C 1 c) and submit the study and recommendations to the commissioner (12VAC5-590-200) within 18 months after the commissioner requires that such studies be conducted.

(4). Step 4: If the waterworks has performed corrosion control studies under Step 2, the commissioner shall designate optimal corrosion control treatment (12VAC5-590-420 C 1 d) within six months after completion of Step 3.

(5). Step 5: The waterworks shall install optimal corrosion control treatment (12VAC5-590-420 C 1 e) within 24 months after the commissioner designates such treatment.

(6). Step 6: The waterworks owner shall complete follow-up sampling (12VAC5-590-370 B 6 a (4) (b) and B 6 b (3)) within 36 months after the commissioner designates optimal corrosion control treatment.

(7). Step 7: The commissioner shall review the waterworks owner's installation of treatment and designate optimal water quality control parameters (12VAC5-590-420 C 1 f) within six months after completion of Step 6.

(8). Step 8: The waterworks owner shall operate in compliance with the commissioner designated optimal water quality control parameters (12VAC5-590-420 C 1 g) and continue to conduct tap sampling (12VAC5-590-370 B 6 a (4) (c) and B 6 b (4)).

D. Water supply (source water) treatment requirements for lead and copper. The owner of any waterworks exceeding the lead or copper action level shall complete the applicable water supply monitoring and treatment requirements (described in the referenced portions of subdivision D 2 of this section, and in 12VAC5-590-370 B 6 a and c) by the following deadlines.

1. Deadlines for completing water supply treatment steps.

a. Step 1: The owner of a waterworks exceeding the lead or copper action level shall complete lead and copper water supply monitoring (12VAC5-590-370 B 6 c (2)) and make a treatment proposal to the appropriate field office within six months after exceeding the lead or copper action level.

b. Step 2: The commissioner shall make a determination regarding the need for water supply treatment (12VAC5-590-420 D 2 b) within six months after submission of monitoring results under step 1.

c. Step 3: If the commissioner requires installation of water supply treatment, the waterworks owner shall install the treatment (12VAC5-590-420 D 3) within 24 months after completion of step 2.

d. Step 4: The waterworks owner shall complete follow-up tap water monitoring (12VAC5-590-370 B 6 a (4) (b)) and water supply lead and copper monitoring (12VAC5-590-370 B 6 c (3)) within 36 months after completion of step 2.

e. Step 5: The commissioner shall review the waterworks owner's installation and operation of water supply treatment and specify maximum permissible water supply lead and copper levels (12VAC5-590-420 D 4) within six months after completion of step 4.

f. Step 6: The waterworks owner shall operate in compliance with the commissioner-specified maximum permissible lead and copper water supply levels (12VAC5-590-420 D 4) and continue water supply monitoring (12VAC5-590-370 B 6 c (4) (a)).

2. Description of water supply treatment requirements.

a. Waterworks treatment recommendation. The owner of any waterworks which exceeds the lead or copper action level shall propose in writing to the appropriate field office, the installation and operation of one of the water supply treatments listed in subdivision D 2 b of this section. An owner may propose that no treatment be installed based upon a demonstration that water supply treatment is not necessary to minimize lead and copper levels at users' taps.

b. Commissioner's determination regarding water supply treatment. The commissioner shall complete an evaluation of the results of all water supply samples submitted by the waterworks owner to determine whether water supply treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the division determines that treatment is needed, the commissioner shall either require installation and operation of the water supply treatment recommended by the waterworks (if any) or require the installation and operation of another water supply treatment from among the following: ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the commissioner requests additional information to aid in the review, the waterworks shall provide the information by the date specified by the commissioner in the request. The commissioner shall notify the waterworks in writing of the determination and set forth the basis for the decision.

3. Installation of water supply treatment. Each waterworks owner shall properly install and operate the water supply treatment designated by the commissioner under subdivision D 2 b of this section.

4. Commissioner's review of water supply treatment and specification of maximum permissible water supply lead and copper levels. The commissioner shall review the water supply samples taken by the waterworks owner both before and after the waterworks owner installs water supply treatment, and determine whether the owner has properly installed and operated the

water supply treatment designated by the commissioner. Based upon the review, the commissioner shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and maintained. The commissioner shall notify the owner in writing and explain the basis for the decision.

5. Continued operation and maintenance. Each waterworks shall be operated to maintain lead and copper levels below the maximum permissible concentrations designated by the commissioner at each sampling point monitored in accordance with 12VAC5-590-370 B 6 c. The waterworks is out of compliance with this subdivision if the level of lead or copper at any sampling point is greater than the maximum permissible concentration designated by the commissioner.

6. Modification of the commissioner's treatment decisions. Upon his own initiative or in response to a request by a waterworks owner or other interested party, the commissioner may modify its determination of the water supply treatment under D 2 b of this section, or may modify the maximum permissible lead and copper concentrations for finished water entering the distribution system under subdivision D 4 of this section. A request for modification by an owner or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The commissioner may modify the determination where he concludes that such change is necessary to ensure that the waterworks continues to minimize lead and copper concentrations in water supplies. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the commissioner's decision, and provide an implementation schedule for completing the treatment modifications.

E. Lead service line replacement requirements.

1. Owners of waterworks that fail to meet the lead action level in tap samples taken pursuant to 12VAC5-590-370 B 6 a (4) (b), after installing corrosion control and/or water supply treatment (whichever sampling occurs later), shall replace lead service lines in accordance with the requirements of this section. If a waterworks is in violation of subdivision C 2 of this section or subsection D of this section for failure to install water supply or corrosion control treatment, the commissioner may require the owner to commence lead service line replacement under this section after the date by which the owner was required to conduct monitoring under 12VAC5-590-370 B 6 a (4) (b) has passed.

2. A waterworks owner shall replace annually at least 7.0% 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 waterworks owner shall identify the initial number of lead service lines in its distribution system, including an identification of the portion(s) owned by the waterworks, based upon a materials evaluation, including the evaluation required under 12 VAC 5-590-370 B 6 a (1) (a) and relevant authorities (e.g., contracts, local ordinances) regarding the portion owned by the waterworks. The first year of lead service line replacement shall begin on the date the action level was exceeded in tap sampling referenced in 12 VAC 5-590-420 E 1.

3. A waterworks owner is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to 12VAC5-590-370 B 6 a (2) (c), is less than or equal to 0.015 mg/L.

4. A waterworks owner shall replace ~~the entire service line (up to the building inlet) unless the owner demonstrates to the satisfaction of the Commissioner under 12 VAC 5-590-420 E 5 that it controls less than the entire service line. In such cases, the owner shall replace the portion of the line which the Commissioner determines is under the owner's control. The owner shall notify the user served by the line that the waterworks owner will replace the portion of the service~~

~~line under the waterworks owner's control and shall offer to replace the building owner's portion of the line, but is not required to bear the cost of replacing the building owner's portion of the line. For buildings where only a portion of the lead service line is replaced, the waterworks owner shall inform the resident(s) that the waterworks owner will collect a first flush tap water sample after partial replacement of the service line is completed if the resident(s) so desire. In cases where the resident(s) accept the offer, the waterworks owner shall collect the sample and report the results to the resident(s) within 14 days following partial lead service line replacement. that portion of the lead service line that is owned by the waterworks. In cases where the waterworks owner does not own the entire lead service line, the waterworks owner shall notify the building owner, or the building owner's authorized agent, that the waterworks owner will replace that portion of the service line that is owned by the waterworks and shall offer to replace the building owner's portion of the line. The waterworks owner is not required to bear the cost of replacing the building owners portion of the service line, nor is the waterworks owner required to replace the building owners portion where the waterworks owner chooses not to pay the cost of replacing the building owners portion of the line, or where replacing the building owners portion would be precluded by State, local or common law. A waterworks owner that does not replace the entire length of the service line also shall complete the following tasks.~~

a. At least 45 days prior to commencing with the partial replacement of a lead service line, the waterworks owner shall provide notice to the resident(s) of all buildings served by the line explaining that they may experience a temporary increase of lead levels in their drinking water, along with guidance on measures consumers can take to minimize their exposure to lead. The commissioner may allow the waterworks owner to provide notice under the previous sentence less than 45 days prior to commencing partial lead service line replacement where such replacement is in conjunction with emergency repairs. In addition, the waterworks owner shall inform the resident(s) served by the line that the waterworks owner will, at the waterworks owner 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 in 12 VAC 5-590-370 B 6 a (2) (c), within 72 hours after the completion of the partial replacement of the lead service line. The waterworks owner shall collect the sample and report the results of the analysis to the building owner and resident(s) served by the line within three business days of receiving the results. Mailed notices post-marked within three business days of receiving the results shall be considered "on time".

b. The waterworks owner shall provide the information required by subdivision E 4 a of this section to the residents of individual dwellings by mail or by other methods approved by the commissioner. In instances where multi-family dwellings are served by the line, the waterworks owner shall have the option to post the information at a conspicuous location.

5. A waterworks owner is presumed to control the entire lead service line (up to the building inlet) unless the owner demonstrates to the satisfaction of the commissioner, in a letter submitted under 12VAC5-590-530 D 5 d, that the owner does not have any of the following forms of control over the entire line (as defined by state statutes, municipal ordinances, public service contracts or other applicable legal authority): authority to set standards for construction, repair, or maintenance of the line, authority to replace, repair, or maintain the service line, or ownership of the service line. The commissioner shall review the information supplied by the owner and determine whether the owner controls less than the entire service line and, in such cases, shall determine the extent of the waterworks owner's control. The commissioner's determination shall be in writing and explain the basis for the decision.

~~6.5.~~ The commissioner shall require a waterworks owner to replace lead service lines on a shorter schedule than that required by this section, taking into account the number of lead service lines in the waterworks, where such a shorter replacement schedule is feasible. The commissioner shall make this determination in writing and notify the owner of the findings within 6 months after the waterworks is triggered into lead service line replacement based on monitoring referenced in subdivision E 1 of this section.

~~7.6.~~ Any waterworks owner may cease replacing lead service lines whenever first draw tap samples collected pursuant to 12VAC5-590-370 B 6 a (2) (b) meet the lead action level during each of two consecutive monitoring periods and the owner submits the results to the appropriate field office

District Engineer. If the first draw tap samples collected in any such waterworks thereafter exceeds the lead action level, the owner shall recommence replacing lead service lines, pursuant to subdivision E 2 of this section.

~~8.7.~~ To demonstrate compliance with subdivisions E 1 through E 4 of this section, a waterworks owner shall report to the appropriate field office the information specified in 12VAC5-590-530 D 5.

F. Lead public education requirements. The owner of a waterworks that exceeds the lead action level based on tap water samples collected in accordance with 12VAC5-590-370 B 6 a shall deliver the public education materials contained in subdivisions F 1 and 2 of this section in accordance with the requirements in subdivision F 3 of this section.

1. Content of Written Public Education Materials - A waterworks owner shall include the following text in all of the printed materials distributed through the lead public education program. ~~Any additional information presented by the owner shall be consistent with the information below and be in plain English that can be understood by laypersons.~~

a. Community waterworks. The owner of a community waterworks shall include the following text in all of the printed materials it distributes through the lead public education program. Waterworks owners may delete information pertaining to lead service line replacement, upon approval by the commissioner, if no lead service lines exist anywhere in the waterworks service area. Public education language in subdivisions F 1 a (4) (b) (v) and F 1 a (4) (d) (ii) of this section may be modified regarding building permit record availability and consumer access to these records, if approved by the commissioner. Waterworks owners may also continue to utilize pre-printed materials that meet the public education language requirements in 40 CFR 141.85, effective November 6, 1991, and contained in the 40 CFR, parts 100 to 149, edition revised as of July 1, 1991. Any additional information presented by a waterworks owner shall be consistent with the information below and be in plain English that can be understood by lay people.

~~a. (1).~~ Introduction. The United States Environmental Protection Agency (EPA) and (insert name of waterworks) are concerned about lead in your drinking water. Although most homes have very low levels of lead in their drinking water, some homes in the community have lead levels above the EPA action level of 15 parts per billion (ppb), or 0.015 milligrams of lead per liter of water (mg/L). Under Federal law we are required to have a program in place to minimize lead in your drinking water by (insert date when corrosion control will be completed for your

waterworks). This program includes corrosion control treatment, source water treatment, and public education. We are also required to replace the portion of each lead service line that we control or own if the line contributes lead concentrations of more than 15 ppb after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation please give us a call at (insert waterworks phone number). This brochure explains the simple steps you can take to protect you and your family by reducing your exposure to lead in drinking water.

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

~~e.~~ (3). Lead in drinking water.

~~(1)~~ (a). Lead in drinking water, although rarely the sole cause of lead poisoning, can significantly increase a person's total lead exposure, particularly the exposure of infants who drink baby formulas and concentrated juices that are mixed with water. The EPA estimates that drinking water can make up 20% or more of a person's total exposure to lead.

~~(2)~~ (b). Lead is unusual among drinking water contaminants in that it seldom occurs naturally in water supplies like rivers and lakes. Lead enters drinking water primarily as a result of the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. These materials include lead-based solder used to join copper pipe, brass and chrome plated brass faucets, and in some cases, pipes made of lead that connect your house to the water main (service lines). In 1986, Congress banned the use of lead solder containing greater than 0.2% lead, and restricted the lead content of faucets, pipes and other plumbing materials to 8.0%.

~~(3)~~ (c). When water stands in lead pipes or plumbing systems containing lead for several hours or more, the lead may dissolve into your

drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon after returning from work or school, can contain fairly high levels of lead.

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

~~(1)~~ (a). Despite our best efforts mentioned earlier to control water corrosivity and remove lead from the water supply, lead levels in some homes or buildings can be high. To find out whether you need to take action in your own home, have your drinking water tested to determine if it contains excessive concentrations of lead. Testing the water is essential because you cannot see, taste, or smell lead in drinking water. Some local laboratories that can provide this service are listed at the end of this booklet. (The waterworks owners should contact the Division of Consolidated Laboratory Service at (804) 786-3411 for a list of certified laboratories in their area). For more information on having your water tested, please call (insert phone number of waterworks).

~~(2)~~ (b). If a water test indicates that the drinking water drawn from a tap in your home contains lead above 15 ppb, then you should take the following precautions:

~~(a)~~ (i). Let the water run from the tap before using it for drinking or cooking any time the water in a faucet has gone unused for more than six hours. The longer water resides in your home's plumbing the more lead it may contain. Flushing the tap means running the cold water faucet until the water gets noticeably colder, usually about 15-30 seconds. If your house has a lead service line to the water main, you may have to flush the water for a longer time, perhaps one minute, before drinking. Although toilet flushing or showering flushes water through a portion of your home's plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive

measure you can take to protect your family's health. It usually uses less than one or two gallons of water and costs less than (insert a cost estimate based on flushing two times a day for 30 days) per month. To conserve water, fill a couple of bottles for drinking water after flushing the tap, and whenever possible use the first flush water to wash the dishes or water the plants. If you live in a high-rise building, letting the water flow before using it may not work to lessen your risk from lead. The plumbing systems have more, and sometimes larger pipes than smaller buildings. Ask your landlord for help in locating the source of the lead and for advice on reducing the lead level.

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

~~(c)~~ (iii). Remove loose lead solder and debris from the plumbing materials installed in newly constructed homes, or homes in which the plumbing has recently been replaced, by removing the faucet strainers from all taps and running the water from three to five minutes. Thereafter, periodically remove the strainers and flush out any debris that has accumulated over time.

~~(d)~~ (iv). If your copper pipes are joined with lead solder that has been installed illegally since it was banned in 1986, notify the plumber who did the work and request that he replace the lead solder with lead-free solder. Lead solder looks dull gray, and

when scratched with a key looks shiny. In addition, notify the local building official in your city or county.

~~(e)~~ (v). Determine whether the service line that connects your home or apartment to the water main is made of lead. The best way to determine if your service line is made of lead is by either hiring a licensed plumber to inspect the line or by contacting the plumbing contractor who installed the line. You can identify the plumbing contractor by checking your localities' record of building permits which should be maintained in the files of the (insert name of department that issues building permits). A licensed plumber can at the same time check to see if your home's plumbing contains lead solder, lead pipes, or pipe fittings that contain lead. The waterworks that delivers water to your home should also maintain records of the materials located in the distribution system. If the service line that connects your dwelling to the water main contributes more than 15 ppb to drinking water, after our comprehensive treatment program is in place, we are required to replace the portion of the line we own. Since the line is only partially ~~controlled~~ owned by the [insert the name of the city, county, or waterworks that controls owns the line], we are required to ~~provide you the owner of the privately-owned portion of the line with information on how to replace your portion of the service line, and offer to replace that portion of the line at your expense and take a follow-up tap water sample within 14 days of the replacement. the~~ privately-owned portion of the service line, and offer to replace that portion of the line at the line

owner's expense. If we replace only the portion of the line that we own, we also are required to notify you in advance and provide you with information on the steps you can take to minimize exposure to any temporary increase in lead levels that may results from the partial replacement, to take a follow-up sample at our expense from the line within 72 hours after the partial replacement, and to mail or otherwise provide you with the results of that sample within three business days of receiving the results. Acceptable replacement alternatives include copper, steel, iron, and plastic pipes and must comply with local plumbing codes.

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

~~(3)~~ (c). The steps described above will reduce the lead concentrations in your drinking water. However, if a water test indicates that the drinking water coming from your tap contains lead concentrations in excess of 15 ppb after flushing, or after we have completed our actions to minimize lead levels, then you may want to take the following additional measures.

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

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

~~(b)~~ (ii). Purchase bottled water for drinking and cooking.

~~(4)~~ (d). You can consult a variety of sources for additional information. Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead. State and local government agencies that can be contacted include:

~~(a)~~ (i). (Insert the name of the waterworks) at (insert phone number) can provide you with information about your community's waterworks and a list of local laboratories that have been certified by Division of Consolidated Laboratory Services for testing water quality.

~~(b)~~ (ii). (Insert the name of city or county department that issues building permits) at (insert phone number) can provide you with information about building permit records that should contain the names of plumbing contractors that plumbed your home.

~~(c)~~ (iii). The Medical Director of [Insert the name of the city or county] Health Department, and the Virginia Department of Health Division of ~~Maternal and Child Health Lead Programs~~ Director at 1-800-523-4019 Child and Adolescent Health, Lead Safe Virginia Program Director at 1-877-668-7987 can

provide you with information about the health effects of lead and how you can have your child's blood tested.

~~(5)~~ (e). The following is a list of some state-approved laboratories in your area that you can call to have your water tested for lead. (Insert names and phone numbers of at least two laboratories.)

b. Non-transient non-community waterworks. The owner of a non-transient non-community waterworks shall either include the text specified in subdivision F 1 a of this section or shall include the following text in all of the printed materials it distributes through its lead public education program. The waterworks owner may delete information pertaining to lead service lines upon approval by the commissioner if no lead service lines exist anywhere in the waterworks service area. Any additional information presented by a waterworks owner shall be consistent with the information below and be in plain English that can be understood by lay people.

(1). Introduction. The United States Environmental Protection Agency (EPA) and (insert name of waterworks) are concerned about lead in your drinking water. Some drinking water samples taken from this facility have lead levels above the EPA action level of 15 parts per billion (ppb), or 0.015 milligrams of lead per liter (mg/L) of water. Under Federal law we are required to have a program in place to minimize lead in your drinking water by (insert date when corrosion control will be completed for your waterworks). This program includes corrosion control treatment, water supply treatment, and public education. We are also required to replace the portion of each lead service line that we own if the line contributes lead concentrations of more than 15 ppb after we have completed the comprehensive treatment program. If you have any questions about how we are carrying out the requirements of the lead regulation please give us a call at (insert waterworks phone number). This brochure explains the simple steps you can take to protect yourself by reducing your exposure to lead in drinking water.

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

(3). Lead in drinking water.

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

(b). Lead is unusual among drinking water contaminants in that it seldom occurs naturally in water supplies like rivers and lakes. Lead enters drinking water primarily as a result of the corrosion, or wearing away, of materials containing lead in the water distribution system and household plumbing. These materials include lead-based solder used to join copper pipe, brass and chrome-plated brass faucets, and in some case, pipes made of lead that connect houses and buildings to water mains (service lines). In 1986, Congress banned the use of lead solder containing greater than 0.2% lead, and restricted the lead content of faucets, pipes and other plumbing materials to 8.0%.

(c). When water stands in lead pipes or plumbing systems containing lead for several hours or more, the lead may dissolve into your drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon if the water has not been used all day, can contain fairly high levels of lead.

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

(a). Let the water run from the tap before using it for drinking or cooking any time the water in a faucet has gone unused for more than six hours. The longer water resides in plumbing the more lead it may contain. Flushing the tap means running the cold water faucet for about 15-30 seconds. Although toilet flushing or showering flushes water through a portion of the plumbing system, you still need to flush the water in each faucet before using it for drinking or cooking. Flushing tap water is a simple and inexpensive measure you can take to protect your health. It usually uses less than one gallon of water.

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

(c). The steps described above will reduce the lead concentrations in your drinking water. However, if you are still concerned, you may

wish to use bottled water for drinking and cooking.

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

(i). (insert the name or title of facility official if appropriate) at (insert phone number) can provide you with information about your facility's water supply; and

(ii). The Medical Director of [Insert the name of the city or county] Health Department, and the Virginia Department of Health, Division of Child and Adolescent Health, Lead Safe Virginia Program Director at 1-877-668-7987 can provide you with information about the health effects of lead.

2. Content of broadcast materials. A waterworks owner shall include the following information in all public service announcements submitted under the lead public education program to television and radio stations for broadcasting:

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

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

3. Delivery of a public education program.

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

b. The owner of a community waterworks that fails to meet exceeds the lead action level on the basis of tap water samples collected in accordance with 12 VAC 5-590-370 B 6 a shall, within 60 days, and that is not already repeating public education tasks pursuant to subdivisions F 3 c, F 3 g, or F 3 h of the section, shall, within 60 days:

(1) Insert notices in each customer's water utility bill containing the information in subdivision F 1 of this section, along with the following alert on the water bill itself in large print: "SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS IN THEIR DRINKING WATER. LEAD CAN POSE A SIGNIFICANT RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER INFORMATION." The owner of a community waterworks having a billing cycle that does not include a billing within 60 days of exceeding the action level, or that cannot insert information in the water utility bill without making major changes to its billing system, may use a separate mailing to deliver the information in subdivision F 1 a of this section as long as the information is delivered to each customer within 60 days of exceeding the action level. The owner of such waterworks shall also include the "alert" language specified in this paragraph.

(2). Submit the information in subdivision F 1 of this section to the editorial departments of the major daily and weekly newspapers circulated throughout the community.

(3). Deliver pamphlets and/or brochures that contain the public education materials in subdivisions F 1 b and d of this section to facilities and organizations, including the following:

- (a). Public schools and/or local school boards;
- (b). City or county health department;
- (c). Women, Infants, and Children and/or Head Start Program(s) whenever available;
- (d). Public and private hospitals and/or clinics;
- (e). Pediatricians;
- (f). Family planning clinics; and
- (g). Local welfare agencies.

(4). Submit the public service announcement in subdivision F 2 of this section to at least five of the radio and television stations with the largest audiences that broadcast to the community served by the waterworks.

c. The owner of a community waterworks shall repeat the tasks contained in subdivisions F 3 b (1), (2), and (3) of this section every 12 months, and the tasks contained in subdivision F 3 b (4) of this section every six months for as long as the waterworks exceeds the lead action level.

d. Within 60 days after it exceeds the lead action level (unless it already is repeating public education tasks pursuant to subdivision F 3 e of this section),

the owner of a nontransient noncommunity waterworks shall deliver the public education materials contained in subdivision F 1 a , ~~F 1 b~~, and ~~F 1 d~~ or the public education materials specified by subdivision F 1 b of this section as follows:

(1). Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the waterworks, and

(2). Distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the nontransient noncommunity waterworks. The commissioner may allow the waterworks owner to utilize electronic transmission in lieu of or combined with printed materials as long as it achieves at least the same coverage.

e. The owner of a nontransient noncommunity waterworks shall repeat the tasks contained in subdivision F 3 d of this section at least once during each calendar year in which the waterworks exceeds the lead action level.

f. A waterworks owner may discontinue delivery of public education materials if the waterworks has met the lead action level during the most recent six-month monitoring period conducted pursuant to 12VAC5-590-370 B 6 a. The owner shall recommence public education in accordance with this section if the waterworks subsequently exceeds the lead action level during any monitoring period.

g. The owner of a community waterworks may apply to the District Engineer, in writing, (unless the commissioner has waived the requirement for prior approval) to use the text specified in subdivision F 1 b of this section in lieu of the text in subdivision F 1 a of this section and to perform the tasks listed in subdivisions F 3 d and F 3 e of this section in lieu of the tasks in subdivisions F 3 b and F 3 c of this section if:

(1). The waterworks serves a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing or installing point of use treatment devices; and

(2). The waterworks owner provides water as part of the cost of services provided and does not separately charge for water consumption.

h. The owner of a community water system serving 3,300 or fewer people may omit the task contained in subdivision F 3 b (4) of this section. As long as the owner distributes notices containing the information contained in subdivision F 1 a of this section to every household served by the waterworks, such waterworks owners may further limit their public education programs as follows:

(1). Waterworks serving 500 or fewer people may forego the task contained in subdivision F 3 b (2) of this section. Such a waterworks owner may limit the distribution of the public education materials required under subdivision F 3 b (3) of this section to facilities and organizations served by the waterworks that are most likely to be visited regularly by pregnant women

and children, unless it is notified by the commissioner in writing that it must make a broader distribution.

(2). If approved by the commissioner in writing, a waterworks owner serving 501 to 3,300 people may omit the task in subdivision F 3 b (2) of this section and/or limit the distribution of the public education materials required under subdivision F 3 b (3) of this section to facilities and organizations served by the waterworks that are most likely to be visited regularly by pregnant women and children.

i. The owner of a community waterworks serving 3,300 or fewer people that delivers public education in accordance with subdivision F 3 h of this section shall repeat the required public education tasks at least once during each calendar year in which the waterworks exceeds the lead action level.

4. Supplemental monitoring and notification of results. The owner of a waterworks that fails to meet the lead action level on the basis of tap samples collected in accordance with 12VAC5-590-370 B 6 a shall offer to sample the tap water of any customer who requests it. The owner is not required to pay for collecting or analyzing the sample, nor is the owner required to collect and analyze the sample itself.

G. Beginning January 1, 1993, each waterworks owner shall certify annually in writing to the commissioner (using third party or manufacturer's certification) that, when polymers containing acrylamide or epichlorohydrin are used by the waterworks in drinking water systems, the combination (or product) of dose and monomer level does not exceed the following specified levels: Acrylamide = 0.05% dosed at 1 ppm (or equivalent) of polymer. Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent) of polymer. Certifications may rely on manufacturers or third parties, as approved by the commissioner.

H. Treatment technique for control of disinfection byproduct (DBPP) precursors.

1. Applicability.

a. Waterworks that use surface water or groundwater under the direct influence of surface water using conventional filtration treatment must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in subdivision H 2 of this section unless the waterworks meets at least one of the alternative compliance criteria listed in subdivision H 1 b or c of this section.

b. Alternative compliance criteria for enhanced coagulation and enhanced softening waterworks. Waterworks that use surface water or groundwater under the direct influence of surface water provided with conventional filtration treatment may use the alternative compliance criteria in subdivisions H 1 b (1) through (6) of this section to comply with this section in lieu of complying with subdivision H 2 of this section. Waterworks must still comply with monitoring requirements in 12VAC5-590-370 B 3 j.

(1). The waterworks' source water TOC level, measured according to 12VAC5-590-440, is less than 2.0 mg/L, calculated quarterly as a running annual average.

(2). The waterworks' treated water TOC level, measured according to 12VAC5-590-440, is less than 2.0 mg/L, calculated quarterly as a running annual average.

(3). The waterworks' source water TOC level, measured according to 12VAC5-590-440, is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to 12VAC5-590-440, is greater than 60 mg/L (as CaCO<sub>3</sub>), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in 12VAC590-370 B 3 b, the waterworks has made a clear and irrevocable financial commitment not later than the effective date for compliance in 12VAC590-370 B 3 b to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Waterworks 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 commissioner for approval not later than the effective date for compliance in 12VAC590-370 B 3 b. These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of these regulations.

(4). The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the waterworks uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(5). The waterworks' source water SUVA, prior to any treatment and measured monthly according to 12VAC5-590-440, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(6). The waterworks' finished water SUVA, measured monthly according to 12VAC5-590-440, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

c. Additional alternative compliance criteria for softening waterworks. Waterworks practicing enhanced softening that cannot achieve the TOC removals required by subdivision H 2 b of this section may use the alternative compliance criteria in subdivisions H 1 c (1) and (2) of this section in lieu of complying with subdivision H 2 of this section. Waterworks must still comply with monitoring requirements in 12VAC5-590-370 B 3 f (1).

(1). Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO<sub>3</sub>), measured monthly according to 12VAC5-590-440 and calculated quarterly as a running annual average.

(2). Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO<sub>3</sub>), measured monthly and calculated quarterly as an annual running average.

2. Enhanced coagulation and enhanced softening performance requirements.

a. Waterworks must achieve the percent reduction of TOC specified in subdivision H 2 b of this section between the source water and the combined filter effluent, unless the commissioner approves a waterworks' request for alternate minimum TOC removal (Step 2) requirements under subdivision H 2 c of this section.

b. Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with 12VAC5-590-440. Waterworks practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity greater than 120 mg/L) for the specified source water TOC:

Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening for Community or Nontransient Noncommunity Waterworks Which Use Surface Water or Groundwater Under the Direct Influence of Surface Water Using Conventional Treatment <sup>1,2</sup>			
Source-water TOC, mg/L	Source-water alkalinity, mg/L as CaCO <sub>3</sub>		
	0-60	> 60-120	>120 <sup>3</sup>
>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%

<sup>1</sup> Waterworks meeting at least one of the conditions in subdivisions H 1 b (1) -(6) of this section are not required to operate with enhanced coagulation.

<sup>2</sup> Softening waterworks meeting one of the alternative compliance criteria in subdivision H 1 c. of this section are not required to operate with enhanced softening.

<sup>3</sup> Waterworks practicing softening must meet the TOC removal requirements in this column.

c. Waterworks that use surface water or groundwater under the direct influence of surface water with conventional treatment systems that cannot achieve the Step 1 TOC removals required by subdivision H 2 b of this section due to water quality parameters or operational constraints must apply to the commissioner, within three months of failure to achieve the TOC removals required by subdivision H 2 b of this section, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the waterworks. If the commissioner approves the alternative minimum TOC removal (Step 2) requirements, the commissioner may make those requirements retroactive for the purposes of determining compliance. Until the commissioner approves the alternate minimum TOC removal (Step 2) requirements, the waterworks must meet the Step 1 TOC removals contained in subdivision H 2 b of this section.

d. Alternate minimum TOC removal (Step 2) requirements. Applications, made to the commissioner by waterworks using enhanced coagulation, for approval of alternative minimum TOC removal (Step 2) requirements under subdivision H 2 c of this section must include, at a minimum, results of bench- or pilot-scale testing conducted under subdivision H 2 d (1) of this section. The submitted bench- or pilot-scale testing must be used to determine the alternate enhanced coagulation level.

(1) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in subdivisions H 2 d (1) through (5) of this section such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of equal to or less than 0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the waterworks. Once approved by the commissioner, this minimum requirement supersedes the minimum TOC removal required by the table in subdivision H 2 b of this section. This requirement will be effective until such time as the commissioner approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve the alternative minimum TOC removal levels set by the commissioner is a violation of these regulations.

(2) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of 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 <sub>3</sub> )	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

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

(4). The waterworks may operate at any coagulant dose or pH necessary (consistent with other sections of these

regulations) to achieve the minimum TOC percent removal approved under subdivision H 2 c of this section.

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

3. Compliance calculations.

a. Waterworks that use surface water or groundwater under the direct influence of surface water other than those identified in subdivision H 1 b or H 1 c of this section must comply with requirements contained in subdivision H 2 b or H 2 c of this section. Waterworks must calculate compliance quarterly, beginning after the waterworks has collected 12 months of data, by determining an annual average using the following method:

(1). Determine actual monthly TOC percent removal, equal to:

$$(1 - (\text{treated water TOC} / \text{source water TOC})) \times 100$$

(2). Determine the required monthly TOC percent removal (from either the table in subdivision H 2 b of this section or from subdivision H 2 c of this section).

(3). Divide the value in subdivision H 3 a (1) of this section by the value in subdivision H 3 a (2) of this section.

(4). Add together the results of subdivision H 3 a (3) of this section for the last 12 months and divide by 12.

(5). If the value calculated in subdivision H 3 a (4) of this section is less than 1.00, the waterworks is not in compliance with the TOC percent removal requirements.

b. Waterworks may use the provisions in subdivisions H 3 b (1) through (5) of this section in lieu of the calculations in subdivisions H 3 a (1) through (5) of this section to determine compliance with TOC percent removal requirements.

(1). In any month that the waterworks' treated or source water TOC level, measured according to 12VAC5-590-440, is less than 2.0 mg/L, the waterworks may assign a monthly value of 1.0 (in lieu of the value calculated in subdivision H 3 a (3) of this section) when calculating compliance under the provisions of subdivision H 3 a of this section.

(2). In any month that a waterworks practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO<sub>3</sub>), the waterworks may assign a monthly value of 1.0 (in lieu of the value calculated in subdivision H 3 a (3) of this section) when

calculating compliance under the provisions of subdivision H 3 a of this section.

(3). In any month that the waterworks' source water SUVA, prior to any treatment and measured according to 12VAC5-590-440, is equal to or less than 2.0 L/mg-m, the waterworks may assign a monthly value of 1.0 (in lieu of the value calculated in subdivision H 3 a (3) of this section) when calculating compliance under the provisions of subdivision H 3 a of this section.

(4). In any month that the waterworks' finished water SUVA, measured according to 12VAC5-590-440, is equal to or less than 2.0 L/mg-m, the waterworks may assign a monthly value of 1.0 (in lieu of the value calculated in subdivision H 3 a (3) of this section) when calculating compliance under the provisions of subdivision H 3 a of this section.

(5). In any month that a waterworks practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO<sub>3</sub>), the waterworks may assign a monthly value of 1.0 (in lieu of the value calculated in subdivision H 3 a (3) of this section) when calculating compliance under the provisions of subdivision H 3 a of this section.

c. Waterworks that use surface water or groundwater under the direct influence of surface water and using conventional treatment may also comply with the requirements of this section by meeting the criteria in subdivision H 1 b or c of this section.

4. Enhanced coagulation or enhanced softening is the treatment technique required to control the level of DBP precursors in drinking water treatment and distribution systems for waterworks using surface water or groundwater under the direct influence of surface water and using conventional treatment.

l. The best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for disinfection byproducts show in Table 2.13 are listed below:

1. Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant is the best available technology for achieving compliance with the maximum contaminant level for TTHM or HAA5.

2. Control of ozone treatment process to reduce production of bromate is the best available technology for achieving compliance with the maximum contaminant level for bromate.

3. Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels is the best available technology for achieving compliance with the maximum contaminant level for chlorite.

4. A waterworks that is installing GAC or membrane technology to comply with Table 2.13 may apply to the commissioner for an extension of up to 24 months past the dates in 12VAC5-590-370 B 3 b, but not beyond December 31, 2003. In granting the extension, the commissioner must set a schedule for compliance and may specify any interim measures that the waterworks

must take. Failure to meet the schedule or interim treatment requirements constitutes a violation of 12VAC5-590-410.

J. The best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels identified in Table 2.12 is the control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

#### **12VAC5-590-440. Analytical methods.**

Analytical methods to determine compliance with the requirements of this chapter shall be those specified in the applicable edition of Standard Methods for the Examination of Water and Wastewater, published by the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation; "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974; and "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water" (Sept 1986), EPA, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268 or in the case of primary maximum contaminant levels and lead and copper action levels, those methods shall be followed by the Division of Consolidated Laboratory Services and consistent with current U.S. Environmental Protection Agency regulations found at 40 CFR Part 141. All laboratories seeking certification to perform drinking water analyses must comply with 1VAC30-40 promulgated by the Department of General Services, Division of Consolidated Laboratory Services.

### **12VAC5-590-530. Reporting.**

A. The results of any required monitoring activity shall be reported by the waterworks owner to the appropriate field office no later than the 10th day of the month following the month during which the tests were taken.

1. Waterworks required to sample quarterly must report to the appropriate field office within 10 days after the end of each quarter in which samples were collected.

2. Waterworks required to sample less frequently than quarterly must report to the appropriate field office within 10 days after the end of each monitoring period in which samples were collected.

B. It shall be the duty and responsibility of an owner to report to the appropriate field office in the most expeditious manner (usually by telephone) under the following circumstances. If it is done by telephone a confirming report shall be mailed as soon as practical.

1. When a bacteriological examination shows a repeat sample is required (see 12VAC5-590-380 D), a report shall be made within 48 hours. A waterworks owner must report a total coliform PMCL violation to the appropriate field office no later than the end of the next business day.

2. When the daily average of turbidity testing exceeds 5 NTU a report shall be made within 48 hours.

3. When a Primary Maximum Contaminant Level of an inorganic or organic chemical is exceeded for a single sample the owner shall report same within seven days. If any one sample result would cause the compliance average to be exceeded the owner shall report same in 48 hours.

4. When the average value of samples collected pursuant to 12VAC5-590-410 exceeds the Primary Maximum Contaminant Level of any organic or inorganic chemical the owner shall report same within 48 hours.

5. When the maximum contaminant level for radionuclides has been exceeded as determined by Table 2.5 the results shall be reported within 48 hours.

6. The waterworks owner shall report to the appropriate field office within 48 hours the failure to comply with the monitoring and sanitary survey requirements of this chapter.

7. The waterworks owner shall report to the appropriate field office within 48 hours the failure to comply with the requirements of any schedule prescribed pursuant to a variance or exemption.

C. Reporting requirements for filtration treatment and disinfection treatment.

1. The owner of a waterworks that provides filtration treatment shall report monthly to the division the following specified information beginning June 29, 1993, or when filtration is installed, whichever is later.

a. Turbidity measurements as required by 12VAC5-590-370 B 7 a shall be reported within 10 days after the end of each month the waterworks serves water to the public. Information that shall be reported includes:

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

(2). The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in 12VAC5-590-420 B 2 for the filtration technology being used.

(3). The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

b. In addition, a waterworks serving at least 10,000 people using surface water or groundwater under the direct influence of surface water that provides conventional filtration treatment or direct filtration must report monthly to the commissioner the information specified in subdivisions C 1 b (1) and (2) of this section beginning January 1, 2002. Also, a waterworks that provides filtration approved under 12VAC5-590-420 B 2 d must report monthly to the commissioner the information specified in subdivision C 1 b (1) of this section beginning January 1, 2002. The reporting in subdivision C 1 b (1) of this section is in lieu of the reporting specified in C 1 a.

(1). Turbidity measurements as required by 12VAC5-590-420 B 2 a (3) must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

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

(b). The number and percentage of filtered water turbidity measurements taken during the month that are less than or equal to the turbidity limits specified in 12VAC5-590-420 B 2 a (3) or 12VAC5-590-420 B 2 d.

(c). The date and value of any turbidity measurements taken during the month that exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or that

exceed the maximum level set by the commissioner under 12VAC590-420 B 2 d.

(2). Waterworks must maintain the results of individual filter monitoring taken under 12VAC5-590-370 B 7 b (1) for at least three years. Waterworks must report that they have conducted individual filter turbidity monitoring under 12VAC5-590-370 B 7 b (1) within 10 days after the end of each month the waterworks system serves water to the public. Waterworks must report individual filter turbidity measurement results taken under 12VAC5-590-370 B 7 b (1) within 10 days after the end of each month the waterworks serves water to the public only if measurements demonstrate one or more of the conditions in subdivisions C 1 b (2) (a) through (d) of this section. Waterworks that use lime softening may apply to the commissioner for alternative exceedance levels for the levels specified in subdivisions C 1 b (2) (a) through (d) of this section if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

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

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

(c). For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15

minutes apart at any time in each of three consecutive months, the waterworks must report the filter number, the turbidity measurement, and the date, or dates, on which the exceedance occurred. In addition, the waterworks must conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(d). For any individual filter that has a measured turbidity level of greater than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of two consecutive months, the waterworks must report the filter number, the turbidity measurement, and the date, or dates, on which the exceedance occurred. In addition, the waterworks must arrange for the conduct of a comprehensive performance evaluation by the commissioner or a third party approved by the commissioner no later than 30 days following the exceedance and have the evaluation completed and submitted to the commissioner no later than 90 days following the exceedance.

2. Disinfection information specified below shall be reported to the division within 10 days after the end of each month the waterworks serves water to the public. Information that shall be reported includes:

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

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

c. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to 12VAC5-590-420 B.

(1). Number of instances where the residual disinfectant concentration is measured;

(2). Number of instances where the residual disinfectant concentration is not measured but HPC is measured;

(3). Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(4). Number of instances where no residual disinfectant concentration is detected and where HPC is greater than 500/mL;

(5). Number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500/mL;

(6). For the current and previous month the system serves water to the public, the value of "V" in percent in the following formula:

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

a = the value in subdivision C 2 c (1) of this section

b = the value in subdivision C 2 c (2) of this section

c = the value in subdivision C 2 c (3) of this section

d = the value in subdivision C 2 c (4) of this section

e = the value in subdivision C 2 c (5) of this section

(7). If the division determines, based on site specific considerations, that a waterworks owner has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions and that the waterworks is providing adequate disinfection in the distribution system, the requirements of subdivision C 2 c (1) through (6) of this section do not apply.

d. A waterworks owner need not report the data listed in subdivision C 2 a of this section if all data listed in subdivisions C 2 a through c of this section remain on file at the waterworks and the division determines that the waterworks owner has submitted all of the information required by subdivisions C 2 a through c of this section for the last 12 months.

3. Additional reporting requirements.

a. Each waterworks owner, upon discovering that a waterborne disease outbreak potentially attributable to that waterworks has occurred, shall report that occurrence to the division as soon as possible, but no later than by the end of the next business day.

b. If at any time the turbidity exceeds 5 NTU, the waterworks owner shall inform the division as soon as possible, but no later than the end of the next business day.

c. Additional reporting requirements for waterworks serving at least 10,000 people.

(1). If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a waterworks using conventional filtration treatment or direct filtration, the

waterworks must inform the commissioner as soon as possible, but no later than the end of the next business day.

(2). If at any time the turbidity in representative samples of filtered water exceed the maximum level set by the commissioner in 12VAC5-590-420 B 2 d for filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the waterworks must inform the commissioner as soon as possible, but no later than the end of the next business day.

d. If at any time the chlorine residual falls below 0.2 mg/L in the water entering the distribution system, the waterworks owner shall notify the division as soon as possible, but no later than by the end of the next business day. The waterworks owner also shall notify the division by the end of the next business day whether or not the residual was restored to at least 0.2 mg/L within four hours.

D. Reporting requirements for lead and copper. All waterworks owners shall report all of the following information to the appropriate ~~field office~~ district engineer in accordance with this section.

1. Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.

a. Except as provided in subdivision D 1 a (8) of this section, a waterworks owner shall report the information specified below for all tap water samples specified in 12 VAC 5-590-370 B 6 a and for all water quality parameter samples specified in 12 VAC 5-590-370 B 6 b within the first 10 days following the end of each applicable monitoring period specified in 12 VAC 5-590-370 B 6 a and 12 VAC 5-590-370 B 6 b and ~~12 VAC 5-590-370 B 6 c~~ (i.e., every six-months, annually, ~~or every 3 years, or every 9 years~~).

(1). The results of all tap samples for lead and copper including location or a location site code and the criteria under 12VAC5-590-370 B 6 a (1) (c), (d), (e), (f) and/or (g) under which the site was selected for the waterworks' sampling pool;

(2). A certification that each first draw sample collected by the waterworks is one-liter in volume and, to the best of their knowledge, has stood motionless in the service line, or in the interior plumbing of a sampling site, for at least six hours; Documentation for each tap water lead sample or copper sample for which the waterworks owner requests invalidation pursuant to 12 VAC 5-590-370 B 6 a (6) (b).

(3). ~~Where residents collected samples, a certification that each tap sample collected by the residents was taken after the waterworks owner informed them of proper sampling procedures specified in 12VAC5-590-370 B 6 a (2) (b);~~ [Reserved];

(4). The 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in

accordance with 12VAC5-590-410 E 3); unless the district engineer calculates the 90<sup>th</sup> percentile lead and copper levels under subdivision D 8 of this section;

(5). With the exception of initial tap sampling conducted pursuant to 12VAC5-590-370 B 6 a (4) (a), the waterworks owner shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

(6). The results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under 12VAC5-590-370 B 6 b (2) through (5);

(7). The results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under 12VAC5-590-370 B 6 b (2) through (5);

(8). The waterworks owner shall report the results of all water quality parameter samples collected under 12 VAC 5-590-370 B (6) b (3) through B (6) b (6) during each six-month monitoring period specified in 12 VAC 5-590-370 B (6) b (4) within the first 10 days following the end of the monitoring period unless the commissioner has specified a more frequent reporting requirement.

b. ~~By the applicable date in 12VAC5-590-370 B 6 a (4) (a) for commencement of monitoring, the owner of each community waterworks which does not complete the targeted sampling pool with tier 1 sampling sites meeting the criteria in 12VAC5-590-370 B 6 a (1) (c) shall send a letter to the appropriate field office justifying the selection of tier 2 and/or tier 3 sampling sites under 12VAC5-590-370 B 6 a (1) (d) and/or (e). The owner of a non-transient non-community waterworks, or a community waterworks meeting the criteria of 12 VAC 5-590-420 F 3 g (1) and (2), that does not have enough taps that can provide first-draw samples, must either:~~

(1). Provide written documentation to the commissioner identifying standing times and locations for enough non-first-draw samples to make up the sampling pool under 12 VAC 5-590-370 B 6 a (2) (e) by the start of the first applicable monitoring period under 12 VAC 5-590-370 B 6 a (4) that commences after April 11, 2000, unless the commissioner has waived prior approval of non-first-draw sample sites selected by the waterworks owner pursuant to 12 VAC 5-590-370 B 6 a (2) (e); or

(2). If the commissioner has waived prior approval of non-first-draw sample sites selected by the waterworks owner, 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 12 VAC 5-590-370 B 6 a (2) (e) and include this information with the lead and

copper tap sample results required to be submitted pursuant to subdivision D 1 a (1) of this section.

c. By the applicable date in 12VAC5-590-370 B 6 a (4) (a) for commencement of monitoring, the owner of each nontransient, noncommunity waterworks which does not complete the sampling pool with tier 1 sampling sites meeting the criteria in 12VAC5-590-370 B 6 a (1) (f) shall send a letter to the appropriate field office justifying the selection of sampling sites under 12VAC5-590-370 B 6 a (1) (g). No later than 60 days after the addition of a new source or any change in water treatment, unless the commissioner requires earlier notification, a waterworks owner deemed to have optimized corrosion control under 12 VAC 5-590-420 C 2 b (3), a waterworks owner subject to reduced monitoring pursuant to 12 VAC 5-590-370 B 6 a (4) (d), or a waterworks owner subject to a monitoring waiver pursuant to 12 VAC 5-590-370 B 6 a (7), shall send written documentation to the commissioner describing the change. In those instances where prior approval of the treatment change or new source is not required, waterworks owners are encouraged to provide the notification to the commissioner beforehand to minimize the risk the treatment change or new source will adversely affect optimal corrosion control.

d. By the applicable date in 12VAC5-590-370 B 6 a (4) (a) for commencement of monitoring, the owner of each waterworks with lead service lines that is not able to locate the number of sites served by such lines required under 12VAC5-590-370 B 6 a (1) (b) (i) shall send a letter to the appropriate field office demonstrating why the owner was unable to locate a sufficient number of such sites based upon the information listed in 12VAC5-590-370 B 6 a (1) (b). The owner of any small waterworks applying for a monitoring waiver under 12 VAC 5-590-370 B 6 a (7) or subject to a waiver granted pursuant to 12 VAC 5-590-370 B 6 a (7) (c), shall provide the following information to the commissioner in writing by the specified deadline:

(1). By the start of the first applicable monitoring period in 12 VAC 5-590-370 B 6 a (4), the owner of any small waterworks applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of 12 VAC 5-590-370 B 6 a (7) (a) and 12 VAC 5-590-370 B 6 a (7) (b).

(2). No later than nine years after the monitoring previously conducted pursuant to 12 VAC 5-590-370 B 6 a (7) (b) or 12 VAC 5-590-370 B 6 a (7) (d) (i), the owner of each small waterworks desiring to maintain its monitoring waiver shall provide the information required by 12 VAC 5-590-370 B 6 a (7) (d) (i), and (ii).

(3). No later than 60 days after it becomes aware that it is no longer free of lead-containing and/or copper-containing material, as appropriate, the owner of each small waterworks with a monitoring waiver shall provide written notification to the commissioner, setting forth the circumstances resulting in the lead-containing and/or copper-containing materials being introduced into the waterworks and what corrective action, if any, the owner plans to remove these materials.

(4). By October 10, 2000, the owner of any small waterworks with a waiver granted prior to April 11, 2000 and that has not previously met the requirements of 12 VAC 5-590-370 B 6 a (7) (b) shall provide the information required by that subdivision.

~~e. Each waterworks owner who requests that the commissioner reduce the number and frequency of sampling shall provide the information required under 12VAC5-590-370 B 6 a (4) (d). The owner of each ground water waterworks that limits water quality parameter monitoring to a subset of entry points under 12 VAC 5-590-370 B 6 b (3) (c) shall provide, by the commencement of such monitoring, written correspondence to the commissioner 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 waterworks.~~

2. Water supply (source water) monitoring reporting requirements.

a. A waterworks owner shall report the sampling results for all source water samples collected in accordance with 12VAC5-590-370 B 6 c within the first 10 days following the end of each source water monitoring period (i.e., annually, per compliance period, per compliance cycle) specified in 12VAC5-590-370 B 6 c.

b. With the exception of the first round of source water sampling conducted pursuant to 12VAC5-590-370 B 6 c (2), the waterworks owner shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

3. Corrosion control treatment reporting requirements. By the applicable dates under 12VAC5-590-420 C 2, waterworks owners shall report the following information:

a. For waterworks demonstrating that they have already optimized corrosion control, information required in 12VAC5-590-420 C 2 b (2) or (3).

b. For waterworks required to optimize corrosion control, the owner's recommendation regarding optimal corrosion control treatment under 12VAC5-590-420 C 1 a.

c. For waterworks required to evaluate the effectiveness of corrosion control treatments under 12VAC5-590-420 C 1 c, the information required by that paragraph.

d. For waterworks required to install optimal corrosion control designated by the commissioner under 12VAC5-590-420 C 1 d (1), a letter certifying that the owner has completed installing that treatment.

4. Water supply source water treatment reporting requirements. By the applicable dates in 12VAC5-590-420 D, waterworks owners shall provide the following information to the appropriate ~~field office~~ district engineer:

a. If required under 12VAC5-590-420 D 2 a, the owner's recommendation regarding source water treatment;

b. For waterworks required to install source water treatment under 12VAC5-590-420 D 2 b, a letter certifying that the waterworks has completed installing the treatment designated by the commissioner within 24 months after the commissioner designated the treatment.

5. Lead service line replacement reporting requirements. Waterworks owners shall report the following information to the appropriate ~~field office~~ district engineer to demonstrate compliance with the requirements of 12VAC5-590-420 E:

a. Within 12 months after a waterworks exceeds the lead action level in sampling referred to in 12VAC5-590-420 E 1, the owner shall demonstrate in writing to the appropriate ~~field office~~ district engineer that the owner has conducted a materials evaluation, including the evaluation in 12VAC5-590-370 B 6 a (1), to identify the initial number of lead service lines in the distribution system, and shall provide the appropriate ~~field office~~ district engineer with the waterworks' schedule for replacing annually at least 7.0% of the initial number of lead service lines in its distribution system.

b. Within 12 months after a waterworks exceeds the lead action level in sampling referred to in 12VAC5-590-420 E 1, and every 12 months thereafter, the waterworks owner shall demonstrate to the appropriate ~~field office~~ district engineer in writing that the waterworks owner has either:

(1). Replaced in the previous 12 months at least 7.0% of the initial lead service lines (or a greater number of lines specified by the commissioner under 12VAC5-590-420 E 6) in the distribution system, or

(2). Conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to 12VAC5-590-370 B 6 a (7) (c), is less than or equal to 0.015 mg/L. In such cases, the total number of lines replaced and/or which meet the criteria in 12VAC5-590-420 E 3 shall equal at least 7.0% of the initial number of lead lines identified under subdivision D 5 a of this section (or the percentage specified by the commissioner under 12VAC5-590-420 E § 5).

c. The annual letter submitted to the appropriate field office under subdivision D 5 b of this section shall contain the following information:

(1). The number of lead service lines scheduled to be replaced during the previous year of the waterworks' replacement schedule;

(2). The number and location of each lead service line replaced during the previous year of the waterworks' replacement schedule;

(3). If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

d. ~~As soon as practicable, but in no case later than three months after a waterworks exceeds the lead action level in sampling referred to in 12VAC5-590-420 E 1, any waterworks owner seeking to rebut the presumption that it has control over the entire lead service line pursuant to 12VAC5-590-420 E 4 shall submit a letter to the appropriate field office describing the legal authority (e.g., state statutes, municipal ordinances, public service contracts or other applicable legal authority) which limits the waterworks owner's control over the service lines and the extent of the waterworks owner's control. The owner of any waterworks which collects lead service line samples following partial lead service line replacement required by 12 VAC 5-590-420 E shall report the results to the commissioner within the first ten days of the month following the month in which the owner receives the laboratory results, or as specified by the commissioner. Waterworks owners shall also report any additional information as specified by the commissioner, and in a time and manner prescribed by the commissioner, to verify that all partial lead service line replacement activities have taken place.~~

6. ~~Public education program reporting requirements. By December 31st of each year, the owner of any waterworks that is subject to the public education requirements in 12VAC5-590-420 F shall submit a letter to the appropriate field office demonstrating that the waterworks owner has delivered the public education materials that meet the content requirements in 12VAC5-590-420 F 1 and 2 and the delivery requirements in 12VAC5-590-420 F 3. This information shall include a list of all the newspapers, radio stations, television stations, facilities and organizations to which the owner delivered public education materials during the previous year. The owner shall submit the letter required by this paragraph annually for as long as it exceeds the lead action level.~~

a. ~~The owner of any waterworks that is subject to the public education requirements in 12 VAC 5-590-420 F shall, within ten days after the end of each period in which the owner is required to perform public education tasks in accordance with 12 VAC 5-590-420 F 3, send written documentation to the commissioner that contains:~~

(1). ~~A demonstration that the waterworks owner has delivered the public education materials that meet the content requirements in 12 VAC 5-590-420 F 1 and F 2 and the delivery requirements in 12 VAC 5-590-420 F 3 and~~

(2). ~~A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the waterworks owner delivered public education materials during the period in which the owner was required to perform public education tasks.~~

b. ~~Unless required by the commissioner, a waterworks owner that previously has submitted the information required by subdivision D 6 (a) (2) of this section need not resubmit the information required by subdivision D 6 (a) (2) of this section, as long as there have been no changes in the distribution list and the owner certifies that the public education materials were distributed to the same list submitted previously.~~

7. ~~Reporting of additional monitoring data. The owner of any waterworks which collects sampling data in addition to that required by this subpart shall report the results to the appropriate field office district engineer within the first 10 days following the end of the applicable monitoring period under 12VAC5-590-370 B 6 a, b and c during which the samples are collected.~~

8. Reporting of 90th percentile lead and copper concentrations where the district engineer calculates a waterworks 90th percentile concentrations. A waterworks owner is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by subdivision D 1 a (4) of this section if:

a. The commissioner has previously notified the waterworks owner that the district engineer will calculate the waterworks 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to subdivision D 8 (b) (1) of this section, and has specified a date before the end of the applicable monitoring period by which the waterworks owner must provide the results of lead and copper tap water samples;

a. The waterworks owner has provided the following information to the district engineer by the date specified in subdivision D 8 (a) of this section:

(1). The results of all tap samples for lead and copper including the location of each site and the criteria under 12 VAC 5-590-370 B 6 a (1) (c) , B 6 a (1) (d), B 6 a (1) (e), B 6 a (1) (f), and/or B 6 a (1) (g) under which the site was selected for the waterworks sampling pool, pursuant to subdivision D 1 a (1) of this section; and

(2). An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed; and

c. The district engineer has provided the results of the 90th percentile lead and copper calculations, in writing, to the waterworks owner before the end of the monitoring period.

E. Reporting requirements for disinfection byproducts. Waterworks must report the following information in accordance with subsection A of this section. (The field office may choose to perform calculations and determine whether the PMCL was violated, in lieu of having the waterworks report that information):

1. A waterworks monitoring for TTHM and HAA5 under the requirements of 12VAC5-590-370 B 3 b on a quarterly or more frequent basis must report:

a. The number of samples taken during the last quarter.

b. The location, date, and result of each sample taken during the last quarter.

c. The arithmetic average of all samples taken in the last quarter.

d. The annual arithmetic average of the quarterly arithmetic averages of this section for the last four quarters.

e. Whether, based on 12VAC5-590-390 C 2 b (2), the PMCL was violated.

2. A waterworks monitoring for TTHMs and HAA5 under the requirements of 12VAC5-590-370 B 3 b less frequently than quarterly (but at least annually) must report:

- a. The number of samples taken during the last year.
- b. The location, date, and result of each sample taken during the last monitoring period.
- c. The arithmetic average of all samples taken over the last year.
- d. Whether, based on 12VAC5-590-390 C 2 b (2), the PMCL was violated.

3. A waterworks monitoring for TTHMs and HAA5 under the requirements of 12VAC5-590-370 B 3 b less frequently than annually must report:

- a. The location, date, and result of the last sample taken.
- b. Whether, based on 12VAC5-590-390 C 2 b (2), the PMCL was violated.

4. A waterworks monitoring for chlorite under the requirements of 12VAC5-590-370 B 3 b must report:

- a. The number of entry point samples taken each month for the last three months.
- b. The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter.
- c. For each month in the reporting period, the arithmetic average of all samples taken in each three sample set taken in the distribution system.
- d. Whether, based on 12VAC5-590-390 C 2 b (2) (c), the PMCL was violated, in which month and how many times it was violated each month.

5. A waterworks monitoring for bromate under the requirements of 12VAC5-590-370 B 3 b must report:

- a. The number of samples taken during the last quarter.
- b. The location, date, and result of each sample taken during the last quarter.
- c. The arithmetic average of the monthly arithmetic averages of all samples taken in the last year.
- d. Whether, based on 12VAC5-590-390 C 2 b (2) (b), the PMCL was violated.

F. Reporting requirements for disinfectants. Waterworks must report the information specified below in accordance with subsection A of this section. (The field office may choose to perform calculations and determine whether the MRDL was violated, in lieu of having the waterworks report that information):

1. A waterworks monitoring for chlorine or chloramines under the requirements of 12VAC5-590-370 B 3 b must report:

- a. The number of samples taken during each month of the last quarter.
- b. The monthly arithmetic average of all samples taken in each month for the last 12 months.
- c. The arithmetic average of all monthly averages for the last 12 months.
- d. Whether, based on 12VAC5-590-410 C 2 b (3) (a), the MRDL was violated.

2. A waterworks monitoring for chlorine dioxide under the requirements of 12VAC5-590-370 B 3 b must report:

- a. The dates, results, and locations of samples taken during the last quarter.
- b. Whether, based on 12VAC5-590-410 C 2 b (3) (b), the MRDL was violated.
- c. Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

G. Reporting requirements for disinfection byproduct precursors and enhanced coagulation or enhanced softening. Waterworks must report the following information in accordance with subsection A of this section. (The field office may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the waterworks report that information):

1. A waterworks monitoring monthly or quarterly for TOC under the requirements of 12VAC5-590-370 B 3 b and required to meet the enhanced coagulation or enhanced softening requirements in 12VAC5-590-420 H 2 b or c must report:

- a. The number of paired (source water and treated water) samples taken during the last quarter.
- b. The location, date, and results 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 percent reduction of TOC for each paired sample and the required TOC percent removal.
- d. Calculations for determining compliance with the TOC percent removal requirements, as provided in 12VAC5-590-420 H 3 a.
- e. Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in 12VAC5-590-420 H 2 a for the last four quarters.

2. A waterworks monitoring monthly or quarterly for TOC under the requirements of 12VAC5-590-370 B 3 b and meeting one or more of the alternative compliance criteria in 12VAC5-590-420 H 1 b or c must report:

- a. The alternative compliance criterion that the system is using.
- b. The number of paired samples taken during the last quarter.
- c. The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.
- d. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in 12VAC5-590-420 H 1 b (2) or (3) or of treated water TOC for systems meeting the criterion in 12VAC5-590-420 H 1 b (2).
- e. The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in 12VAC5-590-420 H 1 b (5) or of treated water SUVA for systems meeting the criterion in 12VAC5-590-420 H 1 b (6).
- f. The running annual average of source water alkalinity for systems meeting the criterion in 12VAC5-590-420 H 1 b (3) and of treated water alkalinity for systems meeting the criterion in 12VAC5-590-420 H 1 c (1).
- g. The running annual average for both TTHM and HAA5 for systems meeting the criterion in 12VAC5-590-420 H 1 b (3) or (4).
- h. The running annual average of the amount of magnesium hardness removal (as CaCO<sub>3</sub>, in mg/L) for systems meeting the criterion in 12VAC5-590-420 H 1 c (2).
- i. Whether the system is in compliance with the particular alternative compliance criterion in 12VAC5-590-420 H 1 b or c.

H. Reporting of analytical results to the appropriate field office will not be required in instances where the state laboratory performs the analysis and reports same to that office.

I. Information to be included on the operation monthly report shall be determined by the division for each waterworks on an individual basis. Appendix G contains suggested monthly operation report requirements.

I certify that this regulation is full, true, and correctly dated.

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Robert B. Stroube, M.D., M.P.H.  
State Health Commissioner  
Virginia Department of Health

Date: \_\_\_\_\_



**Appendix M**

**Lead and Copper**

**Table M1**

**Monitoring Frequency for Initial Sampling Requirements**

<b>PWS Size</b>	<b>Monitoring Type</b>	<b>Location</b>	<b>No. Samples</b>	<b>Frequency</b>
<b>Large PWSs</b>  > 100,000        50,000-100,000	Lead and Copper	Taps		6 months
	Water Quality Parameters	Distribution System	100	Twice per 6 months
	Source Water	Entry Points	25	6 months*
	Lead and Copper		1	Twice per 6 months
	Water Quality Parameters		1	6 months
	Lead and Copper	Taps	60	Twice per 6 months
	Water Quality Parameters	Distribution System	10	6 months*
	Source Water	Entry Points	1	Twice per 6 months
	Lead and Copper		1	
	Water Quality Parameters			
<b>Medium PWSs</b>  10,001-50,000          3,301-10,000	Lead and Copper	Taps		6 months
	If AIs Exceeded	Distribution System	60	Twice per 6 months
	Water Quality Parameters	Entry Points	10	6 months
	Source Water		1	Twice per 6 months
	Lead and Copper		1	6 months
	Water Quality Parameters	Taps	40	Twice per 6 months
	Lead and Copper	Distribution System	3	6 months

	If AIs Exceeded Water Quality Parameters Source Water Lead and Copper Water Quality Parameters	Entry Points	1  1	Twice per 6 months
<b>Small PWSs</b>				
501-3,300	Lead and Copper If AIs Exceeded Water Quality Parameters Source Water Lead and Copper Water Quality Parameters	Taps Distribution System Entry Points	 20 2	6 months Twice per 6 months 6 months
101-500	Source Water Lead and Copper Water Quality Parameters Lead and Copper If AIs Exceeded Water Quality Parameters Source Water Lead and Copper Water Quality Parameters	Taps Distribution System Entry Points Taps Distribution System	1 10 1 1 5 1 1	Twice per 6 months 6 months Twice per 6 months 6 months Twice per 6 months 6 months Twice per 6 months
<100	Lead and Copper** If AIs Exceeded Water Quality Parameters Source Water Lead and Copper Water Quality Parameters	Entry Points	1	
Nontransient Noncommunity Water Systems	Lead and Copper Water Quality Parameters	Taps Distribution System		No more than one per building per monitoring period

\*If system wants to attempt to demonstrate optimization based on difference between source water levels and 90% tap level. Otherwise, one sample per entry point required if an AL is exceeded.

\*\*For lead and copper monitoring, 20% of the homes may be used in lieu of the required if there are less than 5 or 10 available sites, respectively.

**APPENDIX M**

**Lead and Copper**

**Table M2**

**Monitoring Frequency for Follow-up and Routine Sampling Requirements**

<b>PWS Size</b>	<b>Monitoring Type</b>	<b>Location</b>	<b>No. Samples</b>	<b>Frequency</b>
<b>Large PWSs</b>  > 100,000        50,000-100,000	Lead and Copper	Taps		6 months
	Water Quality Parameters	Distribution System	100	Twice per 6 months
	Source Water	Entry Points	25	6 months*
	Lead and Copper		1	Biweekly
	Water Quality Parameters		1	6 months
	Lead and Copper	Taps	60	Twice per 6 months
	Water Quality Parameters	Distribution System	10	6 months*
	Source Water	Entry Points	1	Biweekly
	Lead and Copper		1	
	Water Quality Parameters			
<b>Medium PWSs</b>  10,001-50,000        3,301-10,000	Lead and Copper	Taps		6 months
	Water Quality Parameters	Distribution System	60	Twice per 6 months
	Source Water	Entry Points	10	6 months*
	Lead and Copper		1	Biweekly
	Water Quality Parameters		1	6 months
	Lead and Copper	Taps	40	Twice per 6 months

	Water Quality Parameters	Distribution System	3	6 months*
	Source Water	Entry Points	1	Biweekly
	Lead and Copper		1	
	Water Quality Parameters			
<b>Small PWSs</b>				
501-3,300	Lead and Copper	Taps		6 months
	Water Quality Parameters	Distribution System	20	Twice per 6 months
	Source Water	Entry Points	2	6 months*
	Lead and Copper		1	Biweekly
	Water Quality Parameters		1	6 months
101-500	Lead and Copper	Taps	10	Twice per 6 months
	Water Quality Parameters	Distribution System	1	6 months
	Source Water	Entry Points	1	Biweekly
	Lead and Copper		1	6 months
	Water Quality Parameters		5	Twice per 6 months
≤ 100	Lead and Copper**	Taps	1	6 months*
	Water Quality Parameters	Distribution System	1	Biweekly
	Source Water	Entry Points	1	
	Lead and Copper			
	Water Quality Parameters			
Nontransient Noncommunity Water Systems	Lead and Copper	Taps	No more than one per building per monitoring period	
	Water Quality Parameters	Distribution System		

\*If source water treatment installed; otherwise, see reduced monitoring requirements.

\*\*For lead and copper monitoring, 20% of the homes may be used in lieu of the required if there are less than 5 or 10 available sites, respectively.

## APPENDIX M

### Lead and Copper

Table M3

#### Monitoring Frequency for Reduced Sampling Requirements



101-500	Groundwater Supply	Annually	1 per 9 years
	Surface Water Supply	Biweekly	Biweekly
	Water Quality Parameters	5 per year	5 per 3 years
	Lead and Copper	1 twice per 6 months	1 twice per year
	Water Quality Parameters	1 per 3 years	1 per 9 years
	Points of Entry Lead and Copper	Annually	1 per 9 years
	Groundwater Supply	Biweekly	Biweekly
	Surface Water Supply	5 per year	5 per 3 years
	Water Quality Parameters	1 twice per 6 months	1 twice per year
	Lead and Copper	1 per 3 years	1 per 9 years
≤ 100	Water Quality Parameters	Annually	1 per 9 years
	Points of Entry Lead and Copper	Biweekly	Biweekly
	Groundwater Supply		
	Surface Water Supply		
	Water Quality Parameters		

\*If source water treatment installed; otherwise, see reduced monitoring requirements.

\*\*For lead and copper monitoring, 20% of the homes may be used in lieu of the required if there are less than 5 or 10 available sites, respectively.

#### APPENDIX M

**Table M4**

#### Summary of Monitoring Requirements for Water Quality Parameters<sup>1</sup>

Monitoring Period	Parameters <sup>2</sup>	Location	Frequency
Initial Monitoring	pH, alkalinity, orthophosphate or silica <sup>3</sup> , 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 <sup>3</sup> , calcium <sup>4</sup>  pH, Alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual <sup>5</sup>	Taps  Entry point(s) to distribution system <sup>6</sup>	Every 6 months  <del>Biweekly</del> <u>No less frequently than every two weeks.</u>
After State Specifies Parameter Values for Optimal Corrosion Control	pH, alkalinity, orthophosphate or silica <sup>3</sup> , calcium <sup>4</sup>  pH, Alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual <sup>5</sup>	Taps  Entry point(s) to distribution system	Every 6 months  <del>Biweekly</del> <u>No less frequently than every two weeks.</u>
Reduced Monitoring	pH, alkalinity, orthophosphate or silica <sup>3</sup> , calcium <sup>4</sup>  pH, Alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual <sup>5</sup>	Taps  Entry point(s) to distribution system	Every six months, <u>annually<sup>7</sup> or every 3 years<sup>8</sup></u> at a reduced number of sites  <del>Biweekly</del> <u>No less frequently than every two weeks.</u>

<sup>1</sup> Table is for illustrative purposes; consult the text of this section for precise regulatory requirements.

<sup>2</sup> Small and medium-sized systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.

<sup>3</sup> Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.

<sup>4</sup> Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.

<sup>5</sup> Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.

<sup>6</sup> Groundwater systems may limit monitoring to representative locations throughout the system.

<sup>7</sup> Waterworks may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if they maintain the minimum values or range of values for water quality parameters reflecting optimal corrosion control treatment during 3 consecutive years of monitoring.

<sup>8</sup> Waterworks may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every 3 years if they have maintained the minimum values or range of values for

water quality parameters reflecting optimal corrosion control treatment during 3 consecutive years of annual monitoring. Waterworks may accelerate the triennial monitoring for water quality parameters at the tap if they have maintained 90<sup>th</sup> percentile lead levels less than or equal to 0.005 mg/L, 90<sup>th</sup> percentile copper levels less than or equal to 0.65 mg/L, and the range of water quality parameters designated by the Commissioner under 12 VAC 5-590-420 C1f as representing optimal corrosion control during two consecutive six-month periods.

## **SUMMARY OF REGULATIONS**

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These amendments propose to add to the Virginia Department of Health Waterworks Regulations minor revisions to the federal Safe Drinking Water Act dealing with the control of lead and copper in drinking water. The amendment is necessary to conform Virginia's regulations to changes made to the National Primary Drinking Water Regulations for Lead and Copper found at 40 C.F.R. Part 141 dated January 12, 2000. As this amendment is not materially different from corresponding federal regulations, the amendment is exempt from Article 2 of the Administrative Process Act pursuant to Va. Code § 2.2-4006.A.4.c.

### Summary of amendments:

12 VAC 5-590-10	Definitions	Pages 1-18	Added one definition on page 9
12 VAC 5-590-370	Sampling Frequency	Pages 1-69	Changes made to subdivision

12 VAC 5-590-420 Treatment Techniques Pages 1-46 Changes made to subdivision C,

and subdivision F. Changes  
gin on page 6

12 VAC 5-590-440 Analytical Methods Page 1 of 1 Changes made to the single

12 VAC 5-590-530      Reporting      Pages 1-19      Changes made to subdivision D

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Appendix M      Lead and Copper      Pages 1-4      Changes made to table M4

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