The Texas Commission on Environmental Quality (TCEQ, agency, or commission) proposes amendments to §§290.42, 290.44, and 290.109.

Background and Summary of the Factual Basis for the Proposed Rules

The purpose of the proposed amendments is to reflect changes to the Texas Health and Safety Code (THSC), §341.042, made during the 82nd Legislature, 2011, in House Bill (HB) 3372, §3 of HB 3391, and Senate Bill (SB) 1073. These changes relate to rainwater harvesting systems (RWHS) that are connected to a public water system (PWS) and are intended for indoor potable use (affected RWHS).

HB 3372, §3 of HB 3391, and SB 1073 amend THSC, §341.042, Standards for Harvested Rainwater, by requiring the commission to amend the existing rules for structures that are connected to a PWS and have a RWHS by allowing these systems to be used for indoor potable purposes. HB 3372, §3 of HB 3391, and SB 1073 amend THSC, §341.042, by adding requirements: for the commission to coordinate with the Texas Department of State Health Services (TDSHS) to develop rules, including safe drinking water standards and provisions for cross-connection protection for the installation and maintenance of affected RWHS; that the installation of affected RWHSs must be done by a master plumber or a journeyman plumber with a Water Supply Protection Specialist endorsement; and, that a person who intends to connect an affected RWHS to a PWS for potable purposes must give written notice to, and receive consent from, the

municipality or the owner or operator of the PWS prior to installation.

As directed by the legislation, the executive director's staff worked with TDSHS to develop proposed rules regarding the installation and maintenance of affected RWHS.

HB 3372, §3 of HB 3391, and SB 1073 direct the commission to develop rules regarding the installation and maintenance of RWHSs that are used for indoor potable purposes and are connected to a PWS. The bills stipulate that the rules must contain criteria that are sufficient to ensure that safe sanitary drinking water standards are met however, the bills are silent on the specific measures to be included in these standards. The executive director's staff proposes to fulfill this directive by adding minimum criteria in the rules and publishing more specific recommendations in a guidance document containing criteria the PWSs may choose to implement with their customers.

Section by Section Discussion

In addition to implementation of the state laws discussed previously, the commission proposes administrative changes throughout the proposed rules to reflect the agency's existing practices, conform with *Texas Register* and agency guidelines, and correct typographical and grammatical errors.

§290.42, Water Treatment

The commission proposes to amend §290.42(c)(1) to implement THSC, §341.042, as

amended by HB 3372, §3 of HB 3391, and SB 1073, to include rainwater in the list of sources that require evaluation for the provision of treatment facilities.

§290.44, Water Distribution

The commission proposes to amend §290.44(a)(2) and (i)(2)(K) to define two acronyms in their first use within the rule. The commission proposes to amend §290.44(h) and its subdivisions to reflect that the commission now issues a license, rather than a certificate, to persons who pass an exam to become a backflow prevention assembly tester. The commission proposes to add §290.44(h)(1)(C) to implement THSC, §341.042, as amended by HB 3372, §3 of HB 3391, and SB 1073, to ensure that safe sanitary drinking water standards are met by adding the requirement that at each residence or facility where water from a RWHS is used for indoor potable purposes, and there is a connection to a PWS, the PWS must ensure that the make-up supply line to the rainwater storage tank is provided with an air-gap that has been inspected and approved upon installation by a licensed backflow prevention assembly tester. The commission proposes to amend §290.44(h)(4)(B) to update a reference to an American Water Works Association publication. The commission proposes to amend §290.44(j) to implement THSC, §341.042, as amended by HB 3372, §3 of HB 3391, and SB 1073, by removing the requirement that the RWHS may only be used for nonpotable indoor purposes. The commission proposes to add §290.44(j)(1) to implement THSC, §341.042, as amended by HB 3372, §3 of HB 3391, and SB 1073, by adding the

requirement that a person who intends to connect an affected RWHS to a PWS for potable purposes must give written notice to, and receive consent from, the municipality or the owner or operator of the PWS prior to installation. The commission proposes to add §290.44(j)(2) to implement THSC, §341.042, as amended by HB 3372, §3 of HB 3391, and SB 1073, to add the requirement that at each residence or facility where water from a RWHS is used for indoor potable purposes and where there is a connection to a PWS, the PWS must ensure that the RWHS is installed and maintained by a master plumber or journeyman plumber licensed by the Texas State Board of Plumbing Examiners and who holds an endorsement as a Water Supply Protection Specialist, issued by the Texas State Board of Plumbing Examiners. The proposal requires municipalities or owners/operators of a PWS consenting to the installation of this type of RWHS to assume the responsibility for ensuring that safe sanitary drinking water standards are met. The commission proposes to add §290.44(j)(3) to implement THSC, §341.042, as amended by HB 3372, §3 of HB 3391, and SB 1073, to require that at each residence or facility where water from a RWHS is used for indoor potable purposes, and where there is a connection to a PWS, the PWS shall ensure that minimum treatment consists of filtration and disinfection. The guidance document will discuss filtration and treatment options, but the PWS will be able to implement more stringent requirements. The proposed rules require municipalities or owners/operators of a PWS consenting to the installation of this type of RWHS to assume the responsibility for ensuring that safe sanitary drinking water standards are met. The commission proposes to add

§290.44(j)(4), to implement THSC, §341.042, as amended by HB 3372 and §3 of HB 3391 to allow PWSs to require that at each residence or facility where water from a RWHS is used for indoor potable purposes and where there is a connection to a PWS, the PWS may require additional levels of treatment.

§290.109, Microbial Contaminants

The commission proposes to amend §290.109(b)(1)(C) to define an acronym in its first use within the rule. The commission proposes to amend §290.109(f)(4) to correct a typographical reference error by amending §209.122(a) to §290.122(a). The commission proposes to add §290.109(h) to implement THSC, §341.042, as amended by HB 3372, §3 of HB 3391, and SB 1073, to ensure that safe sanitary drinking water standards are met by requiring the PWS to ensure that the microbiological quality of the treated rainwater is monitored at least annually and to clarify that the PWS has the authority to require additional levels of treatment at each residence or facility where water from a RWHS is used for indoor potable purposes and where there is a connection to a PWS.

Fiscal Note: Costs to State and Local Government

Nina Chamness, Analyst, Strategic Planning and Assessment, has determined that, for the first five-year period the proposed rules are in effect, no significant fiscal implications are anticipated for the agency or other units of state or local government as

a result of administration or enforcement of the proposed rules.

The proposed rules would amend Chapter 290 to implement the provisions of HB 3372, §3 of HB 3391, and SB 1073 to provide the option of using water collected by a RWHS for indoor potable use where a structure is connected to a PWS. The proposed rules would not change existing requirements for RWHSs used to provide water for nonpotable purposes. There are approximately 6,954 PWSs in the state.

The proposed rules remove the current requirement that water from a RWHS be used only for nonpotable purposes when connected to a PWS. The proposed rules require a person or other entity choosing to install this type of RWHS to provide notice to, and receive consent from, the affected municipality or owner/operator of a PWS prior to installing such a system. Because the proposed rules require a PWS to assume the responsibility of ensuring that safe sanitary drinking water standards are met, a PWS would also impose additional obligations on persons or entities installing this type of system. These additional requirements would include: using licensed master plumbers or journeyman plumbers with a Water Supply Protection Specialist endorsement from the Texas State Board of Plumbing Examiners; using backflow protection at the water service entrance; treating collected rainwater used for potable purposes; performing annual monitoring for microbiological quality; and complying with any additional requirements imposed by a PWS.

The proposed rules require municipalities or owner/operators of a PWS consenting to the installation of these types of RWHSs to assume the responsibility for ensuring that safe sanitary drinking water standards are met. Requirements for these PWSs include: ensuring that minimum rainwater treatment consists of filtration and disinfection; ensuring that the make-up supply line to a rainwater storage tank is provided with an air-gap inspected and approved by a licensed backflow prevention assembly tester; ensuring that installation of these types of RWHSs is done by licensed master plumbers or journeyman plumbers with a Water Supply Protection Specialist endorsement from the Texas State Board of Plumbing Examiners; and ensuring that the microbiological quality of treated rainwater from these types of systems is monitored at least annually. The proposed rules allow a PWS or municipality to require additional levels of treatment beyond minimum filtration and disinfection.

There are approximately 2,351 PWSs in the state, owned or operated by local governments. The proposed rules would not require the agency to track which of these PWSs would allow installation of RWHSs.

A PWS, owned or operated by a local government, that consents to allow the installation of these types of RWHSs could incur some revenue loss or additional costs for administration if the number of installations increases substantially above current levels

of installation. However, the fiscal impact of the proposed rules on local government is expected to be minimal for several reasons. A PWS has the option to disallow the installation of this type of RWHS. Also, the number of individuals choosing to install these types of RWHSs is expected to be small. In addition, a PWS is already required by current rules to require cross-connection controls. If a PWS, owned or operated by a local government, chooses to grant permission for the installation of such RWHSs, the PWS is expected to require individuals or businesses owning the RWHS to assume the financial burden of meeting proposed rule requirements and any other optional treatment methods required. At this time, the agency cannot estimate the number of local governments, owning or operating PWSs, that might allow the installation of these types of RWHSs.

Public Benefits and Costs

Nina Chamness also determined that for each year of the first five years the proposed rules are in effect, the public benefit anticipated from the changes seen in the proposed rules will be the allowance of additional methods to conserve water and the promotion of water conservation in the state.

The agency estimates that there are approximately 4,603 PWSs in the state, that are owned or operated by individuals or businesses. The proposed rules would not require the agency to track which of these PWSs would allow installation of RWHSs.

The proposed rules are not expected to have a significant fiscal impact on individuals, since individuals can choose to incur the expense of installing and maintaining a RWHS and comply with PWS requirements when rainwater collection is for indoor potable use and is connected to a PWS. Individuals are expected to install such a system only if they decide it is economically beneficial for them or if the installation and use of such a RWHS promotes water conservation and reflects their personal environmental philosophy.

RWHSs vary widely in cost and sophistication, and individuals are expected to choose a system that best fits their needs. If an individual already has a RWHS installed and connected to a PWS, the additional cost to filter and disinfect the water for indoor potable use could be less than $100 for a chlorinator and bleach or several thousand dollars for an ultraviolet light system. Individuals would also incur the costs of using the appropriate licensed personnel for installation and any other costs to comply with a PWS's water treatment, testing, and monitoring requirements. These costs vary widely across the state depending on local market conditions, additional controls required by each PWS, and the size and design of each system. The cost to hire a licensed master plumber or journeyman plumber, with the required Water Supply Protection Specialist endorsement, could be greater than the cost of hiring a licensed irrigator, landscape designer, or rainwater harvesting equipment owner who are allowed to install RWHSs

for nonpotable use under current rules. Individuals choosing to install RWHSs for potable use could purchase less water from a PWS, assuming there is sufficient rainfall, but any fiscal advantages of using this type of RWHS would depend on a variety of factors, such as the type and cost of the RWHS installed, individual water use patterns, and the cost of purchasing potable water from the PWS.

The proposed rules are not expected to have a significant fiscal impact on businesses. Businesses that choose to install this type of RWHS are expected to do so only if they decide it is economically beneficial for them or if the installation and use of such a RWHS reflects their environmental philosophy and desire to promote water conservation.

Businesses that own or operate PWSs are also not expected to experience significant fiscal impacts under the proposed rules because they would have the same options and flexibility afforded to PWSs owned or operated by a local government. Also, the number of businesses that choose to install this type of RWHS is expected to be small.

Small Business and Micro-Business Assessment

No adverse fiscal implications are anticipated for some small or micro-businesses as a result of the proposed rules; however, there are 36 listed member businesses of the Texas Rainwater Catchment Association that are known to install RWHSs. If any of

these 36 businesses wanted to install systems for potable use, they would have to incur the additional expense of obtaining the proper licensure or contract for a licensed master plumber or journeyman plumber with a Water Supply Protection Specialist endorsement from the Texas State Board of Plumbing Examiners. According to the Bureau of Labor Statistics, the average hourly wage for plumbers, pipefitters, and steamfitters in Texas for 2011 was about $25 per hour, but this cost varies widely across the state. Licensure costs for a master plumber include $175 for the exam and $246 per year for a license. There would be additional costs to attend continuing education classes and obtain the Water Supply Protection Specialist endorsement.

Small Business Regulatory Flexibility Analysis

The commission has reviewed this proposed rulemaking and determined that a small business regulatory flexibility analysis is not required because the proposed rules do not adversely affect small businesses and are required to protect the public health and comply with state law.

Local Employment Impact Statement

The commission has reviewed this proposed rulemaking and determined that a local employment impact statement is not required because the proposed rules do not adversely affect a local economy in a material way for the first five years that the proposed rules are in effect.

Draft Regulatory Impact Analysis Determination

The commission reviewed the proposed rulemaking in light of the regulatory analysis requirements of Texas Government Code, §2001.0225, and determined that the rulemaking is not subject to Texas Government Code, §2001.0225 because it does not meet the definition of a "major environmental rule" as defined in the Texas Administrative Procedures Act. A "major environmental rule" is a rule that is specifically intended to protect the environment or reduce risks to human health from environmental exposure, and that may adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state.

This rulemaking does not meet the statutory definition of a "major environmental rule" because it is not the specific intent of the rule to protect the environment or reduce risks to human health from environmental exposure. The specific intent of the proposed rulemaking is to implement legislative changes enacted by HB 3372, §3 of HB 3391, and SB 1073, which establish requirements for a structure with a RWHS intended for indoor potable use, which is connected to a PWS. All three bills also contain language that states that a municipally owned water or wastewater utility, a municipality, or the owner or operator of a PWS, may not be held liable for any alleged adverse health effects caused by drinking water from an affected RWHS if the PWS complies with applicable

sanitary standards.

HB 3372 and SB 1073 also require the following: TCEQ shall coordinate with TDSHS to develop rules, including safe drinking water standards and provisions for cross-connection protection, for the installation and maintenance of affected RWHSs; the installation of affected RWHS must be done by a master plumber or a journeyman plumber that holds a Water Supply Protection Specialist endorsement; and, any person who intends to connect an affected RWHS to a PWS must give written notice to the municipality or the owner or operator of the PWS prior to installation. Section 3 of HB 3391 also requires the following: the commission shall develop rules, including safe drinking water standards and provisions for cross-connection protection, for the installation and maintenance of affected RWHSs; and any person who intends to connect an affected RWHS to a PWS must provide written notice to, and receive the consent, of the municipality or the owner or operator of the PWS prior to installation.

Further, the rulemaking does not meet the statutory definition of a "major environmental rule" because the proposed rules will not adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state. The cost of complying with the proposed rules is not expected to be significant with respect to the economy.

Furthermore, the proposed rulemaking is not subject to Texas Government Code, §2001.0225 because it does not meet any of the four applicability requirements listed in Texas Government Code, §2001.0225(a). There are no federal standards governing RWHSs connected to a PWS in Texas. Second, the proposed rulemaking does not exceed an express requirement of state law. Third, the proposed rulemaking does not exceed a requirement of a delegation agreement or contract between the state and an agency or representative of the federal government to implement a state and federal program. Finally, the proposed rulemaking is not proposed solely under the general powers of the agency, but specifically under THSC, §341.042, which allows the commission to adopt and enforce rules related to harvested rainwater.

Written comments on the draft regulatory impact analysis determination may be submitted to the contact person at the address listed under the Submittal of Comments section of this preamble.

Takings Impact Assessment

The commission evaluated the proposed rules and performed an assessment of whether the proposed rules constitute a taking under Texas Government Code, Chapter 2007. The primary purpose of the proposed rulemaking is to implement legislative changes enacted by HB 3372, §3 of HB 3391, and SB 1073, which establish requirements for a

structure with a RWHS intended for indoor portable use, which is connected to a PWS. These bills also provide for immunity from liability for a municipally owned water or wastewater utility, a municipality, or the owner or operator of a PWS for any alleged adverse health effects caused by drinking water from an affected RWHS if the PWS complies with applicable sanitary standards. These bills also require the following: TCEQ must coordinate with the TDSHS to develop rules, including safe drinking water standards and provisions for cross-connection protection, for the installation and maintenance of affected RWHSs; the installation of affected RWHSs must be done by a master plumber or a journeyman plumber that holds a Water Supply Protection Specialist endorsement; and any person who intends to connect an affected RWHS to a PWS must give written notice to and receive consent of the municipality or the owner or operator of the PWS prior to installation. This proposed rulemaking would substantially advance these purposes by amending Chapter 290 to incorporate the statutory requirements.

Promulgation and enforcement of this proposed rulemaking would be neither a statutory nor a constitutional taking of private real property. The proposed rulemaking does not affect a landowner's rights in private real property because this rulemaking does not relate to or have any impact on an owner's rights to property. This proposed rulemaking will primarily affect those persons who wish to connect a RWHS, intended for indoor potable purposes, to a PWS; this would not be an effect on real property.

Therefore, the proposed rulemaking would not constitute a taking under Texas Government Code, Chapter 2007.

Consistency with the Coastal Management Program

The commission reviewed the proposed rules and found that they are neither identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11(b)(2) or (4), nor will they affect any action/authorization identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11(a)(6). Therefore, the proposed rules are not subject to the Texas Coastal Management Program.

Written comments on the consistency of this rulemaking may be submitted to the contact person at the address listed under the Submittal of Comments section of this preamble.

Announcement of Hearing

The commission will hold a public hearing on this proposal in Austin on April 9, 2013, at 10:00 a.m. in Building E, Room 201 S, at the commission's central office located at 12100 Park 35 Circle. The hearing is structured for the receipt of oral or written comments by interested persons. Individuals may present oral statements when called upon in order of registration. Open discussion will not be permitted during the hearing; however, commission staff members will be available to discuss the proposal 30 minutes

prior to the hearing.

Persons who have special communication or other accommodation needs who are planning to attend the hearing should contact Sandy Wong, Office of Legal Services at (512) 239 - 1802. Requests should be made as far in advance as possible.

Submittal of Comments

Written comments may be submitted to Bruce McAnally, MC 205, Office of Legal Services, Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087, or faxed to (512) 239 - 4808. Electronic comments may be submitted at: *http://www5.tceq.texas.gov/rules/ecomments/*. File size restrictions may apply to comments being submitted via the eComments system. All comments should reference Rule Project Number 2011-057-290-OW. The comment period closes April 15, 2013. Copies of the proposed rulemaking can be obtained from the commission's Web site at *http://www.tceq.texas.gov/nav/rules/propose_adopt.html*. For further information, please contact Cindy Haynie, Water Supply Division, Plan and Technical Review Section, (512) 239-3465.

SUBCHAPTER D: RULES AND REGULATIONS FOR PUBLIC WATER SYSTEMS
§290.42, §290.44

Statutory Authority

These amendments are proposed under Texas Water Code (TWC), §5.102, which establishes the commission's general authority necessary to carry out its jurisdiction; §5.103, which establishes the commission's general authority to adopt rules; §5.105, which establishes the commission's authority to set policy by rule; and Texas Health and Safety Code (THSC), §341.042, which allows the commission to adopt rules relating to the domestic use of harvested rainwater. Therefore, the TWC and THSC authorize rulemaking that amend §290.42 and §290.44, which relate to rainwater harvesting systems (RWHS) that are connected to a public water system (PWS) and are intended for indoor potable use.

The proposed amendments implement the language set forth in House Bill (HB) 3372; §3 of HB 3391; and Senate Bill 1073, which require the commission to amend the existing rules for structures that are connected to a PWS and have a RWHS by allowing a RWHS to be used for indoor potable purposes.

§290.42. Water Treatment.

(a) Capacity and location.

(1) Based on current acceptable design standards, the total capacity of the public water system's treatment facilities must always be greater than its anticipated maximum daily demand.

(2) The water treatment plant and all pumping units shall be located in well-drained areas not subject to flooding and away from seepage areas or where the groundwater water table is near the surface.

(A) Water treatment plants shall not be located within 500 feet of a sewage treatment plant or lands irrigated with sewage effluent. A minimum distance of 150 feet must be maintained between any septic tank drainfield line and any underground treatment or storage unit. Any sanitary sewers located within 50 feet of any underground treatment or storage unit shall be constructed of ductile iron or polyvinyl chloride (PVC) pipe with a minimum pressure rating of 150 pounds per square inch (psi) and have watertight joints.

(B) Plant site selection shall also take into consideration the need for disposition of all plant wastes in accordance with all applicable regulations and state statutes, including both liquid and solid wastes, [waste] or by-product material from operation and/or maintenance.

(3) Each water treatment plant shall be located at a site that is accessible by an all-weather road.

(b) Groundwater.

(1) Disinfection facilities shall be provided for all groundwater supplies for the purpose of microbiological control and distribution protection and shall be in conformity with applicable disinfection requirements in subsection (e) of this section.

(2) Treatment facilities shall be provided for groundwater if the water does not meet the drinking water standards. The facilities provided shall be in conformance with established and proven methods.

(A) Filters provided for turbidity and microbiological quality control shall be preceded by coagulant addition and shall conform to the requirements of subsection (d)(11) of this section. Filtration rates for iron and manganese removal, regardless of the media or type of filter, shall be based on a maximum rate of five gallons per square foot per minute.

(B) The removal of iron and manganese may not be required if it can be demonstrated that these metals can be sequestered so that the discoloration problems they cause do not exist in the distribution system.

(C) All processes involving exposure of the water to atmospheric contamination shall provide for subsequent disinfection of the water ahead of ground storage tanks. Likewise, all exposure of water to atmospheric contamination shall be accomplished in a manner such that insects, birds, and other foreign materials will be excluded from the water. Aerators and all other such openings shall be screened with 16-mesh or finer corrosion-resistant screen.

(3) Any proposed change in the extent of water treatment required will be determined on the basis of geological data, well construction features, nearby sources of contamination, and on qualitative and quantitative microbiological and chemical analyses.

(4) Appropriate laboratory facilities shall be provided for controls as well as to check the effectiveness of disinfection or any other treatment processes employed.

(5) All plant piping shall be constructed to minimize leakage.

(6) All groundwater systems shall provide sampling taps for raw water, treated water, and at a point representing water entering the distribution system at every entry point.

(7) Air release devices shall be installed in such a manner as to preclude the possibility of submergence or possible entrance of contaminants. In this respect, all openings to the atmosphere shall be covered with 16-mesh or finer corrosion-resistant screening material or an equivalent acceptable to the executive director.

(8) The executive director may require 4-log removal or inactivation of viruses based on raw water sampling results required by §290.116 of this title (relating to Groundwater Corrective Actions and Treatment Techniques).

(c) Springs and other water sources.

(1) Water obtained from springs, infiltration galleries, wells in fissured areas, wells in carbonate rock formations, or wells that do not penetrate [an] impermeable strata<u>, rainwater,</u> or any other source subject to surface or near surface contamination of recent origin shall be evaluated for the provision of treatment facilities. Minimum treatment shall consist of coagulation with direct filtration and adequate disinfection. In all cases, the treatment process shall be designed to achieve at

least a 2-log removal of *Cryptosporidium* oocysts, a 3-log removal or inactivation of *Giardia* cysts, and a 4-log removal or inactivation of viruses before the water is supplied to any consumer. The executive director may require additional levels of treatment in cases of poor source water quality. Based on raw water monitoring results, the executive director may require additional levels of treatment for *Cryptosporidium* treatment as specified in §290.111 of this title (relating to Surface Water Treatment).

(A) Filters provided for turbidity and microbiological quality control shall conform to the requirements of subsection (d)(11) of this section.

(B) All processes involving exposure of the water to atmospheric contamination shall provide for subsequent disinfection of the water ahead of ground storage tanks. Likewise, all exposure of water to atmospheric contamination shall be accomplished in a manner such that insects, birds, and other foreign materials will be excluded from the water. Aerators and all other such openings shall be screened with 16-mesh or finer corrosion-resistant screen.

(2) Any proposed change in the extent of water treatment required will be determined on the basis of geological data, well construction features, nearby sources of contamination, and qualitative and quantitative microbiological and chemical analyses.

(3) Appropriate laboratory facilities shall be provided for controls as well as for checking the effectiveness of disinfection or any other treatment processes employed.

(4) All plant piping shall be constructed to minimize leakage. No cross-connection or interconnection shall be permitted to exist between a conduit carrying potable water and another conduit carrying raw water or water in a prior stage of treatment.

(5) All systems using springs and other water sources shall provide sampling taps for raw water, treated water, and at a point representing water entering the distribution system at every entry point.

(6) Return of the decanted water or sludge to the treatment process shall be adequately controlled so that there will be a minimum of interference with the treatment process and shall conform to the applicable requirements of subsection (d)(3) of this section. Systems that do not comply with the provisions of subsection (d)(3) of this section commit a treatment technique violation and must notify their customers in accordance with the requirements of §290.122(b) of this title (relating to Public Notification).

(7) Air release devices on treated waterlines shall be installed in such a manner as to preclude the possibility of submergence or possible entrance of contaminants. In this respect, all openings to the atmosphere shall be covered with 16-mesh or finer corrosion-resistant screening material or an equivalent acceptable to the executive director.

(d) Surface water.

(1) All water secured from surface sources shall be given complete treatment at a plant which provides facilities for pretreatment disinfection, taste and odor control, continuous coagulation, sedimentation, filtration, covered clearwell storage, and terminal disinfection of the water with chlorine or suitable chlorine compounds. In all cases, the treatment process shall be designed to achieve at least a 2-log removal of *Cryptosporidium* oocysts, a 3-log removal or inactivation of *Giardia* cysts, and a 4-log removal or inactivation of viruses before the water is supplied to any consumer. The executive director may require additional levels of treatment in cases of poor source water quality. Based on raw water monitoring results, the executive director may require additional levels of treatment for *Cryptosporidium* treatment as specified in §290.111 of this title.

(2) All plant piping shall be constructed so as to be thoroughly tight against leakage. No cross-connection or interconnection shall be permitted to exist in a filtration plant between a conduit carrying filtered or post-chlorinated water and another conduit carrying raw water or water in any prior stage of treatment.

(A) Vacuum breakers must be provided on each hose bibb within the plant facility.

(B) No conduit or basin containing raw water or any water in a prior stage of treatment shall be located directly above, or be permitted to have a single common partition wall with another conduit or basin containing finished water.

(C) Make-up water supply lines to chemical feeder solution mixing chambers shall be provided with an air gap or other acceptable backflow prevention device.

(D) Filters shall be located so that common walls will not exist between them and aerators, mixing and sedimentation basins or clearwells. This rule is not strictly applicable, however, to partitions open to view and readily accessible for inspection and repair.

(E) Filter-to-waste connections, if included, shall be provided with an air gap connection to waste.

(F) Air release devices on treated waterlines shall be installed in such a manner as to preclude the possibility of submergence or possible entrance of contaminants. In this respect, all openings to the atmosphere shall be covered with 16-mesh or finer corrosion-resistant screening material or an equivalent acceptable to the executive director.

(3) Return of the decanted water or solids to the treatment process shall be adequately controlled so that there will be a minimum of interference with the treatment process. Systems that do not comply with the provisions of this paragraph commit a treatment technique violation and must notify their customers in accordance with the requirements of §290.122(b) of this title.

(A) Unless the executive director has approved an alternate recycling location, spent backwash water and the liquids from sludge settling lagoons, spent backwash water tanks, sludge thickeners, and similar dewatering facilities shall be returned to the raw waterline upstream of the raw water sample tap and coagulant feed point. The blended recycled liquids shall pass through all of the major unit processes at the plant.

(B) Recycle facilities shall be designed to minimize the magnitude and impact of hydraulic surges that occur during the recycling process.

(C) Solids produced by dewatering facilities such as sludge lagoons, sludge thickeners, centrifuges, mechanical presses, and similar devices shall not be returned to the treatment plant without the prior approval of the executive director.

(4) Reservoirs for pretreatment or selective quality control shall be provided where complete treatment facilities fail to operate satisfactorily at times of maximum turbidities or other abnormal raw water quality conditions exist. Recreational activities at such reservoirs shall be prohibited.

(5) Flow measuring devices shall be provided to measure the raw water supplied to the plant, the recycled decant water, the treated water used to backwash the filters, and the treated water discharged from the plant. Additional metering devices shall be provided as appropriate to monitor the flow rate through specific treatment processes. Metering devices shall be located to facilitate use and to assist in the determination of chemical dosages, the accumulation of water production data, and the operation of plant facilities.

(6) Chemical storage facilities shall comply with applicable requirements in subsection (f)(1) of this section.

(7) Chemical feed facilities shall comply with the applicable requirements in subsection (f)(2) of this section.

(8) Flash mixing equipment shall be provided.

(A) Plants with a design capacity greater than 3.0 million gallons per day must provide at least one hydraulic mixing unit or at least two sets of mechanical flash mixing equipment designed to operate in parallel. Public water systems with other surface water treatment plants, interconnections with other systems, or wells that can meet the system's average daily demand are exempt from the requirement for redundant mechanical flash mixing equipment.

(B) Flash mixing equipment shall have sufficient flexibility to ensure adequate dispersion and mixing of coagulants and other chemicals under varying raw water characteristics and raw water flow rates.

(9) Flocculation equipment shall be provided.

(A) Plants with a design capacity greater than 3.0 million gallons per day must provide at least two sets of flocculation equipment which are designed to operate in parallel. Public water systems with other surface water treatment plants, interconnections with other systems, or wells that can meet the system's average daily demand are exempt from the requirement for redundant flocculation equipment.

(B) Flocculation facilities shall be designed to provide adequate time and mixing intensity to produce a settleable floc under varying raw water characteristics and raw water flow rates.

(i) Flocculation facilities for straight-flow and up-flow sedimentation basins shall provide a minimum theoretical detention time of at least 20 minutes when operated at their design capacity. Flocculation facilities constructed prior to October 1, 2000, are exempt from this requirement if the settled water turbidity of each sedimentation basin remains below 10.0 nephelometric turbidity unit (NTU) and the treatment plant meets with turbidity requirements of §290.111 of this title.

(ii) The mixing intensity in multiple-stage flocculators shall decrease as the coagulated water passes from one stage to the next.

(C) Coagulated water or water from flocculators shall flow to sedimentation basins in such a manner as to prevent destruction of floc. Piping, flumes, and troughs shall be designed to provide a flow velocity of 0.5 to 1.5 feet per second. Gates, ports, and valves shall be designed at a maximum flow velocity of 4.0 feet per second in the transfer of water between units.

(10) Clarification facilities shall be provided.

(A) Plants with a design capacity greater than 3.0 million gallons per day must provide at least two sedimentation basins or clarification units which are designed to operate in parallel. Public water systems with other surface water treatment plants, interconnections with other systems, or wells that can meet the system's average daily demand are exempt from the requirement for redundant sedimentation basins or clarification units.

(B) The inlet and outlet of clarification facilities shall be designed to prevent short-circuiting of flow or the destruction of floc.

(C) Clarification facilities shall be designed to remove flocculated particles effectively.

(i) When operated at their design capacity, basins for straight-flow or up-flow sedimentation of coagulated waters shall provide either a theoretical detention time of at least six hours in the flocculation and sedimentation chambers or a maximum surface overflow rate of 0.6 gallons per minute per square foot of surface area in the sedimentation chamber.

(ii) When operated at their design capacity, basins for straight-flow or up-flow sedimentation of softened waters shall provide either a theoretical detention time of at least 4.5 hours in the flocculation and sedimentation chambers or a maximum surface overflow rate of 1.0 gallons per minute per square foot of surface area in the sedimentation chamber.

(iii) When operated at their design capacity, sludge-blanket and solids-recirculation clarifiers shall provide either a theoretical detention time of at least two hours in the flocculation and sedimentation chambers or a maximum surface overflow rate of 1.0 gallons per minute per square foot in the settling chamber.

(iv) A side wall water depth of at least 12 feet shall be provided in clarification basins that are not equipped with mechanical sludge removal facilities.

(v) The effective length of a straight-flow sedimentation basin shall be at least twice its effective width.

(D) Clarification facilities shall be designed to prevent the accumulation of settled solids.

(i) At treatment plants with a single clarification basin, facilities shall be provided to drain the basin within six hours. In the event that the plant site topography is such that gravity draining cannot be realized, a permanently installed electric-powered pump station shall be provided to dewater the basin. Public water systems with other potable water sources that can meet the system's average daily demand are exempt from this requirement.

(ii) Facilities for sludge removal shall be provided by mechanical means or by hopper-bottomed basins with valves capable of complete draining of the units.

(11) Gravity or pressure type filters shall be provided.

(A) The use of pressure filters shall be limited to installations with a treatment capacity of less than 0.50 million gallons per day.

(B) Filtration facilities shall be designed to operate at filtration rates which assure effective filtration at all times.

(i) The design capacity of gravity rapid sand filters shall not exceed a maximum filtration rate of 2.0 gallons per square foot per minute. At the beginning of filter runs for declining rate filters, a maximum filtration rate of 3.0 gallons per square foot per minute is allowed.

(ii) Where high-rate gravity filters are used, the design capacity shall not exceed a maximum filtration rate of 5.0 gallons per square foot per minute. At the beginning of filter runs for declining rate filters, a maximum filtration rate of 6.5 gallons per square foot per minute is allowed.

(iii) The design capacity of pressure filters shall not exceed a maximum filtration rate of 2.0 gallons per square foot per minute with the largest filter off-line

(iv) Except as provided in clause (vi) of this subparagraph, any surface water treatment plant that provides, or is being designed to provide, less than 7.5 million gallons per day must be able to meet either the maximum daily demand

or the minimum required 0.6 gallons per minute per connection, whichever is larger, with all filters on-line.

(v) Any surface water treatment plant that provides, or is being designed to provide, 7.5 million gallons per day or more must be able to meet either the maximum daily demand or the minimum required 0.6 gallons per minute per connection, whichever is larger, with the largest filter off-line.

(vi) Any surface water treatment plant that uses pressure filters must be able to meet either the maximum daily demand or the minimum required 0.6 gallons per minute per connection, whichever is larger, with the largest filter off-line.

(C) The depth and condition of the media and support material shall be sufficient to provide effective filtration.

(i) The filtering material shall conform to American Water Works Association (AWWA) standards and be free from clay, dirt, organic matter, and other impurities.

(ii) The grain size distribution of the filtering material shall be as prescribed by AWWA standards.

(iii) The depth of filter sand, anthracite, granular activated carbon, or other filtering materials shall be 24 inches or greater and provide an L/d ratio of at least 1,000.

(I) Rapid sand filters typically contain a minimum of eight inches of fine sand with an effective size of 0.35 to 0.45 millimeter (mm), eight inches of medium sand with an effective size of 0.45 to 0.55 mm, and eight inches of coarse sand with an effective size of 0.55 to 0.65 mm. The uniformity coefficient of each size range should not exceed 1.6.

(II) High-rate dual media filters typically contain a minimum of 12 inches of sand with an effective size of 0.45 to 0.55 mm and 24 inches of anthracite with an effective size of 0.9 to 1.1 mm. The uniformity coefficient of each material should not exceed 1.6.

(III) High-rate multi-media filters typically contain a minimum of three inches of garnet media with an effective size of 0.2 to 0.3 mm, nine inches of sand with an effective size of 0.5 to 0.6 mm, and 24 inches of anthracite with

an effective size of 0.9 to 1.1 mm. The uniformity coefficient of each size range should not exceed 1.6.

(IV) High-rate mono-media anthracite or granular activated carbon filters typically contain a minimum of 48 inches of anthracite or granular activated carbon with an effective size of 1.0 to 1.2 mm. The uniformity coefficient of each size range should not exceed 1.6.

(iv) Under the filtering material, at least 12 inches of support gravel shall be placed varying in size from 1/16 inch to 2.5 inches. The gravel may be arranged in three to five layers such that each layer contains material about twice the size of the material above it. Other support material may be approved on an individual basis.

(D) The filter shall be provided with facilities to regulate the filtration rate.

(i) With the exception of declining rate filters, each filter unit shall be equipped with a manually adjustable rate-of-flow controller with rate-of-flow indication or flow control valves with indicators.

(ii) Each declining rate filter shall be equipped with a rate-of-flow limiting device or an adjustable flow control valve with a rate-of-flow indicator.

(iii) The effluent line of each filter installed after January 1, 1996, must be equipped with a slow opening valve or another means of automatically preventing flow surges when the filter begins operation.

(E) The filters shall be provided with facilities to monitor the performance of the filter. Monitoring devices shall be designed to provide the ability to measure and record turbidity as required by §290.111 of this title.

(i) Each filter shall be equipped with a sampling tap so that the effluent turbidity of the filter can be individually monitored.

(ii) Each filter operated by a public water system that serves fewer than 10,000 people shall be equipped with an on-line turbidimeter and recorder which will allow the operator to measure and record the turbidity at 15-minute intervals. The executive director may allow combined filter effluent monitoring in lieu of individual filter effluent monitoring under the following conditions:

(I) The public water system has only two filters that were installed prior to October 1, 2000, and were never equipped with individual on-line turbidimeters and recorders; and

(II) The plant is equipped with an on-line turbidimeter and recorder which will allow the operator to measure and record the turbidity level of the combined filter effluent at a location prior to clearwell storage at 15-minute intervals.

(iii) Each filter operated by a public water system that serves at least 10,000 people shall be equipped with an on-line turbidimeter and recorder which will allow the operator to measure and record the turbidity at 15-minute intervals.

(iv) Each filter installed after October 1, 2000, shall be equipped with an on-line turbidimeter and recorder which will allow the operator to determine the turbidity at 15-minute intervals.

(v) Each filter unit that is not equipped with an on-line turbidimeter and recorder shall be equipped with a device to indicate loss of head through the filter. In lieu of loss-of-head indicators, declining rate filter units may be equipped with rate-of-flow indicators.

(F) Filters shall be designed to ensure adequate cleaning during the backwash cycle.

(i) Only filtered water shall be used to backwash the filters. This water may be supplied by elevated wash water tanks, by the effluent of other filters, or by pumps which take suction from the clearwell and are provided for backwashing filters only. For installations having a treatment capacity no greater than 150,000 gallons per day, water for backwashing may be secured directly from the distribution system if proper controls and rate-of-flow limiters are provided.

(ii) The rate of filter backwashing shall be regulated by a rate-of-flow controller or flow control valve.

(iii) The rate of flow of backwash water shall not be less than 20 inches vertical rise per minute (12.5 gallons per minute per square foot) and usually not more than 35 inches vertical rise per minute (21.8 gallons per minute per square foot).

(iv) The backwash facilities shall be capable of expanding the filtering bed during the backwash cycle.

(I) For facilities equipped with air scour, the backwash facilities shall be capable of expanding the filtering bed at least 15% during the backwash cycle.

(II) For mixed-media filters without air scour, the backwash facilities shall be capable of expanding the filtering bed at least 25% during the backwash cycle.

(III) For mono-media sand filters without air scour, the backwash facilities shall be capable of expanding the filtering bed at least 40% during the backwash cycle.

(v) The filter freeboard in inches shall exceed the wash rate in inches of vertical rise per minute.

(vi) When used, surface filter wash systems shall be installed with an atmospheric vacuum breaker or a reduced pressure principle backflow assembly in the supply line. If an atmospheric vacuum breaker is used it shall be installed in a section of the supply line through which all the water passes and which is located above the overflow level of the filter.

(vii) Gravity filters installed after January 1, 1996 shall be equipped with air scour backwash or surface wash facilities.

(G) Each filter installed after October 1, 2000, shall be equipped with facilities that allow the filter to be completely drained without removing other filters from service.

(12) Pipe galleries shall provide ample working room, good lighting, and good drainage provided by sloping floors, gutters, and sumps. Adequate ventilation to prevent condensation and to provide humidity control is also required.

(13) The identification of influent, effluent, waste backwash, and chemical feed lines shall be accomplished by the use of labels or various colors of paint. Where labels are used, they shall be placed along the pipe at no greater than five-foot intervals. Color coding must be by solid color or banding. If bands are used, they shall be placed along the pipe at no greater than five-foot intervals.

(A) A plant that is built or repainted after October 1, 2000, must use the following color code. The color code to be used in labeling pipes is as follows:

Figure: 30 TAC §290.42(d)(13)(A) (No change to the figure as it currently exists in TAC.)

(B) A plant that was repainted before October 1, 2000, may use an alternate color code. The alternate color code must provide clear visual distinction between process streams.

(C) The system must maintain clear, current documentation of its color code in a location easily accessed by all personnel.

(14) All surface water treatment plants shall provide sampling taps for raw, settled, individual filter effluent, and clearwell discharge. Additional sampling taps shall be provided as appropriate to monitor specific treatment processes.

(15) An adequately equipped laboratory shall be available locally so that daily microbiological and chemical tests can be conducted.

(A) For plants serving 25,000 persons or more, the local laboratory used to conduct the required daily microbiological analyses must be accredited by the executive director to conduct coliform analyses.

(B) For plants serving populations of less than 25,000, the facilities for making microbiological tests may be omitted if the required microbiological samples can be submitted to a laboratory accredited by the executive director on a timely basis.

(C) All surface water treatment plants shall be provided with equipment for making at least the following determinations:

(i) pH;

(ii) temperature;

(iii) disinfectant residual;

(iv) alkalinity;

(v) turbidity;

(vi) jar tests for determining the optimum coagulant dose; and

(vii) other tests deemed necessary to monitor specific water quality problems or to evaluate specific water treatment processes.

(D) An amperometric titrator with platinum-platinum electrodes shall be provided at all surface water treatment plants that use chlorine dioxide.

(E) Each surface water treatment plant that uses sludge-blanket clarifiers shall be equipped with facilities to monitor the depth of the sludge blanket.

(F) Each surface water treatment plant that uses solids-recirculation clarifiers shall be equipped with facilities to monitor the solids concentration in the slurry.

(16) Each surface water treatment plant shall be provided with a computer and software for recording performance data, maintaining records, and submitting reports to the executive director. The executive director may allow a water system to locate the computer at a site other than the water treatment plant only if performance data can be reliably transmitted to the remote location on a real-time basis, the plant operator has access to the computer at all times, and performance data is readily accessible to agency staff during routine and special investigations.

(e) Disinfection.

(1) All water obtained from surface sources or groundwater sources that are under the direct influence of surface water must be disinfected in a manner consistent with the requirements of §290.110 of this title (relating to Disinfectant Residuals).

(2) All groundwater must be disinfected prior to distribution. The point of application must be ahead of the water storage tank(s) if storage is provided prior to distribution. Permission to use alternate disinfectant application points must be obtained in writing from the executive director.

(3) Disinfection equipment shall be selected and installed so that continuous and effective disinfection can be secured under all conditions.

(A) Disinfection equipment shall have a capacity at least 50% greater than the highest expected dosage to be applied at any time. It shall be capable of satisfactory operation under every prevailing hydraulic condition.

(B) Automatic proportioning of the disinfectant dosage to the flow rate of the water being treated shall be provided at plants where the treatment rate

varies automatically and at all plants where the treatment rate varies more than 50% above or below the average flow. Manual control shall be permissible at surface water treatment plants or plants treating groundwater under the direct influence of surface water only if an operator is always on hand to make adjustments promptly.

(C) All disinfecting equipment in surface water treatment plants shall include at least one functional standby unit of each capacity for ensuring uninterrupted operation. Common standby units are permissible but, generally, more than one standby unit must be provided because of the differences in feed rates or the physical state in which the disinfectants are being fed (solid, liquid, or gas).

(D) Facilities shall be provided for determining the amount of disinfectant used daily as well as the amount of disinfectant remaining for use.

(E) When used, solutions of calcium hypochlorite shall be prepared in a separate mixing tank and allowed to settle so that only a clear supernatant liquid is transferred to the hypochlorinator container.

(F) Provisions shall be made for both pretreatment disinfection and post-disinfection in all surface water treatment plants. Additional application points

shall be installed if they are required to adequately control the quality of the treated water.

(G) The use of disinfectants other than chlorine will be considered on a case-by-case basis under the exception guidelines of §290.39(l) of this title (relating to General Provisions).

(4) Systems that use chlorine gas must ensure that the risks associated with its use are limited as follows.

(A) When chlorine gas is used, a full-face self-contained breathing apparatus or supplied air respirator that meets Occupational Safety and Health Administration (OSHA) standards for construction and operation, and a small bottle of fresh ammonia solution (or approved equal) for testing for chlorine leakage shall be readily accessible outside the chlorinator room and immediately available to the operator in the event of an emergency.

(B) Housing for gas chlorination equipment and cylinders of chlorine shall be in separate buildings or separate rooms with impervious walls or partitions separating all mechanical and electrical equipment from the chlorine facilities. Housing shall be located above ground level as a measure of safety. Equipment

and cylinders may be installed on the outside of the buildings when protected from adverse weather conditions and vandalism.

(C) Adequate ventilation, which includes both high level and floor level screened vents, shall be provided for all enclosures in which gas chlorine is being stored or fed. Enclosures containing more than one operating 150-pound cylinder of chlorine shall also provide forced air ventilation which includes: screened and louvered floor level and high level vents; a fan which is located at and draws air in through the top vent and discharges to the outside atmosphere through the floor level vent; and a fan switch located outside the enclosure. Alternately, systems may install negative pressure ventilation as long as the facilities also have gas containment and treatment as prescribed by the current International Fire Code (IFC).

(5) Hypochlorination solution containers and pumps must be housed in a secure enclosure to protect them from adverse weather conditions and vandalism. The solution container top must be completely covered to prevent the entrance of dust, insects, and other contaminants.

(6) Where anhydrous ammonia feed equipment is utilized, it must be housed in a separate enclosure equipped with both high and low level ventilation to the outside atmosphere. The enclosure must be provided with forced air ventilation which

includes: screened and louvered floor level and high level vents; a fan which is located at and draws air in through the floor vent and discharges through the top vent; and a fan switch located outside the enclosure. Alternately, systems may install negative pressure ventilation as long as the facilities also have gas containment and treatment as prescribed by the current IFC.

(f) Surface water treatment plant chemical storage and feed facilities.

(1) Chemical storage facilities shall be designed to ensure a reliable supply of chemicals to the feeders, minimize the possibility and impact of accidental spills, and facilitate good housekeeping.

(A) Bulk storage facilities at the plant shall be adequate to store at least a 15-day supply of all chemicals needed to comply with minimum treatment technique and maximum contaminant level (MCL) requirements. The capacity of these bulk storage facilities shall be based on the design capacity of the treatment plant. However, the executive director may require a larger stock of chemicals based on local resupply ability.

(B) Day tanks shall be provided to minimize the possibility of severely overfeeding liquid chemicals. Day tanks will not be required if adequate process

control instrumentation and procedures are employed to prevent chemical overfeed incidents.

(C) Every chemical bulk storage facility and day tank shall have a label that identifies the facility's or tank's contents and a device that indicates the amount of chemical remaining in the facility or tank.

(D) Dry chemicals shall be stored off the floor in a dry room that is located above ground and protected against flooding or wetting from floors, walls, and ceilings.

(E) Bulk storage facilities and day tanks must be designed to minimize the possibility of leaks and spills.

(i) The materials used to construct bulk storage and day tanks must be compatible with the chemicals being stored and resistant to corrosion.

(ii) Except as provided in this clause, adequate containment facilities shall be provided for all liquid chemical storage tanks.

(I) Containment facilities for a single container or for multiple interconnected containers must be large enough to hold the maximum amount of chemical that can be stored with a minimum freeboard of six vertical inches or to hold 110% of the total volume of the container(s), whichever is less.

(II) Common containment for multiple containers that are not interconnected must be large enough to hold the volume of the largest container with a minimum freeboard of six vertical inches or to hold 110% of the total volume of the container(s), whichever is less.

(III) The materials used to construct containment structures must be compatible with the chemicals stored in the tanks.

(IV) Incompatible chemicals shall not be stored within the same containment structure.

(V) No containment facilities are required for hypochlorite solution containers that have a capacity of 35 gallons or less.

(VI) On a site-specific basis, the executive director may approve the use of double-walled tanks in lieu of separate containment facilities.

(F) Chemical transfer pumps and control systems must be designed to minimize the possibility of leaks and spills.

(G) Piping, pumps, and valves used for chemical storage and transfer must be compatible with the chemical being fed.

(2) Chemical feed and metering facilities shall be designed so that chemicals shall be applied in a manner which will maximize reliability, facilitate maintenance, and ensure optimal finished water quality.

(A) Each chemical feeder that is needed to comply with a treatment technique or MCL requirement shall have a standby or reserve unit. Common standby feeders are permissible, but generally, more than one standby feeder must be provided due to the incompatibility of chemicals or the state in which they are being fed (solid, liquid, or gas).

(B) Chemical feed equipment shall be sized to provide proper dosage under all operating conditions.

(i) Devices designed for determining the chemical feed rate shall be provided for all chemical feeders.

(ii) The capacity of the chemical feeders shall be such that accurate control of the dosage can be achieved at the full range of feed rates expected to occur at the facility.

(iii) Chemical feeders shall be provided with tanks for chemical dissolution when applicable.

(C) Chemical feeders, valves, and piping must be compatible with the chemical being fed.

(D) Chemical feed systems shall be designed to minimize the possibility of leaks and spills and provide protection against backpressure and siphoning.

(E) If enclosed feed lines are used, they shall be designed and installed so as to prevent clogging and be easily maintained.

(F) Dry chemical feeders shall be located in a separate room that is provided with facilities for dust control.

(G) Coagulant feed systems shall be designed so that coagulants are applied to the water prior to or within the mixing basins or chambers so as to permit their complete mixing with the water.

(i) Coagulant feed points shall be located downstream of the raw water sampling tap.

(ii) Coagulants shall be applied continuously during treatment plant operation.

(H) Chlorine feed units, ammonia feed units, and storage facilities shall be separated by solid, sealed walls.

(I) Chemical application points shall be provided to achieve acceptable finished water quality, adequate taste and odor control, corrosion control, and disinfection

(g) Other treatment processes. Innovative/alternate treatment processes will be considered on an individual basis, in accordance with §290.39(l) of this title. Where innovative/alternate treatment systems are proposed, the licensed professional engineer must provide pilot test data or data collected at similar full-scale operations demonstrating that the system will produce water that meets the requirements of Subchapter F of this chapter (relating to Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Systems). Pilot test data must be representative of the actual operating conditions which can be expected over the course of the year. The executive director may require a pilot study protocol to be submitted for review and approval prior to conducting a pilot study to verify compliance with the requirements of §290.39(l) of this title and Subchapter F of this chapter. The executive director may require proof of a one-year manufacturer's performance warrantee or guarantee assuring that the plant will produce treated water which meets minimum state and federal standards for drinking water quality.

(1) Package-type treatment systems and their components shall be subject to all applicable design criteria in this section.

(2) Bag and cartridge filtration systems or modules installed or replaced after April 1, 2012, and used for microbiological treatment, can receive up to 3.0-log *Giardia* removal credit, up to 2.0-log *Cryptosporidium* removal credit for individual

bag or cartridge filters, and up to 2.5-log *Cryptosporidium* removal credit for bag or cartridge filters operated in series only if the cartridges or bags meet the criteria in subparagraphs (A) - (C) of this paragraph.

(A) The filter system must treat the entire plant flow.

(B) To be eligible for this credit, systems must receive approval from the executive director based on the results of challenge testing that is conducted according to the criteria established by 40 Code of Federal Regulations (CFR) §141.719 (a) and the executive director.

(i) A factor of safety equal to 1.0-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit.

(ii) Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium* and *Giardia*.

(iii) Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(iv) Systems may use results from challenge testing conducted prior to January 5, 2006, if prior testing was consistent with 40 CFR §141.719, submitted by the system's licensed professional engineer, and approved by the executive director.

(v) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, additional challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and results submitted to the executive director for approval.

(C) Pilot studies must be conducted using filters that will meet the requirements of this section.

(3) Membrane filtration systems or modules installed or replaced after April 1, 2012, and used for microbiological treatment, can receive *Cryptosporidium* and *Giardia* removal credit for membrane filtration only if the systems or modules meet the criteria in subparagraphs (A) - (F) of this paragraph.

(A) The membrane module used by the system must undergo challenge testing to evaluate removal efficiency. Challenge testing must be conducted according to the criteria established by 40 CFR §141.719(b)(2) and the executive director.

(i) All membrane module challenge test protocols and results, the protocol for calculating the representative Log Removal Value (LRV) for each membrane module, the removal efficiency, calculated results of LRVC-Test , and the non-destructive performance test with its Quality Control Release Value (QCRV) must be submitted to the executive director for review and approval prior to beginning a membrane filtration pilot study at a public water system.

(ii) Challenge testing must be conducted on either a full-scale membrane module identical in material and construction to the membrane modules to be used in the system's treatment facility, or a smaller-scale membrane module identical in material and similar in construction to the full-scale module if approved by the executive director.

(iii) Systems may use data from challenge testing conducted prior to January 5, 2006, if prior testing was consistent with 40 CFR §141.719,

submitted by the system's licensed professional engineer, and approved by the executive director.

(iv) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane product line or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of the modified membrane and determine a new QCRV for the modified membrane must be conducted and results submitted to the executive director for approval.

(B) The membrane system must be designed to conduct and record the results of direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration system approved by the executive director and meets the requirements in clauses (i) - (ii) of this subparagraph.

(i) The design must provide for direct integrity testing of each membrane unit.

(ii) The design must provide direct integrity testing that has a resolution of 3 micrometers or less.

(iii) The design must provide direct integrity testing with [a] sensitivity sufficient to verify the log removal credit approved by the executive director. Sensitivity is determined by the criteria in 40 CFR §141.719(b)(3)(iii).

(iv) The executive director may reduce the direct integrity testing requirements for membrane units.

(C) The membrane system must be designed to conduct and record continuous indirect integrity monitoring on each membrane unit. The turbidity of the water produced by each membrane unit must be measured using the Hach FilterTrak Method 10133. The executive director may approve the use of alternative technology to monitor the quality of the water produced by each membrane unit.

(D) The level of removal credit approved by the executive director shall not exceed the lower of:

(i) the removal efficiency demonstrated during challenge testing conducted under the conditions in subparagraph (A) of this paragraph, or

(ii) the maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in subparagraph (B) of this paragraph.

(E) Pilot studies must be conducted using membrane modules that will meet the requirements of this section.

(F) Membrane systems must be designed so that membrane units' feed water, filtrate, backwash supply, waste and chemical cleaning piping shall have cross-connection protection to prevent chemicals from all chemical cleaning processes from contaminating other membrane units in other modes of operation. This may be accomplished by the installation of a double block and bleed valving arrangement, a removable spool system or other alternative methods approved by the executive director.

(4) Bag, cartridge or membrane filtration systems or modules installed or replaced before April 1, 2012, and used for microbiological treatment, can receive up to a 2.0-log removal credit for *Cryptosporidium* and up to a 3.0-log removal credit for *Giardia* based on site specific pilot study results, design, operation, and reporting requirements.

(5) Ultraviolet (UV) light reactors used for microbiological inactivation can receive *Cryptosporidium*, *Giardia* and virus inactivation credit if the reactors meet the criteria in subparagraphs (A) - (C) of this paragraph.

(A) UV light reactors can receive inactivation credit only if they are located after filtration.

(B) In lieu of a pilot study, the UV light reactors must undergo validation testing to determine the operating conditions under which a UV reactor delivers the required UV dose. Validation testing must be conducted according to the criteria established by 40 CFR §141.720(d)(2) and the executive director.

(i) The validation study must include the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps and other critical system components; inlet and outlet piping or channel configuration of the UV reactor; lamp and sensor locations; and other parameters determined by the executive director.

(ii) Validation testing must be conducted on a full-scale reactor that is essentially identical to the UV reactor(s) to be used by the system and

using waters that are essentially identical in quality to the water to be treated by the UV reactor.

(C) The UV light reactor systems must be designed to monitor and record parameters to verify the UV reactors operation within the validated conditions approved by the executive director. The UV light reactor must be equipped with facilities to monitor and record UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters designated by the executive director.

(h) Sanitary facilities for water works installations. Toilet and hand washing facilities provided in accordance with established standards of good public health engineering practices shall be available at all installations requiring frequent visits by operating personnel.

(i) Permits for waste discharges. Any discharge of wastewater and other plant wastes shall be in accordance with all applicable state and federal statutes and regulations. Permits for discharging wastes from water treatment processes shall be obtained from the commission, if necessary.

(j) Treatment chemicals and media. All chemicals and any additional or replacement process media used in treatment of water supplied by public water systems

must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 60 for direct additives and ANSI/NSF Standard 61 for indirect additives. Conformance with these standards must be obtained by certification of the product by an organization accredited by ANSI.

(k) Safety.

(1) Safety equipment for all chemicals used in water treatment shall meet applicable standards established by the OSHA or Texas Hazard Communication Act, Texas Health and Safety Code, Title 6, Chapter 502.

(2) Systems must comply with United States Environmental Protection Agency (EPA) requirements for Risk Management Plans.

(l) Plant operations manual. A thorough plant operations manual must be compiled and kept up-to-date for operator review and reference. This manual should be of sufficient detail to provide the operator with routine maintenance and repair procedures, with protocols to be utilized in the event of a natural or man-made catastrophe, as well as provide telephone numbers of water system personnel, system officials, and local/state/federal agencies to be contacted in the event of an emergency.

(m) Security. Each water treatment plant and all appurtenances thereof shall be enclosed by an intruder-resistant fence. The gates shall be locked during periods of darkness and when the plant is unattended. A locked building in the fence line may satisfy this requirement or serve as a gate.

(n) Corrosion control treatment. Systems must install any corrosion control or source water treatment required by §290.117(f) and (g) of this title (relating to Regulation of Lead and Copper), respectively. Such treatment must be designed and installed consistent with the requirements of this subchapter. The requirements of 40 CFR §141.82(i) and §141.83(b)(7) relating to EPA involvement in treatment determination are adopted by reference.

§290.44. Water Distribution.

(a) Design and standards. All potable water distribution systems including pump stations, mains, and both ground and elevated storage tanks, shall be designed, installed, and constructed in accordance with current American Water Works Association (AWWA) standards with reference to materials to be used and construction procedures to be followed. In the absence of AWWA standards, commission review may be based upon the standards of the American Society for Testing and Materials (ASTM), commercial, and other recognized standards utilized by licensed professional engineers.

(1) All newly installed pipes and related products must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and must be certified by an organization accredited by ANSI.

(2) All plastic pipes [pipe] for use in public water systems must also bear the National Sanitation Foundation Seal of Approval (NSF-pw) and have an ASTM design pressure rating of at least 150 pounds per square inch (psi) [psi] or a standard dimension ratio of 26 or less.

(3) No pipe which has been used for any purpose other than the conveyance of drinking water shall be accepted or relocated for use in any public drinking water supply.

(4) Water transmission and distribution lines must be installed in accordance with the manufacturer's instructions. However, the top of the waterline must be located below the frost line and in no case shall the top of the waterline be less than 24 inches below ground surface.

(5) The hydrostatic leakage rate shall not exceed the amount allowed or recommended by AWWA formulas.

(b) Lead ban. The following provisions apply to the use of lead in plumbing.

(1) The use of pipes and pipe fittings that contain more than 8.0% lead or solders and flux that contains more than 0.2% lead is prohibited in the following circumstances:

(A) for installation or repair of any public water supply; and

(B) for installation or repair of any plumbing in a residential or nonresidential facility providing water for human consumption and connected to a public drinking water supply system.

(2) This requirement will be waived for lead joints that are necessary for repairs to cast iron pipe.

(c) Minimum waterline sizes. The minimum waterline sizes are for domestic flows only and do not consider fire flows. Larger pipe sizes shall be used when the licensed professional engineer deems it necessary. It should be noted that the required sizes are based strictly on the number of customers to be served and not on the distances between connections or differences in elevation or the type of pipe. No new

waterline less than [under] two inches in diameter will be allowed to be installed in a public water system distribution system. These minimum line sizes do not apply to individual customer service lines.

Figure: 30 TAC §290.44(c) (No change to the figure as it currently exists in TAC.)

(d) Minimum pressure requirement. The system must be designed to maintain a minimum pressure of 35 psi at all points within the distribution network at flow rates of at least 1.5 gallons per minute per connection. When the system is intended to provide fire fighting capability, it must also be designed to maintain a minimum pressure of 20 psi under combined fire and drinking water flow conditions. The distribution system of public water systems that are also affected utilities must be designed to meet the requirements of §290.45(h) of this title (relating to Minimum Water System Capacity Requirements).

(1) Air release devices shall be installed in the distribution system at all points where topography or other factors may create air locks in the lines. Air release devices shall be installed in such a manner as to preclude the possibility of submergence or possible entrance of contaminants. In this respect, all openings to the atmosphere shall be covered with 16-mesh or finer, corrosion-resistant screening material or an acceptable equivalent.

(2) When service is to be provided to more than one pressure plane or when distribution system conditions and demands are such that low pressures develop, the method of providing increased pressure shall be by means of booster pumps taking suction from storage tanks. If an exception to this requirement is desired, the designing engineer must furnish for the executive director's review all planning material for booster pumps taking suction from other than a storage tank. The planning material must contain a full description of the supply to the point of suction, maximum demands on this part of the system, location of pressure recorders, safety controls, and other pertinent information. Where booster pumps are installed to take suction directly from the distribution system, a minimum residual pressure of 20 psi must be maintained on the suction line at all times. Such installations must be equipped with automatic pressure cut-off devices so that the pumping units become inoperative at a suction pressure of less than 20 psi. In addition, a continuous pressure recording device may be required at a predetermined suspected critical pressure point on the suction line in order to record the hydraulic conditions in the line at all times. If such a record indicates critical minimum pressures, less than 20 psi, [(less than 20 psi),] adequate storage facilities must be installed with the booster pumps taking suction from the storage facility. Fire pumps used to maintain pressure on automatic sprinkler systems only for fire protection purposes are not considered as in-line booster pumps.

(3) Service connections that require booster pumps taking suction from the public water system lines must be equipped with automatic pressure cut-off devices so that the pumping units become inoperative at a suction pressure of less than 20 psi. Where these types of installations are necessary, the preferred method of pressure maintenance consists of an air gapped connection with a storage tank and subsequent repressurization facilities.

(4) Each community public water system shall provide accurate metering devices at each residential, commercial, or industrial service connection for the accumulation of water usage data. A water system that furnishes the services or commodity only to itself or its employees when that service or commodity is not resold to or used by others is exempt from this requirement.

(5) The system shall be provided with sufficient valves and blowoffs so that necessary repairs can be made without undue interruption of service over any considerable area and for flushing the system when required. The engineering report shall establish criteria for this design.

(6) The system shall be designed to afford effective circulation of water with a minimum of dead ends. All dead-end mains shall be provided with acceptable flush valves and discharge piping. All dead-end lines less than two inches in diameter

will not require flush valves if they end at a customer service. Where dead ends are necessary as a stage in the growth of the system, they shall be located and arranged to ultimately connect the ends to provide circulation.

(e) Location of waterlines. The following rules apply to installations of waterlines, wastewater mains or laterals, and other conveyances/appurtenances identified as potential sources of contamination. Furthermore, all ratings specified shall be defined by ASTM or AWWA standards unless stated otherwise. New mains, service lines, or laterals are those that are installed where no main, service line, or lateral previously existed, or where existing mains, service lines, or laterals are replaced with pipes of different size or material.

(1) When new potable water distribution lines are constructed, they shall be installed no closer than nine feet in all directions to wastewater collection facilities. All separation distances shall be measured from the outside surface of each of the respective pieces.

(2) Potable water distribution lines and wastewater mains or laterals that form parallel utility lines shall be installed in separate trenches.

(3) No physical connection shall be made between a drinking water supply and a sewer line. Any appurtenance shall be designed and constructed so as to prevent any possibility of sewage entering the drinking water system.

(4) Where the nine-foot separation distance cannot be achieved, the following criteria shall apply.

(A) New waterline installation - parallel lines.

(i) Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater main or lateral and the licensed professional engineer licensed in the State of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.

(ii) Where a new potable waterline parallels an existing pressure rated wastewater main or lateral and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater main or

lateral shall be replaced with at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater main or lateral.

(iii) Where a new potable waterline parallels a new wastewater main, the wastewater main or lateral shall be constructed of at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the wastewater main or lateral.

(B) New waterline installation - crossing lines.

(i) Where a new potable waterline crosses an existing, non-pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral is disturbed or

shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.

(ii) Where a new potable waterline crosses an existing, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.

(iii) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and the standard pipe segment length of the wastewater main or lateral is at least 18 feet, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pipe

stiffness of 115 psi at 5.0% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.

(iv) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and a standard length of the wastewater pipe is less than 18 feet in length, the potable water pipe segment shall be centered over the wastewater line. The materials and method of installation shall conform to [with] one of the following options.

(I) Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater main or lateral shall be located below the waterline.

(II) All sections of wastewater main or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater main or lateral. The space around

the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled to the springline with washed sand. Each end of the casing shall be sealed with watertight non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.

(III) When a new waterline crosses under a wastewater main or lateral, the waterline shall be encased as described for wastewater mains or laterals in subclause (II) of this clause or constructed of ductile iron or steel pipe with mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. Both the waterline and wastewater main or lateral must pass a pressure and leakage test as specified in AWWA C600 standards.

(v) Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the center line of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pressure rating of at least

150 psi. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.

(vi) Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater mains during future construction.

(5) Waterline and wastewater main or lateral manhole or cleanout separation. The separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The

encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.

(6) Location of fire hydrants. Fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line regardless of construction.

(7) Location of potable or raw water supply or suction lines. Suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile or concrete wastewater main, wastewater lateral, or wastewater service line.

(8) Proximity of septic tank drainfields. Waterlines shall not be installed closer than ten feet to septic tank drainfields.

(f) Sanitary precautions and disinfection. Sanitary precautions, flushing, disinfection procedures, and microbiological sampling as prescribed in AWWA standards for disinfecting water mains shall be followed in laying waterlines.

(1) Pipe shall not be laid in water or placed where it can be flooded with water or sewage during its storage or installation.

(2) Special precautions must be taken when waterlines are laid under any flowing or intermittent stream or semipermanent body of water such as marsh, bay, or estuary. In these cases, the water main shall be installed in a separate watertight pipe encasement and valves must be provided on each side of the crossing with facilities to allow the underwater portion of the system to be isolated and tested to determine that there are no leaks in the underwater line. Alternately, and with the permission of the executive director, the watertight pipe encasement may be omitted.

(3) New mains shall be thoroughly disinfected in accordance with AWWA Standard C651 and then flushed and sampled before being placed in service. Samples shall be collected for microbiological analysis to check the effectiveness of the disinfection procedure. Sampling shall be repeated if contamination persists. A minimum of one sample for each 1,000 feet of completed waterline will be required or at the next available sampling point beyond 1,000 feet as designated by the design engineer.

(g) Interconnections.

(1) Each proposal for a direct connection between public drinking water systems under separate administrative authority will be considered on an individual basis.

(A) Documents covering the responsibility for sanitary control shall accompany the submitted planning material.

(B) Each water supply shall be of a safe, potable quality.

(2) Where an interconnection between systems is proposed to provide a second source of supply for one or both systems, the system being utilized as a second source of supply must be capable of supplying a minimum of 0.35 gallons per minute per connection for the total number of connections in the combined distribution systems.

(h) Backflow, siphonage.

(1) No water connection from any public drinking water supply system shall be allowed to any residence or establishment where an actual or potential contamination hazard exists unless the public water facilities are protected from contamination.

(A) At any residence or establishment where an actual or potential contamination hazard exists, additional protection shall be required at the meter in the form of an air gap or backflow prevention assembly. The type of backflow prevention assembly required shall be determined by the specific potential hazard identified in §290.47(i) of this title (relating to Appendices).

(B) At any residence or establishment where an actual or potential contamination hazard exists and an adequate internal cross-connection control program is in effect, backflow protection at the water service entrance or meter is not required.

(i) An adequate internal cross-connection control program shall include an annual inspection and testing by a licensed [certified] backflow prevention assembly tester on all backflow prevention assemblies used for health hazard protection.

(ii) Copies of all such inspection and test reports must be obtained and kept on file by the water purveyor.

(iii) It will be the responsibility of the water purveyor to ensure that these requirements are met.

(C) At each residence or facility where water from a rainwater harvesting system is used for indoor potable purposes and there is a connection to a public water system, the public water system must ensure that the make-up supply line to the rainwater storage tank is provided with an air-gap that has been inspected and approved upon installation by a licensed backflow prevention assembly tester.

(2) No water connection from any public drinking water supply system shall be connected to any condensing, cooling, or industrial process or any other system of nonpotable usage over which the public water supply system officials do not have sanitary control, unless the said connection is made in accordance with the requirements of paragraph (1) of this subsection. Water from such systems cannot be returned to the potable water supply.

(3) Overhead bulk water dispensing stations must be provided with an air gap between the filling outlet hose and the receiving tank to protect against back siphonage and cross-contamination.

(4) All backflow prevention assemblies that are required according to this section and associated table located in §290.47(i) of this title shall be tested upon installation by a licensed [recognized] backflow prevention assembly tester and certified

to be operating within specifications. Backflow prevention assemblies which are installed to provide protection against health hazards must also be tested and certified to be operating within specifications at least annually by a licensed [recognized] backflow prevention assembly tester.

(A) Backflow [Recognized backflow] prevention assembly testers shall have completed an executive director approved course on cross-connection control and backflow prevention assembly testing, pass an examination administered by the executive director, and hold a current license as a backflow prevention assembly tester.

(i) Backflow prevention assembly testers are qualified to test and repair assemblies on any domestic, commercial, industrial, or irrigation service.

(ii) Backflow prevention assembly testers may test and repair assemblies on firelines only if they are permanently employed by an Approved Fireline Contractor. The State Fire Marshal's office requires that any person performing maintenance on firelines must be employed by an Approved Fireline Contractor.

(B) Gauges used in the testing of backflow prevention assemblies shall be tested for accuracy annually in accordance with the University of Southern California's Manual of Cross-Connection Control or the AWWA's [American Water

Works Association] Recommended Practice for Backflow Prevention and Cross-Connection Control (AWWA Manual, M14) [(Manual M14)]. Public water systems shall require testers to include test gauge serial numbers on "Test and Maintenance" report forms and ensure testers have gauges tested for accuracy.

(C) A test report must be completed by the recognized backflow prevention assembly tester for each assembly tested. The signed and dated original must be submitted to the public water supplier for recordkeeping purposes. Any form which varies from the format specified in Appendix F located in §290.47(f) of this title must be approved by the executive director prior to being placed in use.

(5) The use of a backflow prevention assembly at the service connection shall be considered as additional backflow protection and shall not negate the use of backflow protection on internal hazards as outlined and enforced by local plumbing codes.

(6) At any residence or establishment where there is no actual or potential contamination hazard, a backflow prevention assembly is not required.

(i) Water hauling. When drinking water is distributed by tank truck or trailer, it must be accomplished in the following manner.

(1) Water shall be obtained from an approved source.

(2) The equipment used to haul the water must be approved by the executive director and must be constructed as follows.

(A) The tank truck or trailer shall be used for transporting drinking water only and shall be labeled "Drinking Water." Tanks which have been used previously for purposes other than transporting potable liquids shall not be used for hauling drinking water.

(B) The tank shall be watertight and of an approved material which is impervious and easily cleaned and disinfected. Any paint or coating and any plastic or fiberglass materials used as contact surfaces must be approved by the United States Environmental Protection Agency, the United States Food and Drug Administration, or the NSF. Effective January 1, 1993, any newly installed surfaces shall conform to ANSI/NSF Standard 61 and must be certified by an organization accredited by ANSI.

(C) The tank shall have a manhole and a manhole cover which overlaps the raised manhole opening by a minimum of two inches and terminates in a

downward direction. The cover shall fit firmly on the manhole opening and shall be kept locked.

(D) The tank shall have a vent which is faced downward and located to minimize the possibility of drawing contaminants into the stored water. The vent must be screened with 16-mesh or finer corrosion-resistant material.

(E) Connections for filling and emptying the tank shall be properly protected to prevent the possible entrance of contamination. These openings must be provided with caps and keeper chains.

(F) A drain shall be provided which will completely empty the tank for cleaning or repairs.

(G) When a pump is used to transfer the water from the tank, the pump shall be permanently mounted with a permanent connection to the tank. The discharge side of the pump shall be properly protected between uses by a protective cap and keeper chain.

(H) Hoses used for the transfer of drinking water to and from the tank shall be used only for that purpose and labeled for drinking water only. The hoses

shall conform to ANSI/NSF Standard 61 and must be certified by an entity recognized by the commission. Hoses and related appurtenances must be cleaned and disinfected on a regular basis during prolonged use or before start-up during intermittent use. Hoses must be properly stored between uses and must be provided with caps and keeper chains or have the ends connected together.

(I) The tank shall be disinfected monthly and at any time that contamination is suspected.

(J) At least one sample per month from each tank shall be collected and submitted for microbiological analysis to one of the commission's approved laboratories for each month of operation.

(K) A minimum free chlorine residual of 0.5 milligrams per liter (mg/L) [mg/L] or, if chloramines are used as the primary disinfectant, a chloramine residual of 1.0 mg/L (measured as total chlorine) shall be maintained in the water being hauled. Chlorine or chlorine containing compounds may be added on a "batch" basis to maintain the required residual.

(L) Operational records detailing the amount of water hauled, purchases, microbiological sampling results, chlorine residual readings, dates of disinfection, and source of water shall be maintained.

(j) If a structure is connected to a public water supply system and has a rainwater harvesting system for indoor use, the structure must have appropriate cross-connection safeguards in accordance with subsection (h)(1) of this section [and the rainwater harvesting system may be used only for nonpotable indoor purposes].

(1) A person who intends to connect a rainwater harvesting system to a public water system for use for potable purposes must give written notice of that intention to the municipality or the owner or operator of the public water system in which the rainwater harvesting is located, and must receive consent from the municipality or the owner or operator of the public water system before connecting the rainwater harvesting system to the public water system.

(2) At each residence or facility where water from a rainwater harvesting system is used for indoor potable purposes and there is a connection to a public water system, the public water system shall ensure that the rainwater harvesting system is installed and maintained by a master plumber or journeyman plumber licensed by the

Texas State Board of Plumbing Examiners and who holds an endorsement issued by the Texas State Board of Plumbing Examiners as a Water Supply Protection Specialist.

(3) At each residence or facility where water from a rainwater harvesting system is used for indoor potable purposes and there is a connection to a public water system, the public water system shall ensure that minimum treatment consists of filtration and disinfection.

(4) At each residence or facility where water from a rainwater harvesting system is used for indoor potable purposes and there is a connection to a public water system, the public water system may require additional levels of treatment beyond the minimum requirements of paragraph (3) of this section.

SUBCHAPTER F: DRINKING WATER STANDARDS GOVERNING DRINKING WATER QUALITY AND REPORTING REQUIREMENTS FOR PUBLIC WATER SYSTEMS
§290.109

Statutory Authority

The amendment is proposed under Texas Water Code (TWC), §5.102, which establishes the commission's general authority necessary to carry out its jurisdiction; §5.103, which establishes the commission's general authority to adopt rules; §5.105, which establishes the commission's authority to set policy by rule; and Texas Health and Safety Code (THSC), §341.042, which allows the commission to adopt rules relating to the domestic use of harvested rainwater. Therefore, the TWC and THSC authorize rulemaking that amends §290.109, which relates to rainwater harvesting systems (RWHS) that are connected to a public water system (PWS) and are intended for indoor potable use.

The proposed amendment implements the language set forth in House Bill (HB) 3372; §3 of HB 3391; and Senate Bill 1073, which require the commission to amend the existing rule for structures that are connected to a PWS and have a RWHS by allowing the RWHS to be used for indoor potable purposes.

§290.109. Microbial Contaminants.

(a) Applicability. All public water systems must produce and distribute water that meets the provisions of this section regarding microbial contaminants.

(b) Maximum contaminant levels (MCL) for microbial contaminants. Treatment techniques and MCL requirements for microbial contaminants are based on detection of those contaminants or fecal indicator organisms.

(1) The MCL for microbial contaminants in the distribution system is based on the presence of total or fecal coliform bacteria in routine, repeat, and increased monitoring distribution samples.

(A) For a system which collects at least 40 routine distribution samples per month, the MCL is defined as when more than 5.0% of samples collected in a month are coliform positive.

(B) For a system which collects fewer than 40 routine distribution samples per month, the MCL is defined as when more than one sample is coliform positive.

(C) The acute MCL is defined as when a repeat sample is fecal coliform or *Escherichia coli (E. coli)* [*E. coli*] positive; or a total coliform positive repeat sample follows a fecal coliform or *E. coli* positive routine sample.

(2) For systems required to collect raw groundwater samples, the standard is no detection of fecal indicators in a raw groundwater samples.

(c) Monitoring requirements for microbial contaminants. Public water systems shall collect samples for total coliform, fecal coliform, *E. coli*, or other fecal indicator organisms at locations and frequency as directed by the executive director. All compliance samples must be collected during normal operating conditions.

(1) Routine microbial sampling locations. Public water systems shall routinely monitor for microbial contaminants at the following locations.

(A) Public water systems must collect routine distribution coliform samples at active service connections which are representative of water quality throughout the distribution system. Other sampling sites may be used if located adjacent to active service connections.

(B) Public water systems shall collect distribution coliform samples at locations specified in the system's monitoring plan.

(2) Routine distribution coliform sampling frequency. Public water systems must sample for distribution coliform at the following frequency:

(A) Community and noncommunity public water systems must collect routine distribution coliform samples at a frequency based on the population served by the system.

(i) the population for noncommunity systems will be based on the maximum number of persons served on any given day during the month;

(ii) the population of community systems will be based on the data reported during the most recent sanitary survey of the public water system; and

(iii) the minimum sampling frequency for public water systems is shown in the following table.

Figure: 30 TAC §290.109(c)(2)(A)(iii) (No change to the figure as it currently exists in TAC.)

(B) A public water system which uses surface water or groundwater under the direct influence of surface water must collect routine distribution coliform samples at regular time intervals throughout the month.

(C) A public water system which uses only uses only purchased water or groundwater not under the direct influence of surface water and serves more than 4,900 persons must collect routine distribution coliform samples at regular time intervals throughout the month.

(D) A public water system which uses only purchased water or groundwater not under the direct influence of surface water and serves 4,900 persons or fewer may collect all required routine distribution coliform samples on a single day if they are taken from different sites.

(E) A total coliform-positive sample invalidated under this subsection does not count towards meeting the minimum routine monitoring requirements of this subsection.

(F) If a system collecting fewer than five routine distribution coliform samples per month has one or more total coliform-positive samples and the

executive director does not invalidate the sample(s) in accordance with subsection (d)(1) of this section, it must collect at least five routine distribution coliform samples during the next month the system provides water to the public.

(3) Repeat distribution coliform sampling requirements. Systems shall conduct repeat monitoring if one or more of the routine samples is found to contain coliform organisms.

(A) If a routine distribution coliform sample is coliform-positive, the public water system must collect a set of repeat distribution coliform samples within 24 hours of being notified of the positive result, or as soon as possible if the local laboratory is closed.

(i) A system which collects more than one routine distribution coliform sample per month must collect no fewer than three repeat samples for each coliform-positive sample found.

(ii) A system which collects one routine distribution coliform sample per month must collect no fewer than four repeat samples for each coliform-positive sample found.

(B) The system must collect all repeat samples on the same day, except a system with a single service connection may collect daily repeat samples until the required number of repeat samples has been collected.

(C) The system must collect at least one repeat sample from the sampling tap where the original coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a fourth repeat sample is required, it must be collected within five service connections upstream or downstream. If the positive routine sample was collected at the end of the distribution line, one repeat sample must be collected at that point and all other samples must be collected within five connections upstream of that point.

(D) If one or more repeat samples in the set is total coliform-positive, the public water system must collect an additional set of repeat samples in the manner specified in subparagraphs (A) - (C) of this paragraph. The additional samples must be collected within 24 hours of being notified of the positive result or as soon as possible if the local laboratory is closed. The system must repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms has been exceeded.

(E) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample is found to contain total coliform bacteria, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(4) Raw groundwater source monitoring. Groundwater systems must comply, unless otherwise noted, with the requirements of this section. Any raw groundwater source sample required under this paragraph must be collected at a location prior to any treatment of the groundwater source and use analytical procedures and methods described in §290.119(b)(10) of this title (relating to Analytical Procedures).

(A) General requirements. A groundwater system must conduct triggered source water monitoring for *E. coli* or other fecal indicators, if both of the following conditions exist.

(i) The system does not provide at least 4-log treatment of viruses (as defined in §290.103(39) of this title (relating to Definitions)) before the first customer for each groundwater source; and

(ii) The system is notified that a routine distribution coliform sample is positive and the sample is not invalidated under subsection (d)(1) of this section.

(B) Sampling requirements. A groundwater system must collect, within 24 hours of notification of the routine distribution total coliform-positive sample, at least one raw groundwater source *E. coli* (or other approved fecal indicator) sample from each groundwater source in use at the time the distribution coliform-positive sample was collected.

(i) The executive director may extend the 24-hour time limit on a case-by case basis if the system cannot collect the raw groundwater source sample within 24 hours due to circumstances beyond its control.

(ii) If approved by the executive director and documented in the system's monitoring plan, systems with more than one groundwater source may be allowed to sample a representative groundwater source or sources. Systems must modify their current monitoring plan to identify one or more groundwater sources that are representative of each distribution coliform sampling site and is intended to be used for representative source sampling.

(iii) A groundwater system serving 1,000 people or fewer may use one of the four required repeat samples collected from a raw groundwater source to meet both the repeat requirements of subparagraph (A)(ii) of this paragraph and the triggered raw source monitoring requirements in this paragraph. If a required repeat sample is used to meet both requirements and found to be *E. coli* positive, the system will have achieved an acute MCL as defined in subsection (b)(1)(C) of this section and corrective action will be required for the groundwater source were the sample was found to be *E. coli* positive.

(C) Consecutive and wholesale systems. Consecutive groundwater systems receiving drinking water from a wholesaler must notify the wholesale system(s) within 24 hours of being notified of the positive coliform distribution sample. The wholesale groundwater system(s) must comply with the following:

(i) A wholesale groundwater system that receives notice of a distribution coliform sample positive from a consecutive system it serves must collect a sample from each of its groundwater sources within 24 hours of the notification and analyze each sample for the presence of *E. coli*.

(ii) If any raw source sample is *E. coli* positive, the wholesale groundwater system must notify all consecutive systems served by that groundwater

source of the fecal indicator positive within 24 hours of being notified. The wholesale system and all consecutive systems served by that groundwater source must notify their water system customers in accordance with subsection (g)(2) of this section.

(D) Exceptions to the triggered source monitoring requirements. A groundwater system is not required to comply with the triggered source monitoring requirements if any of the following conditions exist.

(i) The executive director determines and documents in writing, that the distribution coliform positive sample is caused by a distribution system deficiency; or

(ii) The distribution coliform positive sample is collected at a location that meets the distribution coliform sample invalidation criteria as specified in subsection (d)(1) of this section and the replacement sample is negative for coliforms.

(E) Assessment source monitoring. The executive director may require monthly source assessment raw monitoring without the presence of a positive total coliform distribution sample if well conditions exist that indicate the groundwater may be susceptible to fecal contamination. The executive director may conduct a hydrogeological sensitivity assessment to determine if the source is susceptible to fecal

contamination. If requested by the executive director, groundwater systems must provide the executive director with any existing information that will enable the executive director to perform a hydrogeological sensitivity assessment. A groundwater system conducting assessment source monitoring may use a triggered source sample collected under subparagraph (B) of this paragraph to meet the assessment source monitoring requirement. Additionally, an assessment source monitoring sample may be used as a triggered source monitoring sample if collected within 24 hours of notification of the coliform-positive distribution sample. Assessment source monitoring requirements may include:

(i) Source monitoring, collected in a manner described in §290.119(b)(10) of this title, for a period of 12 months that represents each month that the system provides groundwater to the public from the raw groundwater source or such time period as specified by the executive director.

(ii) Collection of samples from each well unless the system has an approved triggered source monitoring plan under subparagraph (B)(ii) of this paragraph.

(5) Culture analysis. If any routine or repeat sample is total coliform-positive, that total coliform-positive culture medium will be analyzed to determine if

fecal coliforms or bacteria are present. If fecal coliforms or *E. coli* are present, the system must notify the executive director by the end of the day in accordance with subsection (g) of this section.

(d) Analytical and invalidation requirements for microbial contaminants. Analytical procedures shall be performed in accordance with §290.119 of this title. Testing for microbial contaminants shall be performed at a laboratory certified by the executive director.

(1) Distribution coliform sample invalidation. The executive director may invalidate a distribution total coliform-positive sample if one of the following conditions is met.

(A) The executive director may invalidate a sample if the laboratory provides written notice that improper sample analysis caused the total coliform-positive result.

(B) The executive director may invalidate a sample if the results of repeat samples collected, as required by this section, determine [determines] that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The executive director cannot invalidate a sample on the

basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative. Under those circumstances, the system may cease resampling and request that the executive director invalidate the sample. The system must provide copies of the routine positive and all repeat samples.

(C) The executive director may invalidate a sample if there are substantial grounds to believe that the total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required by this section, and use them to determine compliance with the MCL for total coliforms in subsection (f) of this section. The system must provide written documentation which must state the specific cause of the total coliform-positive sample, and the action the system has taken, or will take, to correct this problem. The executive director may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(D) The executive director may invalidate a sample if the laboratory provides written notice that the sample was unsuitable for analysis.

(E) If a sample is invalidated by the laboratory, the system must collect another sample from the same location as the original sample within 24 hours of being notified, or as soon as possible if the laboratory is closed, and have it analyzed for the presence of total coliform. The system must continue to resample within 24 hours and have the samples analyzed until it obtains a valid result.

(2) A groundwater system may obtain invalidation of a fecal indicator positive groundwater source sample if the conditions of subparagraphs (A) and (B) of this paragraph apply. If the executive director invalidates a fecal indicator positive groundwater source sample, the system must collect another source sample as specified in subsection (c)(4) of this section within 24 hours of being notified of the invalidation.

(A) Notice from the laboratory must document that improper sample analysis occurred. If a laboratory invalidates a sample, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the invalidated sample, and have it analyzed for the presence of *E. coli*. The system must continue to re-sample within 24 hours and have the samples analyzed until it obtains a valid result. If approved by the executive director, the 24-hour time limit may be extended.

(B) The executive director may invalidate the sample if the system provides written documentation that there is substantial evidence that a fecal indicator positive groundwater source sample is not related to source water quality. If the executive director invalidates a sample, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the invalidated sample, and have it analyzed for the presence of *E. coli*.

(e) Reporting requirements for microbial contaminants. Upon the request of the executive director, the owner or operator of a public water system must provide the executive director with a copy of the results of any test, measurement, or analysis required by this subsection. The copies must be submitted within ten days of the request or within ten days of their receipt by the public water system, whichever is later. The copies must be mailed to the Water Supply Division, MC 155, Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087.

(f) Compliance determination for microbial contaminants. Compliance with the requirements of this section shall be determined using the following criteria each month that the system is in operation.

(1) A system commits an acute MCL violation if:

(A) A repeat distribution system sample is fecal coliform-positive or *E. coli*-positive; or

(B) A total coliform-positive repeat distribution system sample follows a fecal coliform-positive or *E. coli*-positive routine distribution system sample.

(2) A system that collects at least 40 routine distribution coliform samples per month commits a nonacute MCL violation if more than 5.0% of the samples collected during a month are total coliform-positive, but none of the initial or repeat samples are fecal coliform-positive or *E. coli*-positive.

(3) A system that collects fewer than 40 routine distribution coliform samples per month commits a nonacute MCL violation if more than one sample collected during a month is total coliform-positive, but none of the initial or repeat samples are fecal coliform-positive or *E. coli*-positive.

(4) A public groundwater system that is required to collect raw source samples is required to conduct corrective action as described in §290.116 of this title (relating to Groundwater Corrective Actions and Treatment Techniques) and is required to provide public notification in accordance with §290.122(a) [§209.122(a)] of this title

(relating to Public Notification) if a source sample is confirmed positive for *E. coli* or other approved fecal indicators.

(5) A public water system that fails to provide the required number of suitable distribution coliform samples commits a monitoring violation.

(6) A public water system that fails to monitor in accordance with the requirements of subsection (c)(4) of this section commits a monitoring violation and must provide public notification in accordance to §290.122 of this title.

(7) A public water system that fails to report the results of the monitoring tests required by this section commits a reporting violation.

(8) A public water system that fails to do a required public notice or certify that notification has been performed commits a public notice reporting violation.

(9) Results of all routine and repeat distribution coliform samples not invalidated by the executive director must be included in determining compliance with the MCL for total coliforms.

(10) Distribution coliform samples invalidated by the executive director shall not be included in determining compliance with the MCL for total coliforms.

(11) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the MCL for microbiological contaminants.

(g) Public notification for microbial contaminants. A system that is out of compliance with the requirements described in this section must notify the public using the procedures described in §290.122 of this title for microbial contamination.

(1) A public water system that commits an acute MCL violation for microbial contaminants must notify the water system customers in accordance with the boil water notice requirements of §290.46(q) of this title (relating to Minimum Acceptable Operating Practices for Public Drinking Water Systems) and the public notice requirements of §290.122(a) of this title.

(2) A public groundwater system that receives an *E. coli* or other fecal indicator positive source sample that has not been invalidated by the executive director, or a notice of an *E. coli* or other fecal indicator positive source sample from a wholesale

system, including consecutive systems, must notify the water system customers within 24-hours in accordance with the requirements of §290.122(a) of this title and include notice in the next Consumer Confidence Report for community systems or provide as a special notice for noncommunity systems in accordance with §290.272(g)(7) of this title (relating to Content of the Report) for community water systems and §290.116(f)(2) of this title for noncommunity systems. Consecutive systems must issue public notice in accordance with §290.122(g) of this title. The system must continue to notify the public annually until the fecal contamination in the source water is determined by the executive director to be corrected as specified under §290.116 of this title.

(3) A public water system that has fecal coliforms or *E. coli* present must notify the executive director by the end of the day when the system is notified of the test result, unless the system is notified of the result after the commission's office is closed, in which case the system must notify the executive director before the end of the next business day.

(4) A public water system which commits an MCL violation must report the violation to the executive director immediately after it learns of the violation, but no later than the end of the next business day, and notify the public in accordance with §290.122(b) of this title.

(5) A public water system which has failed to comply with a coliform monitoring requirement must report the monitoring violation to the executive director within ten days after the system discovers the violation and notify the public in accordance with §290.122(c) of this title.

(h) At each residence or facility where water from a rainwater harvesting system is used for indoor potable purposes and there is a connection to a public water system, the public water system shall be responsible for ensuring that the microbiological quality of the treated rainwater is monitored at least annually. The public water system may require more frequent microbiological monitoring.