The Texas Commission on Environmental Quality (TCEQ, agency, or commission) adopts the repeal of §§217.1, 217.36, 217.63, 217.69, 217.70, 217.94, 217.162, and 217.193; new §§217.1, 217.18, 217.36, 217.40, 217.63, 217.69 - 217.71, 217.90, 217.94, 217.120, 217.162, 217.193, and 217.194; and amendments to §§217.2 - 217.17, 217.31 - 217.35, 217.37 - 217.39, 217.51 - 217.62, 217.64 - 217.68, 217.91 - 217.93, 217.95 - 217.100, 217.121 - 217.129, 217.151 - 217.161, 217.163, 217.164, 217.182 - 217.192, 217.201 - 217.213, 217.241 - 217.252, 217.271 - 217.283, 217.291 - 217.300, 217.321 - 217.330, 217.332, and 217.333.

The repeal of §§217.1, 217.36, 217.63, 217.69, 217.70, 217.94, 217.162, and 217.193; new §§217.1, 217.18, 217.40, 217.63, 217.71, 217.90, 217.94, and 217.120; and the amendments to §§217.3 - 217.5, 217.8 - 217.15, 217.17, 217.31 - 217.35, 217.38, 217.39, 217.51 - 217.54, 217.58, 217.59, 217.61, 217.62, 217.64 - 217.68, 217.91, 217.93, 217.95 - 217.97, 217.99, 217.100, 217.121 - 217.128, 217.151, 217.153, 217.157 - 217.161, 217.183 - 217.189, 217.191, 217.192, 217.201, 217.202, 217.204, 217.205, 217.241 - 217.249, 217.251, 217.252, 217.271, 217.273 - 217.280, 217.282, 217.283, 217.291 - 217.300, 217.321 - 217.328, 217.330, and 217.333 are adopted *without changes* to the proposed text as published in the May 29, 2015, issue of the *Texas Register* (40 TexReg 2935). The amendments to §§217.2, 217.6, 217.7, 217.16, 217.37, 217.55 - 217.57, 217.60, 217.92, 217.98, 217.129, 217.152, 217.154 - 217.156, 217.163, 217.164, 217.182, 217.190, 217.203, 217.206 - 217.213, 217.250, 217.272, 217.281, 217.329, and 217.332; and new §§217.36,

217.69, 217.70, 217.162, 217.193, and 217.194 are adopted *with changes* to the proposed text.

Background and Summary of the Factual Basis for the Adopted Rules

On July 11, 2011, Eric J. Dupre filed a petition for rulemaking that proposed amending §217.55 (Manholes and Related Structures) and §217.60 (Lift Station, Wet Well, and Dry Well Designs) to include design criteria for rehabilitation of existing manholes, lift stations, and other wastewater treatment plant structures. On August 31, 2011, TCEQ's commissioners instructed the executive director to initiate rulemaking on Chapter 217.

The executive director held stakeholder meetings on November 1, 2011, and March 6, 2012, in Austin, Texas. Both meetings were webcast for the public. The executive director's staff requested that stakeholders provide comments and propose changes to the existing rules. The executive director's staff received comments from: the rule petitioner; engineers and service providers (Aqua-Aerobic Systems, Inc., Freese and Nichols, Dr. Clifford Fedler, Ph.D., P.E., Houston Council of Engineering Companies, Jones & Carter, Inc., Don Vandertulip, P.E.); a professional association (Water Environment Association of Texas - collection systems subcommittee); city utilities (Austin Water Utility, San Antonio Water System); and a local government (Harris County).

Proposed changes from stakeholders and the executive director's staff received before the stakeholder meetings were discussed at the stakeholder meetings. The executive director provided additional outreach at TCEQ's Environmental Trade Fair, TCEQ's Water Quality/Stormwater Seminar, TCEQ's Water Quality Advisory Work Group meetings, and the Water Environment Association of Texas's Texas Water conference.

The commission adopts amendments to Chapter 217 that will: add new definitions and clarify existing definitions; add design criteria and approval requirements for rehabilitation of existing infrastructure, based on the petition for rulemaking; add design criteria for new technologies, including cloth filters and air lift pumps; update existing requirements or develop new requirements to reflect current commission and industry practices, standards and trends; and clarify rule language to improve understanding of the chapter.

In an effort to clarify rule language to improve understanding of the chapter and to enhance compliance with and enforceability of the chapter, a rule team was established with representatives from the Office of Legal Services, Office of Compliance and Enforcement, and the Office of Water to provide input on the rules. These efforts resulted in a significant number of changes throughout the chapter, with nearly every section affected.

Adopted new §217.69 establishes minimum requirements for collection system rehabilitation projects, and requires a collection system owner to develop and implement a maintenance and inspection program in response to the petition for rulemaking filed by Eric J. Dupre on July 11, 2011. Stakeholders generally agree that corrosion and improper rehabilitation are problems that need to be addressed, but there was no consensus about how to address the issue. The adopted new section seeks to address the essence of the petition request, while also providing engineering flexibility when deciding how to address this issue.

A corresponding rulemaking is adopted in this issue of the *Texas Register* concerning 30 TAC Chapter 317, Design Criteria Prior to 2008 (Rule Project Number 2013-025-317-LS).

Section by Section Discussion

This rulemaking adopts various non-substantive changes throughout the chapter to conform to Texas Register requirements and the executive director's current practices and guidelines. These adopted changes include: improving the rule structure; using consistent terms; correcting grammatical, syntactic, and typographical errors; using appropriate and consistent acronyms; and updating section references. These non-substantive changes are not addressed in the Section by Section Discussion.

Additionally, certain terms were revised to prevent ambiguity by clarifying the term used, using consistent terms where the meaning is the same, and using defined terms. These changes are non-substantive and are not addressed in the Section by Section Discussion.

Subchapter A: Administrative Requirements

§217.1, Applicability

This rulemaking adopts the repeal of §217.1; and adopts new §217.1. The adopted repeal and new section are necessary to clearly identify when and how the adopted amendments to this chapter apply to wastewater collection systems, wastewater treatment facilities, and their various components. The adopted amendments are not intended to retroactively apply to a project that was approved for construction before the effective date of the adopted amendments unless the project proposes to: 1) alter or re-rate existing infrastructure, 2) rehabilitate existing collection system infrastructure, or 3) re-approve a facility with an expired wastewater permit.

The commission is concurrently adopting new Chapter 317. On August 28, 2008, Chapter 317 was repealed and replaced with the initial adoption of Chapter 217, Design Criteria for Domestic Wastewater Systems. The repeal of Chapter 317 created regulatory uncertainty for the owners and operators of existing facilities not subject to Chapter 217 requirements, because Chapter 217 applies to facilities constructed or renovated after its

adoption, but does not otherwise apply to existing facilities. Although those existing facilities are subject to permit requirements, because Chapter 317 was repealed and no savings clause was included in Chapter 217 to address existing facilities, it has been unclear under what regulations those permitted existing facilities should operate and the basis for applying those regulations. This adoption will clarify the commission's initial and ongoing position that facilities designed and approved under Chapter 317 must be installed, operated, and maintained in accordance with the design criteria of Chapter 317 and the plans and specifications approved by the executive director.

This rulemaking will provide that certain wastewater collection systems, wastewater treatment facilities, and their various components will be subject to the requirements in adopted Chapter 317, while others will be subject to the requirements of Chapter 217 effective on August 28, 2008, and others will be subject to the requirements of Chapter 217 effective after this adoption. Adopted §217.1(a)(2) contains a savings clause that will allow the version of Chapter 217 that became effective on August 28, 2008 to remain in effect for compliance purposes for components of wastewater treatment facilities and collection systems that were originally subject to the requirements effective on August 28, 2008. Treatment units and collection system units that were approved under the August 28, 2008 criteria will not need to comply with the adopted amendments to this chapter unless they are altered, as defined in these amendments, or an owner allows a wastewater permit to expire. The executive director prepared Table 1 in Figure: 30 TAC

Chapter 217--Preamble to clarify how the various rules would apply to wastewater treatment facilities and collection systems.

Figure: 30 TAC Chapter 217--Preamble

Table 1. Application of various design criteria for wastewater treatment systems after the effective date of this rulemaking

Chapter 317	Chapter 317 applies to the design, operation, and maintenance of all unaltered existing infrastructure with plans and specifications approved before August 28, 2008, except for unaltered facilities that were designed and constructed prior to the original effective date of Chapter 317. Chapter 317 applies to all variances that were approved under §217.1(c), as adopted on August 28, 2008, with plans and specifications submitted before March 1, 2009. Chapter 317 was adopted to be effective April 16, 1990 with amendments effective October 3, 1991; March 23, 1994; January 1, 1996; March 3, 1997; and January 6, 2005.
Chapter 217, as adopted on August 28, 2008	Chapter 217, as adopted on August 28, 2008, applies to the design, operation, and maintenance of all unaltered existing infrastructure with plans and specifications approved after August 28, 2008, and before the effective date of the amendments to this chapter that were made during this rulemaking. Chapter 217, as adopted on August 28, 2008, applies to the design, operation, and maintenance of all unaltered existing infrastructure with plans and specifications received, but not yet approved, after August 28, 2008, and before the effective date of the amendments to this chapter that were made during this rulemaking.
These amendments to Chapter 217	These amendments to Chapter 217 apply to the design, operation, installation, and maintenance of any project with plans and specifications received and approved

	after the effective date of these amendments. These amendments to Chapter 217 apply to infrastructure that was designed under previous criteria, if the infrastructure is being altered or rehabilitated. These amendments to Chapter 217 apply to infrastructure that was designed under previous criteria if the wastewater treatment facility's wastewater permit expires.
Grace period for variances from these amendments to Chapter 217	These amendments to Chapter 217 allow the executive director to grant variances from new requirements added by the amendments to this chapter if the plans and specifications for the project are submitted within 180 days of the effective date of the adopted amendments. For example, if these amendments become effective on January 1, 2016, and the plans and specifications for a project are submitted on January 5, 2016, then any differences between the existing Chapter 217 and the adopted Chapter 217 can potentially be addressed by a variance request.

§217.2, Definitions

This chapter contains many technical terms which have established meanings within the appropriate technical context. Terms that are explicitly defined in this chapter have meanings that are: different from the common language meaning (e.g., *surcharge*); difficult to ascertain from common language or technical context (e.g., *effective size*); or necessary for accurate classification (e.g., *collection system* versus *alternative collection system*).

The adopted amendment to §217.2 changes some definitions to enhance understanding and readability, specifically: advanced nutrient removal, alternative collection system,

building lateral, bypass, collection system, constructed wetland, design flow, diurnal flow, domestic wastewater, effective size, engineer, equivalent dwelling unit, filter media, firm pumping capacity, force main, free water surface wetland, grinder pump, headworks, innovative technology, interceptor tank, lift station, membrane bioreactor system, minimum grade effluent sewer, multiple equivalent dwelling unit, non-conforming technology, off-site component, on-site component, overflow, owner, pressure sewer, project, sequencing batch reactor, small diameter effluent sewer, variable grade effluent sewer, and wasting. Stakeholders requested amendment of the grinder pump definition to avoid limiting grinder pumps to those connected to a building lateral. The definition adopted by the commission does not limit grinder pumps to those connected to a building lateral.

The adopted amendment to §217.2 adds definitions for activated sludge; activated sludge process; air gap; alter or alteration; appurtenance; auxiliary pump; collection system unit; completely mixed aerated lagoon; construct; day; decanter; design life; dry well; effluent; emergency overflow; engineering report; equalization basin; gravity relief sewer; influent; maintenance; partially mixed aerated lagoon; plans; preliminary treatment; primary sedimentation unit; primary treatment; processing unit; rehabilitate; re-rate; secondary treatment; sludge stabilization; specifications; stabilization lagoon; subsurface flow wetland; summary transmittal letter; surcharge; totalizing meter; treatment unit; twenty-five-year, 24-hour rainfall event; two-year, 24-

hour rainfall event; wastewater treatment facility; weir overflow; and wet well. Stakeholders requested the new definitions for auxiliary pump, dry well, equalization basin, gravity relief sewer, and wet well. Stakeholders requested amendment of the new sludge stabilization definition to include reduction of volatile suspended solids.

The adopted amendment to §217.2 deletes the definitions for facility, material alteration, proposed facility, and report, which are no longer used in Chapter 217. The term facility was replaced with wastewater treatment facility. The term material alteration was replaced with alter or alteration.

The definitions for: flat plate system; gross flux rate; hollow fiber system; net flux rate; transmembrane pressure; and tubular system were deleted from §217.2 and added to §217.157 because the terms are only used in §217.157.

The definition of building lateral was amended to include a pipe that conveys raw wastewater and connects the plumbing of a structure to a collection system pipe or an on-site component to clearly define the point where the collection system ends and plumbing begins for the purposes of this chapter, based on comments from stakeholders. The commission is not authorized to review plumbing.

The definition of bypass was amended to include the intentional diversion of a waste stream from the collection system to include an additional way that the term is commonly used in the industry.

The definition of design flow was deleted and replaced with new language so that the term is broad enough to include individual pipes and treatment units, and also to prevent any conflict between a wastewater treatment facility's design flow and the flow an owner applies for in a wastewater permit application. The commission expects that owners will be familiar with the requirements of these rules before they apply for a wastewater permit. A stakeholder requested clarification of the definition of design flow, noting that the definition makes design flow and permitted flow the same value. The adopted design flow definition is needed because the design flow of individual pipes and treatment units may not be the same as a wastewater treatment facility's permitted flow, and also because a wastewater treatment facility may not have a permit during the design phase of a project.

The definition of equivalent dwelling unit was amended to include that, for calculation purposes, an equivalent dwelling unit is occupied by 3.5 individuals. An equivalent dwelling unit is essentially a synthetic unit used to measure expected use.

The definition of innovative technology was amended to include methods, products, and materials to clarify non-process innovative technologies that the executive director reviews.

The definition of lift station was amended to recognize that, although belowground construction is typical, lift stations are not always constructed below ground level.

The definition of on-site component was deleted and replaced with new language that defines the term as it was used in the text of the existing rules. The previous rule defined the term "on-site component" as equipment, structure, or pipe located within a wastewater treatment facility's site boundary, but only used the term to refer to alternative collection system equipment that is placed on private property.

The definition of overflow was deleted and replaced with a new definition that includes the unauthorized flow of untreated or partially treated wastewater from a collection system or from a treatment unit at a wastewater treatment facility. This adopted definition matches how the term "overflow" is commonly used in other commission program areas. The previous rules used the term in other technical contexts, therefore the terms "weir overflow" and "emergency overflow" were defined and used in the appropriate places throughout the chapter to clarify the technical context.

The definition of owner was amended to clarify that the term "owner" refers to the owner and the owner's representatives, agents, and designees because the owner is the party that is ultimately responsible to the commission. Use of the term "owner," as it is defined in the adopted rule, also makes it possible to clearly distinguish between a general obligation of an owner and specific obligation that must be assigned to an engineer or operator.

The definition of project was deleted and replaced with a new definition that describes the actions which constitute a project, to reflect the way the term is actually used in the rules. The adopted definition includes all phases of a project, from the design phase to permanent decommissioning. The adopted definition of the term "project" also makes it easier to clearly identify which version of the design criteria apply to each component of a wastewater treatment facility or collection system.

The definition of variance was amended to clarify that a variance requires executive director approval to further clarify the commission's procedures and rules for granting variances. Any deviation from the requirements in this chapter is a violation of this chapter, unless the deviation is specifically approved according to the substantive requirements in §217.4 or §217.12 or is otherwise allowed by §217.14(b) for problems that emerge during construction.

§217.3, Purpose

The adopted amendment to §217.3(a) clarifies that the rules in this chapter are intended to apply to projects that involve individual units, and adds that the design criteria in this chapter is intended to promote the design of facilities in accordance with good public health and water quality engineering practices. Adopted §217.3(b) requires that a project must be installed, operated and maintained to function as it was designed to function, and to ensure the safety of the public and all individuals authorized to access a wastewater treatment facility or collection system, and to ensure protection of the environment. The commission has always intended for infrastructure to be appropriately installed, operated, and maintained, but is adding this language to enhance compliance and enforceability. Adopted §217.3(c) provides that this chapter includes procedures for the review of plans and specifications, and clarifies the commission's existing practice that an approval granted by a municipality or by the Texas Water Development Board, in accordance with §217.8 or §217.9, is equivalent to approval by the executive director. Adopted §217.3(c) was motivated, in part, by comments from a stakeholder. The previous §217.3(b) was moved to adopted §217.5(h) to improve the structure of the rule.

§217.4, Variances

The adopted amendment to §217.4(b) adds that the executive director may determine what level of justification is acceptable for a variance request. This amendment reflects

the executive director's practice and makes it clear that the executive director is not obliged to accept an insubstantial or inadequate justification for a variance. The adopted amendment to §217.4(c) clarifies that any compensatory measures the executive director requires in a design are for the purpose of preventing a nuisance or potential endangerment of public health or the environment. The adopted amendment to §217.4(e) provides criteria that clarify when a variance may be automatically approved (i.e., without written approval by the executive director) to improve rule structure. These criteria were already present in the rules, but were not clearly expressed.

§217.5, Plans and Specifications General Requirements

Adopted §217.5(b) requires an owner to construct a project according to the approved plans and specifications. TCEQ has always intended for infrastructure to be appropriately installed, operated, and maintained, but is adding this language to enhance enforceability. Subsequent subsections were re-lettered.

Adopted §217.5(f) provides that the executive director's approval of plans and specifications must be in writing, unless the project is approved through the automatic approval processes in §217.6(f) or (h) (Submittal Requirements and Review Process). This amendment reflects the executive director's practice and clarifies that verbal agreement or consent does not constitute approval.

Adopted §217.5(g) requires the plans and specifications for an alteration project to comply with the adopted rule to ensure that outdated standards are not used for the design. Additionally, adopted §217.5(g) provides that any existing infrastructure that is not altered does not need to meet additional requirements resulting from these rule amendments unless specifically required by this chapter or requested by the executive director. Adopted §217.5(h) was moved from §217.3(b) to improve the structure of the rule.

§217.6, Submittal Requirements and Review Process

Adopted §217.6(b) specifies that an owner is not required to submit collection system or wastewater treatment facility plans and specifications for approval if the project only consists of maintenance, because the executive director does not need to review projects that clearly fit within the adopted definition of maintenance.

Additionally, to promote more efficient communication between the applicant and the executive director, the adopted amendment to §217.6(d) requires that the summary transmittal letter include an email address for the engineer. Adopted §217.6(d)(8)(B) and (C) adds a requirement that the summary transmittal letter must provide a description of each treatment unit or collection system unit that will be altered, constructed, rehabilitated, or re-rated, and a map that identifies the location of these

units. This information will assist owners and the executive director in determining the regulations that apply to each treatment unit or collection system unit.

The adopted amendment to §217.6(h) provides consistency with §217.6(f). Specifically, an automatic approval granted when the executive director does not respond within 30 business days after receiving additional information is a conditional approval subject to an executive director determination under §217.4(c) or (d). The adopted amendment to §217.6(h) also clarifies that the conditional approval is not valid if there is any conflict with a provision that requires written approval from the executive director.

§217.7, Types of Plans and Specifications Approvals

The adopted amendment to §217.7(b)(1) clarifies that standard approvals are for plans and specifications that do not include innovative or non-conforming technologies because approval of these technologies is subject to the requirements of §217.4. The adopted amendment to §217.7(b)(2)(E) limits the expenses that a performance bond must guarantee to those associated with removal and replacement of the innovative or non-conforming technology covered by the bond, instead of costs associated with replacing the entire wastewater treatment facility or collection system.

§217.8, Municipality Reviews

The adopted amendment to §217.8(f)(3) clarifies that if a municipality approves a variance, the approval must be in writing. The adopted amendment to §217.8(g)(2) requires the municipality to retain all files related to its review and approval activities for the life of each reviewed project. The files must be kept for the life of the reviewed project so that the municipality can enforce the approved design, if necessary, and so that the executive director can confirm whether approved projects comply with the requirements of this chapter.

§217.9, Texas Water Development Board Reviews

The adopted amendment to this section was made to ensure consistent use of defined terms.

§217.10, Final Engineering Report

The adopted amendment to this section changes the heading from "Final Engineering Design Report" to "Final Engineering Report" to use defined terms. The adopted amendment to §217.10(a) establishes when an owner must submit an engineering report to the executive director. The previous rule required an owner to submit an engineering report for each project, but did not establish a clear timeline for providing the engineering report to the executive director. Adding the 30-day time limit adds certainty for both the owner and the commission.

The adopted amendment to §217.10(c) specifies the minimum information required in a final engineering report to clarify the meaning of "demonstrate compliance with this chapter;" this information will also assist the executive director in determining whether a project is installed, operated, and maintained according to an approved design.

The adopted amendment to §217.10(d) specifies the minimum information required to justify a variance from a requirement of this chapter; this information will aid the commission in its decision on variance requests.

A stakeholder recommended an amendment to §217.10(f)(13) to better protect human health, safety, and the environment. The executive director agreed with this recommendation. The adopted amendment to §217.10(f)(13) expands the list of safety considerations for a collection system project to include methods for rerouting flow from a portion of the collection system during collection system repair work, which will protect human health, safety, and the environment.

The adopted amendment to §217.10(g) delineates the information required by the following sections to improve rule structure and to comply with Texas Register formatting requirements. Adopted §217.10(g)(2)(A) requires a general location map for the proposed wastewater treatment facility because the information will give the

executive director useful context that will facilitate the review. The adopted amendment to §217.10(g)(2)(C) requires a map of the wastewater treatment facility site, including the site boundary, buffer zones, and the 100-year floodplain because the information will assist the executive director during the review. Adopted §217.10(g)(2)(D) requires a map of the discharge route or land application unit because the information will assist the executive director during the review.

§217.11, Construction of an Approved Project

The adopted amendment to §217.11 changes the title from "Construction of an Approved Facility" to "Construction of an Approved Project" to better describe the section.

Adopted §217.11(b) incorporates the previous §217.11(c), which was moved to improve rule structure, so that the general concept of permit phases is introduced before addressing specific permit phases.

Adopted §217.11(f) establishes that rehabilitation projects must comply with this chapter, but provides that the executive director may grant variances from specific requirements. The executive director recognizes that variances may be reasonable for ensuring compatibility between the adopted requirements for rehabilitation projects and existing infrastructure that was constructed under previous requirements. In this adoption, previous §217.11(f) was divided into two subsections (§217.11(g) and (h)) for

improved rule structure. Section 217.11(g) addresses compliance measures for an owner that allows a wastewater permit to expire, and §217.11(h) addresses compliance measures for an existing project that was never approved by the executive director.

The adopted amendment to §217.11(i) clarifies that the requirement to comply with the current design criteria at the time lack of approval is discovered also applies to collection system units, not just entire collection systems.

§217.12, Substantial Design Changes

The adopted amendment to this section was made to ensure consistent use of defined terms.

§217.13, Final Construction Drawings and Specifications

The adopted amendment to the section heading and to the section was made to ensure consistent use of defined terms. In the section, the word "technical" was deleted from the phrase "technical specifications." A stakeholder raised ethical concerns about design engineers sealing as-built plans. As a result, the phrase "an engineer" replaced the phrase "the engineer who is responsible for the facility design" in the adopted amendments to §217.13(b). The executive director encourages engineers with concerns about certifying record drawings to review the August 15, 2006 policy advisory by the Texas Board of Professional Engineers.

§217.14, Completion Notice

To clarify the existing requirement, the adopted amendment to §217.14(b) requires an engineer to certify that all substantial design changes were submitted for approval.

§217.15, Inspection

Adopted §217.15(b) specifies that all documents required by this chapter must be available for review by the executive director according to the requirements of adopted new §217.18. This requirement will ensure that the executive director has access to documents within a reasonable amount of time (available for inspection within 24 hours of a request from the executive director and submitted to the executive director within 15 days of a written request).

§217.16, Wastewater Treatment Facility Operation and Maintenance Manual

The adopted amendment to §217.16 changes the title from "Treatment Facility Operation and Maintenance Manual" to "Wastewater Treatment Facility Operation and Maintenance Manual" for consistent use of terms.

The adopted amendment to §217.16(a) adds a requirement to update the operation and maintenance manual and adds criteria for when updates are required. This will ensure

that the operation and maintenance manual contains the most recent and accurate information for the proper operation and maintenance of the facility.

The adopted amendment to §217.16(b)(1)(D) - (G) requires the operation and maintenance manual to include staff contact information, a copy of the final engineering report, approved plans and specifications, and all other documents required by this chapter, to ensure that staff can be contacted during an emergency and to assist the executive director in determining which requirements apply to each project. The commission adopts to re-letter §217.16(b)(2)(I) as §217.16(b)(2)(J) and add §217.16(b)(2)(I) that requires the operation and maintenance manual to include the design life of each treatment unit, which will establish a standardized location to identify the design life of a given treatment unit. Documenting the design life of each treatment unit in a centralized location will also assist owners with planning and management of their infrastructure. The commission adopts to re-letter §217.16(b)(3)(C) - (J) as §217.16(b)(3)(D) - (K) and add §217.16(b)(3)(C). Adopted §217.16(b)(3)(C) requires the operation and maintenance manual to include a schedule for servicing all personal safety, respiratory, and protective equipment, which will ensure that a service schedule is developed and equipment is operational when needed.

The adopted amendment to §217.16(c) requires the operation and maintenance manual to be immediately available for inspection by the executive director upon request, which will allow inspectors immediate access to the manual during inspections.

§217.17, Collection System Records

The adopted amendment to §217.17 requires collection system records to be retained for the life of the project and to be available to the executive director upon request. The adopted amendment to §217.17(a)(1) - (3) provides consistency between collection system records and the administrative and recordkeeping requirements for wastewater treatment facilities in §217.16(b)(1), which will make it easier for owners to maintain records.

§217.18, Provisions that Apply to All Sections in this Chapter

The commission adopts a new section that identifies provisions applicable to all sections of this chapter. Adopted new §217.18(a) requires each component designed in accordance with this chapter to be installed, operated, and maintained in a manner consistent with the design. This provision will enhance enforceability of the chapter as a whole.

Adopted new §217.18(b) requires all safety and emergency equipment required by this chapter to be operational for its intended use and maintained in a readily accessible

location. This provision will ensure that safety and emergency equipment is working and available when needed.

Adopted new §217.18(c) requires all executive director approvals to be maintained with other required records. This provision ensures that records will be centrally located and easy to access for the owner's and executive director's use.

Adopted new §217.18(d) requires records to be available for inspection within 24 hours of a request by the executive director and submitted to the executive director within 15 days of a written request. This provision ensures that the executive director will have reasonable access to records.

Subchapter B: Wastewater Treatment Facility Design Requirements

The adopted amendment to Subchapter B changes the title from "Treatment Facility Design Requirements" to "Wastewater Treatment Facility Design Requirements" to use consistent terms.

§217.31, Applicability

The adopted amendment to §217.31 clarifies that existing wastewater treatment facilities that do not have a valid wastewater permit must comply with the requirements in this subchapter. This will enhance the enforceability of this chapter because these adopted

amendments to this chapter will be the only version of the chapter under which an owner will be able to submit plans and specifications for review.

§217.32, Organic Loadings and Flows for New Wastewater Treatment Facilities

The title of adopted §217.32 is changed from "Organic Loadings and Flows" to "Organic Loadings and Flows for New Wastewater Treatment Facilities" for clarification.

The adopted amendment to §217.32(a)(1) restructures the wording in subparagraphs (A) and (B) to clarify how design flow must be calculated so that the design flow is consistent with the permitted flow. The adopted amendment to §217.32(a)(1)(A) and (B) was based on comments received from a stakeholder who noted that wastewater treatment facilities should use this section to calculate flow when applying for a wastewater permit. Adopted subparagraph (C) requires the design flow for a wastewater treatment facility to be based on the facility's wastewater permit to further clarify subparagraphs (A) and (B), and to ensure that a wastewater treatment facility is actually designed to treat the flow authorized in its wastewater permit. The adopted amendment to §217.32(a)(2) adds a requirement that site-specific data must be used to calculate the peak flow, if it is available, to ensure that a wastewater treatment facility is capable of treating the actual peak flow. The adopted amendment to §217.32(a)(2)(A) requires a facility to be designed on the actual daily peaking factor if the actual daily peaking factor exceeds 4.0, to ensure that a wastewater treatment facility is capable of treating the

actual peak flow. The adopted amendment to §217.32(a)(2)(A) provides that a facility may be designed using a lower daily peaking factor if equalization is provided to reduce the peak flow that the wastewater treatment facility must treat. Adopted §217.32(a)(2)(B) is added to require the event-based peaking factor to be used to calculate peak flow when the peaking factor exceeds 5.0 to ensure that a wastewater treatment facility is capable of treating the actual peak flow. Subsequent subparagraphs (B) and (C) were re-lettered. The amendment to re-lettered §217.32(a)(2)(C) provides that a facility may be designed using a lower event-based peaking factor if equalization is provided to reduce the peak flow that the wastewater treatment facility must treat. Section 217.32(a)(2)(D) was deleted and moved to §217.33(c)(4)(A) to improve rule structure because §217.33(c)(4)(A) already requires all flow through a wastewater treatment facility to be totalized. The adopted amendment to §217.32(a)(3) improves readability and makes the following changes to Table B.1. in Figure: 30 TAC §217.32(a)(3). "Persons" is corrected to "individuals" because the term "person" can include entities, corporations, and other organizations that differ from the common language meaning of the word. Some five-day biochemical oxygen demand (BOD_5) concentrations were increased to reflect increased wastewater BOD_5 concentrations, which are commonly attributed to the widespread use of household water saving devices and garbage disposals, based on comments from stakeholders. Additionally, a new column was added to include ammonia-nitrogen concentration values because

increasing ammonia-nitrogen concentrations were also observed across the state and can have a substantial impact on the treatability of wastewater.

The adopted amendment to §217.32(b) improves readability and makes the use of existing historical data a requirement instead of an option.

§217.33, Flow Measurement

The adopted amendment to §217.33(a) deletes the word "accurate" and instead defines the level of accuracy as less than 10% error in the expected range of flows to prevent ambiguity.

The adopted amendment to §217.33(c)(1)(C) no longer requires the primary flow measuring device to be installed upstream of a secondary measuring device because a primary flow measuring device is customarily installed downstream of a secondary measuring device, such that the secondary measuring device measures the liquid level discharging through the primary measuring device. The adopted amendment to §217.33(c)(2)(A) allows the executive director to consider a manufacturer's recommendations, supplied by the engineer, in instances where the channel approach section to a weir is not straight for a length at least 20 times the maximum expected height on a weir at peak flow. This adopted amendment was based on comments received from a stakeholder who noted that it is difficult for small facilities to meet the

existing requirement using weirs designed to accurately measure small flow rates. The adopted amendment to §217.33(c)(2)(B) clarifies that the minimum distance requirements between a channel bottom and weir crest apply to the peak flow. The adopted amendment to §217.33(c)(2)(F)(i) improves readability and clarifies that the head height on a weir is at peak flow. The adopted amendment to §217.33(c)(4)(A) clarifies that a totalizing meter must be used to develop totalized flow and incorporates language from deleted §217.32(a)(2)(D). Adopted §217.33(c)(4)(D) requires that a secondary measuring device be designed to allow periodic calibration, which will allow the operator to adjust the secondary measuring device to improve its accuracy.

Adopted §217.33(d)(4)(E) requires a secondary flow measuring device not to interfere with the accuracy of the primary flow measuring device. This requirement will ensure both devices work independently and accurately at all times.

§217.34, Organic Loadings and Flows for Existing Wastewater Treatment Facilities, Re-Ratings, and Alternations

The adopted amendment to §217.34 changes the section title from "Re-Rating, Expanding, or Materially Altering an Existing Facility" to "Organic Loadings and Flows for Existing Wastewater Treatment Facilities, Re-Ratings, and Alternations" to clearly describe the section. The adopted amendment also clarifies what operating data is

required when an owner proposes to alter or re-rate an existing wastewater treatment facility.

The adopted amendment to §217.34(1)(A) incorporates data standards from the previously existing subparagraphs (B) and (C) for clarity and readability. Section 217.34(1)(B) and (C) were deleted and subsequent subparagraphs were re-lettered.

Adopted §217.34(1)(D) requires the design flow, for a re-rating or alteration, to be based on the average flow, plus one standard deviation for a wastewater treatment facility that will not be affected by future growth, to reflect the executive director's practice for evaluating re-ratings and alterations. For a wastewater treatment facility that will be affected by future growth, adopted §217.34(1)(E) requires the design flow, for a re-rating or alteration of a facility, to be based on future flow using a linear regression or other appropriate statistical method for predicting the design flow when significant data exists, to ensure that facilities are designed to accommodate the anticipated growth.

The following adopted amendment to §217.34(2) ensures that the executive director has access to all information necessary to determine whether a re-rating or alteration may be hazardous to human health or the environment. The adopted amendment to §217.34(2)(A) deletes the last sentence because the sentence was moved to adopted §217.34(2)(C) to improve organizational structure. The adopted amendment to

§217.34(2)(A)(i) requires data to include samples collected during both wet and dry weather conditions, requires composite samples, and provides that the executive director may request additional samples that are representative of actual conditions at a facility. This information will ensure that the executive director has the information necessary to understand how the facility operates and will assist the executive director in determining whether the proposal is likely to ensure compliance with the effluent limits in the facility's wastewater permit. The adopted amendment to §217.34(2)(A)(ii) clarifies that samples must be representative of the peak loading only if the samples are not 24-hour flow weighted composite samples. The adopted amendment to §217.34(2)(A)(iii) clarifies that the data regarding organic loading only needs to include the parameters included in the existing wastewater permit. The adopted amendment also divides the parameters into subclauses to improve organizational structure. The adopted amendment to §217.34(2)(A)(iv) clarifies that the owner must provide the engineering analysis and re-designates the clause as §217.34(2)(B). Section 217.34(2)(B) and (C) were deleted and the information was integrated into the revised section. Adopted §217.34(2)(C) requires that the design organic loading, for a re-rating or alteration, must be calculated using the wastewater treatment facility's average organic loading plus one standard deviation for a wastewater treatment facility that will not be affected by future growth, to reflect the executive director's practice for evaluating re-ratings and alterations.

Adopted §217.34(2)(D) requires the design organic loading, for a re-rating or alteration of a facility, to be based on future loading calculated using anticipated changes from the existing loading. The design analysis may use a linear regression or other appropriate statistical method for predicting the design organic load when significant data exists, to ensure that facilities are designed to accommodate anticipated growth.

§217.35, One Hundred-Year Flood Plain Requirements

The adopted amendment to §217.35 updates terms, corrects grammatical errors, and uses acronyms consistently.

§217.36, Emergency Power Requirements

The commission adopts the repeal of §217.36 and replaces it with a new §217.36 that is organized for improved clarity and consistency with the emergency power requirements for lift stations in §217.63. Most of the new language existed in the previous rule, but the section was reorganized for clarity and consistency. Specific changes are noted in the discussion of the appropriate subsection.

Adopted new §217.36(a) clarifies that the design of a wastewater treatment facility must prevent the discharge of untreated or partially treated wastewater during electrical power outages.

Adopted new §217.36(b) requires that wastewater treatment facilities must have an audiovisual alarm system that transmits alarm conditions via a Supervisory Control and Data Acquisition (SCADA) system, or a telemetering system connected to a continuously monitored location. This new requirement will provide for additional protection of human health and safety and protection of the environment by ensuring that the operator will be immediately notified of a power outage.

Adopted new §217.36(c) provides that the alarm must self-activate under certain conditions. This new requirement will provide for additional protection of human health and safety and protection of the environment by ensuring that alarm will be activated under the appropriate conditions.

Adopted new §217.36(d) provides that the alarm system must include self-testing capability at the control panel to ensure the system is working appropriately.
Adopted new §217.36(e) describes how an owner shall determine the reliability of the existing commercial power service; this provision will provide owners and the commission with a consistent method of determining the reliability of commercial power services.

Adopted new §217.36(f) allows the executive director to consider documentation of commercial power system upgrades. This provision will allow owners to design

emergency systems based on the current reliability of commercial power, rather than on the historical reliability commercial power, if the commercial power provider has made appropriate upgrades to improve its commercial power reliability.

Adopted new §217.36(g) defines the length of time a system for preventing the discharge of untreated or partially treated wastewater must be able to operate. This provision will provide consistency between wastewater treatment facilities and will provide for additional protection of human health and safety and protection of the environment by ensuring that untreated or partially treated wastewater is not discharged, even during a typical power outage.

Adopted new §217.36(h) provides that a system for preventing the discharge of untreated or partially treated wastewater must be either a permanent feature of the wastewater treatment facility or be a temporary power system. This provision will help ensure that wastewater treatment facilities have adequate safeguards to prevent the discharge of untreated or partially treated wastewater. This provision will provide consistency between wastewater treatment facilities and will provide for additional protection of human health and safety and protection of the environment by ensuring that untreated or partially treated wastewater is not discharged, even during a typical power outage.

Adopted new §217.36(i) describes the systems that an owner may use to prevent the discharge of untreated or partially treated wastewater. This provision will provide consistency between wastewater treatment facilities and will provide for additional protection of human health and safety and protection of the environment by ensuring that untreated or partially treated wastewater is not discharged, even during a typical power outage.

Adopted new §217.36(j) describes what an owner must include in the engineering report regarding emergency operation of a wastewater treatment facility. This information in the engineering report will help the owner and commission staff determine which treatments should be operating during a power outage or other emergency situation.

§217.37, Disinfection System Power Reliability

The adopted amendment to §217.37(a) adds the requirement that the disinfection backup power system must be capable of providing power to operate continuously during power outages as defined in §217.36. The new language provides clarification and rule consistency.

§217.38, Buffer Zones and Odor Abatement

The adopted amendment to this section was made to ensure proper punctuation and consistent use of defined terms.

§217.39, Wastewater Treatment Facility Use of Reclaimed Water

The adopted amendment to §217.39 changes the section title from "Facility Use of Reclaimed Water" to "Wastewater Treatment Facility Use of Reclaimed Water" to better describe the section. In subsections (a) and (b) "the effective date of this chapter" is replaced with "August 28, 2008," which was the effective date of the previous Chapter 217.

Adopted §217.39(c) requires that reclaimed water must undergo secondary treatment before it can be used and specifies that untreated or partially treated wastewater may not be used as reclaimed water. The adopted subsection also requires that a reclaimed water system must provide for screening or filtration, a backup pump, and a pressure-sustaining device. These adopted provisions add clarity, enhance enforcement and provide for greater protection of human health and the environment. The subsections that follow were re-lettered.

§217.40, Signs with Emergency Contact Information

Adopted new §217.40 requires an owner to post a sign with emergency contact information at a wastewater treatment facility and defines the location and minimum font size of the sign. This new requirement provides the public with access to the 24-

hour contact, and is important in case there is an emergency situation at the wastewater treatment facility.

Subchapter C: Conventional Collection Systems

§217.51, Applicability

The adopted amendment to this section was made to ensure consistent use of defined terms.

§217.52, Edwards Aquifer

The adopted amendment to §217.52 adds a cross reference for the definition of "recharge zone."

§217.53, Pipe Design

The adopted amendment to §217.53(a)(1) deletes the term "dry weather" because a distinction between dry weather and wet weather flow is not necessary for the purposes of determining compliance with this chapter based on the definitions of "design flow" and "peak flow." To ensure consistency, the adopted amendment also adds that flow calculations must be included in the engineering report and that a design must minimize inflow and infiltration. The adopted amendment to §217.53(a)(2) deletes the term "dry weather" because the limiting peak flow value for design must consider the effects of wet weather.

The adopted amendment to §217.53(b) deletes previously existing §217.53(b)(2)(B) because it was redundant. Subsequent subparagraphs were re-lettered.

The adopted amendment to §217.53(c)(2) adds the term "inflow." Though the potential for inflow at a pipe joint is rare, it must be considered in the design of a gravity collection system.

Generally, the adopted amendment to §217.53(d) revises the subsection to improve clarity, structure, and readability. To ensure protection of human health, a requirement that pipe joints must be designed to seal at atmospheric pressure was added throughout the subsection. The adopted amendment to §217.53(d)(1) deletes the term "public" in favor of a more general reference to "water supply trenches" to ensure safety of all water used for domestic purposes.

Adopted §217.53(d)(2) requires that all collection system pipes must be located below a water supply pipe whenever possible and adds that, if location below a water supply pipe cannot be achieved, the owner must provide justification in the engineering report. The requirement to locate a collection system pipe below water supply pipes was moved from previously existing §217.53(d)(3)(A)(iv) and (B)(i)(II).

Adopted §217.53(d)(3) continues the requirement from previously existing §217.53(d)(2) and (4) that all collection system pipes and manholes must be at least nine feet in any direction from a water supply pipe whenever possible and adds a new requirement that, if a nine-foot separation cannot be achieved, the owner must provide justification in the engineering report. Adopted §217.53(d)(3) also includes a table that will assist owners in determining which requirements apply if a nine foot separation distance cannot be achieved.

Adopted §217.53(d)(4) addresses collection system pipes that run parallel above a water supply pipe within nine feet, and requires that all portions of a collection system pipe within nine feet of a water supply pipe must be encased in a casing pipe that is sealed on both ends. This situation was not addressed in the previous rules, but is being addressed in these amendments to ensure that acceptable standards of protection are applied consistently for the protection of human health.

Adopted §217.53(d)(5) replaces previously existing §217.53(d)(3)(B)(iii) for collection system pipes that cross above a water supply pipe within nine feet, both of which allow a pipe to be either encased or constructed of at least 150 per square inch (psi) pressure class material. Adopted §217.53(d)(5)(B) adds the phrase "150 psi pressure class, corrosion-resistant, non-brittle" to indicate the properties of acceptable pipes, instead of listing individual materials.

Adopted §217.53(d)(6) replaces previously existing §217.53(d)(3)(A)(i) - (iii) for collection system pipes that run parallel below a water supply pipe within nine feet. Adopted §217.53(d)(6)(B) adds the option of encasing the collection system pipe in a casing pipe.

Adopted §217.53(d)(7) replaces previously existing §217.53(d)(3)(B)(i) - (iii) for collection system pipes that cross below a water supply pipe within nine feet. Adopted §217.53(d)(7)(A) adds the phrase "150 psi pressure class, corrosion-resistant, non-brittle" to indicate the properties of acceptable pipes, instead of listing individual materials. Adopted §217.53(d)(7)(C) adds the option of encasing the collection system pipe in a casing pipe. Adopted new §217.53(d)(7)(D) replaces existing §217.53(d)(3)(B)(ii)(II) related to requirements for cement-stabilized sand.

Adopted §217.53(d)(8) replaces previously existing §217.53(d)(4) for manholes within nine feet of a water supply pipe and provides that a manhole must either: 1) pass a leakage test with no measureable leakage, or 2) be encased in at least one foot of cement-stabilized sand for all portions within nine feet of a water supply pipe.

The adopted amendment to §217.53(e)(1) requires a manufactured fitting to prevent infiltration and root entrance, to ensure protection of human health and the

environment. The adopted amendment to §217.53(e)(2) clarifies that service lines must not protrude into a collection system pipe, to prevent pipe blockages that require additional maintenance and can lead to corrosion.

The adopted amendment to §217.53(g)(1) requires that the engineering report must include calculations or other information to demonstrate the structural integrity of a pipe during the minimum 50-year design life cycle; this ensures that the minimum information necessary to demonstrate the structural integrity of the pipe is included in the engineering report. The amendment to §217.53(g)(2) requires that the functional life of a pipe, for corrosion analysis purposes, must be based on the structural analysis in §217.53(k); this ensures all engineers calculate the functional life of a pipe in the same manner.

The adopted amendment to §217.53(h) requires an owner to implement necessary odor control measures. The adopted amendment also deletes the phrase "based on the potential of the collection system to generate hydrogen sulfide" because a nuisance may have other causes. Subsection (h)(2) was deleted because the adopted amendment to the subsection makes it redundant.

The adopted amendment to §217.53(i)(1)(B)(ii) clarifies that manholes must be provided on each side of a geologic fault so that a pump may be used to prevent the unauthorized

discharge of wastewater. This provision provides additional protection of human health and the environment in the event of a collection system failure near a fault.

The adopted amendment to §217.53(j)(1) clarifies that the population estimates must be based on the area served by the project. The adopted amendment to §217.53(j)(5) adds that any connection between a stormwater collection system and a wastewater collection system is prohibited because connecting a domestic wastewater system to a stormwater system would result in unauthorized discharges. The adopted amendment to §217.53(j)(6) specifies characteristics of a "similar system" to add clarity and certainty. The adopted amendment to §217.53(j)(7)(A) specifies that the minimum considerations the owner must use in determining initial and future flows include: the peak flow of domestic wastewater, peak flow of wastewater from industrial sites, and maximum expected infiltration rates. This provision will ensure that collection systems are appropriately designed, constructed and operated, which will add additional protection of human health, safety, and the environment.

The adopted amendment to §217.53(k)(2) deletes the introductory phrase in subparagraph (G); and redesignates the clauses in §217.53(k)(2)(G) as separate subparagraphs to provide improved organizational structure. The adopted amendment to §217.53(k)(3) deletes the phrase "the design procedure dictates a minimum pipe stiffness" because the statement is redundant and unnecessary.

The adopted amendment restructures §217.53(k)(4) for clarity.

The adopted amendment to Figure: 30 TAC §217.53(l)(2)(A) provides recalculated minimum pipe slopes. The minimum pipe slopes were re-calculated to correct rounding errors.

The adopted amendment to §217.53(m)(1) provides that, if possible, a gravity collection system must have a uniform grade and straight alignment between manholes. The requirement for straight alignment was moved from previously existing §217.53(m)(2). Additionally, the requirement that all deviations from uniform grade and straight alignment must be justified in the engineering report was moved from §217.53(m)(2) to §217.53(m)(1) to clarify what must be in the engineering report. The adopted amendment to §217.53(m)(2) delineates prohibited deviations. This adopted amendment to §217.53(m)(1) and (2) will enhance compliance and enforceability by clarifying what must be included in the engineering report and what deviations from uniform grade and straight alignment are prohibited. Adopted §217.53(m)(2)(B) specifies how both segmented pipes and non-segmented pipes can be horizontally curved. This provision will provide clarity and certainty, and will ensure that pipes are not structurally compromised by bending, and that pipe joints are sealed properly and will not leak because of improper joining and bending techniques. Adopted

§217.53(m)(2)(C) specifies how pipe joints may be offset. This provision will provide clarity and certainty and will ensure that pipe joints are sealed properly and will not leak because of improper joining techniques.

The adopted amendment to §217.53(m)(3) clarifies that details of a proposed curvature must be displayed on the plan drawings (instead of in the engineering report). This provision provides clarity and certainty about what must be included in the engineering report.

The adopted amendment to §217.53(n)(1)(C) clarifies that sag pipe appurtenances should make routine flushing possible. The adopted amendment to §217.53(n)(5) clarifies that taking a pipe out of service for cleaning must be temporary, and that the pipe will be returned to service in a reasonable amount of time. The adopted amendment to §217.53(n)(7) replaces "prevent" with "minimize" for clarity.

§217.54, Criteria for Laying Pipe

The adopted amendment to §217.54(a)(1) and (2) clarifies that adequate bedding means bedding that will meet the appropriate standards and will support the anticipated load. This provision prevents ambiguity by ensuring that accepted standards are used. The adopted amendment to §217.54(a)(3) clarifies that all of the materials on the list are prohibited for use as bedding, haunching, or initial backfill. The adopted amendment to

§217.54(a)(5) clarifies that a significant fracture, fault zone, cave or solutional modification to the rock strata is one that would prevent pipe bedding, and that the report that must be prepared when a fracture, fault zone, cave, or solutional modification is encountered must be submitted with the final engineering report.

In the adopted amendment to §217.54(b) and (c), the words "embedment" replaces "envelope" and "embedment envelope," and the phrase "embedment thickness" replaces "envelope size" for clarity and consistent use of terms.

The adopted amendment to §217.54(d)(3) adds a cross reference to §217.54(a) to ensure that accepted standards are used to place and compact haunching materials in a trench.

§217.55, Manholes and Related Structures

The adopted amendment to §217.55(e) clarifies that the materials used in a manhole must be made of material that is designed to withstand the anticipated live and static loads. Additionally, polymer-concrete was added to the list of materials that can be used for a manhole because the executive director has determined that polymer-concrete has suitable strength characteristics and helps prevent corrosion.

The adopted amendment to §217.55(f) clarifies the acceptable materials for manhole cover adjustment rings.

The adopted amendment to §217.55(g) clarifies that the executive director's approval of different manhole spacing distances must be in writing.

The adopted amendment to §217.55(h) deletes "because of construction constraints" because the phrase is not necessary.

The adopted amendment deletes previously existing §217.55(i) because it was redundant, given §217.55(a)(2). The remaining subsections are re-lettered.
The adopted amendment to §217.55(i) clarifies that a manhole must be accessible. This clarification enhances compliance and enforceability.

The adopted amendment to §217.55(k)(1)(B) makes gasketing and bolting a manhole cover the only acceptable means of preventing inflow, unless a variance is granted in accordance with §217.4. This adopted provision enhances compliance and enforceability and provides for greater protection of human health and safety, and the environment.

The adopted amendment to §217.55(k)(1)(C) clarifies that a manhole cover may not have holes that could allow inflow. This adopted provision enhances compliance and enforceability and provides for greater protection of human health and safety, and the environment.

Adopted §217.55(k)(1)(E) requires an owner to follow an appropriate national reference standard for manhole gaskets. This adopted provision enhances compliance and enforceability and provides for greater protection of human health and safety, and the environment.

Adopted §217.55(k)(1)(F) defines acceptable materials for manhole covers. This adopted provision enhances compliance and enforceability and provides for greater protection of human health and safety, and the environment.

The adopted amendment to §217.55(k)(2)(E) clarifies that the slope between gravity pipes of different sizes must prevent backpressure.

The adopted amendment §217.55(n) rewrites the subsection to improve organizational structure.

§217.56, Trenchless Pipe Installation

The adopted amendment to §217.56(a) expands the list of approved trenchless technologies available for installing new pipes. The additional technologies were based on input from a stakeholder and the executive director's research on technologies that were reviewed by the Trenchless Technology Center at Louisiana Tech University. The addition of technologies will provide engineers with additional design flexibility. Section

217.56(a)(1) - (3) were deleted because they do not state a requirement and are not appropriate to include in the rules.

The adopted amendment to §217.56(b) expands the list of trenchless technologies available for replacing pipes. The additional technologies were based on input from a stakeholder and the executive director's research on technologies that were reviewed by the Trenchless Technology Center at Louisiana Tech University. The addition of technologies will provide engineers with additional design flexibility. Section 217.56(b)(1) - (3) are deleted because they do not state a requirement and are not appropriate to include in the rule.

The adopted amendment to §217.56(c) expands the list of trenchless technologies available for lining existing collection system pipes. The additional technologies were based on input from a stakeholder and the executive director's research on technologies that were reviewed by the Trenchless Technology Center at Louisiana Tech University. The addition of technologies will provide engineers with additional design flexibility. Section 217.56(c)(1) - (4) were deleted because they do not state a requirement and are not appropriate to include in the rule.

The adopted amendment to §217.56(e) adds that a collection system using trenchless technology must be operated and maintained in accordance with the standards used for

design and construction. This new provision enhances compliance and enforceability and provides for greater protection of human health and safety, and the environment.

The adopted amendment deletes previously existing §217.56(g) because it was redundant.

§217.57, Testing Requirements for Installation of Gravity Collection System Pipes

The adopted amendment to §217.57(a)(1)(A) clarifies that the executive director's approval of an alternate low pressure air test procedure must be in writing and that Equation C.3. must be used regardless of the testing procedure used. The adopted amendment to §217.57(a)(1)(B)(i) clarifies that the pipe must be pressurized to 3.5 psi gauge (3.5 psi above the local atmospheric pressure) if groundwater is not present. In the adopted amendment to §217.57(a)(1)(B)(ii), Equation C.3., the definitions of the variables were updated to correct errors introduced during software conversion and to clarify the meaning of the variable "L." The adopted amendment to §217.57(a)(1)(E) adds "of the test" to clarify that "failure" refers to a test failure (as opposed to material failure) for the purposes of this section. However, a material failure would also constitute a test failure. The adopted amendment to §217.57(a)(1)(G) clarifies that the executive director's approval of pipe with an inside diameter greater than 33 inches must be in writing. The adopted amendment to §217.57(a)(2)(A) combines the requirements from previously existing §217.57(a)(2)(A), (C), and (D). This amendment

applies a standard allowable exfiltration rate of 10 gallons per inch diameter per mile of pipe per day to all collection system pipes, regardless of their location relative to the floodplain, because the standard is achievable using commonly available materials and will improve protection of human health and the environment. Subparagraphs (C) and (D) were deleted because they were combined with subparagraph (A). Previously existing §217.57(a)(2)(E) is re-lettered as §217.57(a)(2)(C), and clarifies that if the infiltration or exfiltration tests exceeds the limits in Equation C.3., the owner must perform remedial action and ensure the remedial action was effective before putting the collection system into service.

The adopted amendment to §217.57(b) deletes the phrase "The following procedures must be followed:..." because it was redundant. In §217.57(b)(1)(A)(i), the phrase "or any related appendix" was deleted because it was redundant. In §217.57(b)(1)(A)(ii), the term "sizing" was deleted because it was redundant. The adopted amendment to §217.57(b)(1)(A)(ii) and (iii) deletes the phrase "appropriate standard" to make it clear that the standard to apply should come from one of the sources listed in §217.57(b)(1)(A)(i), and that the same standard should be applied throughout the design. The adopted amendment to §217.57(b)(1)(B)(i) includes a prohibition on adjustable or flexible mandrels, which was moved from the previously existing §217.57(b)(1)(C)(i). The term "rigid" was deleted from §217.57(b)(1)(B)(i) because it is redundant. In the adopted amendment to §217.57(b)(1)(B)(ii), the previously existing

§217.57(b)(1)(B)(ii) is divided into clauses (ii) and (iii) to improve clarity and structure. Subsequent clauses are renumbered. The adopted amendment deletes §217.57(b)(1)(C)(i) because the section was moved to §217.57(b)(1)(B)(i), and renumbers §217.57(b)(1)(C)(ii) and (iii) as §217.57(b)(1)(C)(i) and (ii). The adopted amendment to §217.57(b)(1)(C)(iii) also clarifies that the executive director's approval of a deflectometer or mandrel with removable legs or runners must be in writing. Adopted §217.57(b)(1)(D) provides that the executive director may exempt pipe sections installed using trenchless technologies from mandrel testing on a case-by-case basis. This provision acknowledges that there are locations where mandrel testing is not technically possible, or is not reasonably necessary because the construction method and overlying earth do not pose any risk that the pipe will be crushed. However, because the exemption must be in writing, the executive director will have made a determination based on the site specific information, considering the impact to human health, safety, and the environment. The adopted amendment to §217.57(b)(2) clarifies that the executive director's approval of alternate deflection testing methods for large pipes must be in writing. The adopted amendment to §217.57(b)(6) clarifies that problems found after a pipe section fails a deflection test must be corrected immediately, rather than leaving the time frame indefinite. Adopted amendment to §217.57(c) replaces the word "analysis" with "integrity" to clarify that it is the structural integrity of the collection system that must be inspected during the construction and testing phase of the project.

§217.58, Testing Requirements for Manholes

The adopted amendment to §217.58(b) clarifies that manholes be tested for leakage after assembly, but before backfilling; manholes must be tested separately and independently from the collection system pipes; and that alternate testing methods must be approved by the executive director in writing. The adopted amendment to §217.58(b)(2) clarifies that an owner can choose either of two options in this section for vacuum testing. This amendment clarifies that if a manhole fails a vacuum test, additional grout must be applied to the exterior of the manhole before the manhole is retested. The adopted amendment to §217.58(b)(2)(B) adds American Society for Testing and Materials D1244-11 as an acceptable vacuum test method.

§217.59, Lift Station Site Requirements

The adopted amendment to §217.59(a)(1) requires that a lift station must be located in a dedicated right-of-way or a permanent easement, and delete the requirement that the design include a road because a road is not necessary for access in all cases. Adopted §217.59(a)(2) provides that a lift station site must be reasonably accessible by truck during all weather conditions, including a 25-year, 24-hour rainfall event. These provisions will enhance compliance and enforceability and protection of human health, safety, and the environment. The adopted amendment renumbers previously existing §217.59(a)(2) as §217.59(a)(3). The adopted amendment to renumbered §217.59(a)(3) clarifies that the referenced road is the road to the lift station. The adopted amendment

will delete previously existing §217.59(a)(3) because it is redundant based on the amendment to §217.59(a)(1).

The adopted amendment to §217.59(b)(2) adds requirements for intruder-resistant fences and enclosures. The adopted requirements will provide clarity, which will enhance compliance and enforceability. The adopted requirements are consistent with similar requirements in 30 TAC Chapter 290 (Public Drinking Water). In the adopted amendments, the term "intruder-resistant" was used to describe the purpose of the fence or enclosure. The adopted requirements for intruder-resistant fences will require that fences be locked at each access point, be at least 6.0 feet tall, extend close enough to the ground that a human cannot get under the fence, and either have three strands of barbed wire or outwardly-directed iron bars. Fences that are at least 8.0 feet tall no longer require barbed wire, for consistency with Chapter 290. The adoption also requires approval, in writing, from the executive director for fences made of any material other than wood, concrete, masonry, or metal. The adopted amendment also allows use of outwardly-directed iron bars in place of barbed wire, based on comments from a stakeholder, which requested that intruder-resistant ornamental fences without barbed wire be allowed for aesthetic reasons. The necessary intruder-resistance capabilities of the fence should also be adequate using outwardly-directed iron bars in place of barbed wire. Additionally, an intruder-resistant enclosure must be approved in writing by the executive director to ensure that "intruder-resistant" is interpreted

consistently. Adopted §217.59(b)(3) requires that above-ground valves located outside of an intruder-resistant fence must be chained and locked to prevent unauthorized operation, while above-ground valves located inside of an intruder resistant fence or enclosure do not have to be chained and locked. Additionally, an intruder-resistant enclosure must be locked at each access point to prevent unauthorized operation. This adopted provision will provide consistency and enhanced compliance and enforceability. Previously existing §217.59(b)(3) is deleted because the language was moved to adopted §217.59(b)(2)(C).

§217.60, Lift Station, Wet Well, and Dry Well Designs

Adopted §217.60(a)(1) adds a requirement that pump controls must be designed to prevent surcharges in the collection system and designed to prevent adverse effects on the operation of the facility. This requirement will prevent unauthorized discharges and protect human health and the environment. Adopted §217.60(a)(7) requires an electronic wet well level control system to use a float switch or similar manual backup to ensure control at all times, to prevent overflows and protect human health and the environment. Adopted §217.60(a)(8) requires wet well level control settings to be designed to discourage septic conditions in a lift station. This requirement will provide additional protection for human health, safety, and the environment by ensuring that septic conditions (which can cause odors and corrosion, and may interfere with treatment) will be minimized. Adopted §217.60(a)(9) requires wet well control settings

to be designed to prevent overloading of downstream pipes and treatment units to prevent overflows and protect human health and the environment.

The adopted amendment to §217.60(b)(7) adds new language to clarify that pumps must run continuously during the pump cycle time, which begins when the pump is activated by the pump controls.

The adopted amendment to §217.60(c)(1) clarifies that an underground dry well must be accessible for maintenance and shall be ventilated according to §217.60(d).

The adopted amendment to §217.60(d)(1)(A) adds that screening on a passively-ventilated wet well must be corrosion-resistant for consistency with §217.60(d)(2)(B)(ii). The adopted amendment to §217.60(d)(2)(B)(ii) clarifies that air exchanges must be complete air exchanges. The adopted amendment to §217.60(d)(2)(B)(iii) deletes the previously existing language and replaces it with new language that requires owners to prevent a wet well from creating nuisance odor conditions and lists factors the owner must consider when implementing odor control measures. This provision adds clarity and will enhance compliance and enforceability. Adopted §217.60(d)(2)(B)(iv) requires that all mechanical and electrical equipment in a wet well must be fire code compliant. This new provision adds clarity and will enhance compliance and enforceability.

The adopted amendment to §217.60(e)(2) clarifies that a wet well design must prevent the deposition of grease and debris under normal operating conditions.

The adopted amendment to §217.60(h)(1)(A) replaces the word "generated" with "to prevent accumulation of water from condensation and incidental leaks," in order to minimize the potential for flooding of a wet well. The adopted amendment to §217.60(h)(1)(C) clarifies that the floor of a dry well must slope towards the sump, and the sump pumps must be sized to prevent accumulation of water from condensation and incidental leaks in a dry well. The adopted amendment to §217.60(h)(2)(A) clarifies a sump pump must prevent overflow of the associated wet well by using independent piping that is capable of discharging more than the maximum liquid level necessary to prevent overflow. This requirement ensures that an overflow can be prevented if there is a clogged pipe or if a leak is isolated on the discharge side of a dry well.

§217.61, Lift Station Pumps

Adopted §217.61(b)(5) requires that a lift station be designed to prevent the discharge of wastewater from the lift station and at all points in the upstream collection system. This provision will protect public health, safety and the environment, and will enhance compliance and enforceability.

The adopted amendment to §217.61(c) clarifies the existing requirement that a lift station must have a minimum of two pumps.

The adopted amendment to §217.61(d)(1) clarifies that the owner must determine the pressure head requirements of a single pump operating alone, and with other pumps. The adopted amendment to §217.61(d)(3) requires the friction coefficient used in the head loss calculations to be included in the engineering report so that the executive director will have access to all of the information necessary to determine whether a project complies with this chapter. The adopted amendment to §217.61(d)(4) replaces "proposed and existing pipe" with "the force main pipe" to prevent ambiguity.

The adopted amendment to §217.61(e)(2) clarifies that each lift station that discharges to a wastewater treatment facility with a peak flow greater than 300,000 gallons per day (gpd) must use at least three pumps, which will provide flow rate control in accordance with §217.61(e)(1). Adopted §217.61(e)(3) was added to clarify that a lift station that discharges to a wastewater treatment facility with a peak flow less than or equal to 300,000 gpd must use at least two pumps, to provide flow rate control in accordance with §217.61(e)(1).

The adopted amendment to §217.61(i) improves organizational structure and clarify that a grinder pump is not subject to the requirements of this subchapter if it is part of an alternative collection system or if it serves only a single connection.

§217.62, Lift Station Pipes

The adopted amendment to §217.62(b)(1)(A) adds that a check valve must have either an external lever or an external position indicator, and was based on comments from stakeholders. These stakeholders noted that the existing rules would not allow certain products capable of satisfying the requirement which are now available on the market. Therefore, the commission determined that it was appropriate to allow check valves with external position indicators because an external position indicator will also make it easy for an operator to see whether a valve is open or closed. The adopted amendment to §217.62(b)(3) deletes the redundant term flow.

§217.63, Emergency Provisions for Lift Stations

The adopted repeal of and new §217.63 replaces all of the previously existing emergency power requirements with requirements consistent with the emergency power requirements for lift stations in §217.36. Most of the new language existed in the previous rules, but the section was reorganized for clarity and consistency. When new requirements are added or previously existing requirements are deleted, the changes are noted in the discussion of the appropriate subsection.

Adopted new §217.63(a) requires that a sign with emergency contact information be posted at all lift stations. The new language also defines the location and minimum font size of the sign. This provision provides the public with access to the 24-hour emergency contact information, and is important in case there is an emergency situation at the wastewater treatment facility.

Adopted new §217.63(b) clarifies that the lift station must be designed to prevent the discharge of wastewater from the lift station and all points upstream of the lift station during power outages. This new provision ensures that lift stations will be able to prevent the discharge of untreated wastewater, thereby, protecting human health, safety and the environment. This provision will also enhance compliance and enforceability.

Adopted new §217.63(c) requires a lift station to have an audiovisual alarm and provides specific requirements for the alarm. The adopted new language clarifies the alarm conditions that must be monitored by an alarm system, and that audiovisual alarms are not required if the control system alerts the operator about communication loss. This new requirement will provide for additional protection of human health, safety, and the environment by ensuring that the operator will be immediately notified of a power outage.

Adopted new §217.63(d) requires that an alarm system include a self-testing capability at the control panel to provide lift stations with additional protective safety measures.

Adopted new §217.63(e) describes how an owner shall determine the reliability of the existing commercial power service. This provision will provide owners and the commission with a consistent method of determining the reliability of commercial power services.

Adopted new §217.63(f) allows the executive director to consider documentation of commercial power system upgrades. This provision will allow owners to design emergency systems based on the current reliability of commercial power, rather than on the historical reliability commercial power, if the commercial power provider has made appropriate upgrades to improve its commercial power reliability.

Adopted new §217.63(g) defines the length of time a system must be able to operate during electric power outages to prevent the discharge of untreated or partially treated wastewater. The power reliability determination requirements were increased from the longest power outage on record for the past 24 months to the past 60 months to use more reliable data and reduce unauthorized discharges during electrical power outages. This provision will provide consistency between wastewater treatment facilities and will provide for additional protection of human health, safety, and the environment by

ensuring that untreated or partially treated wastewater is not discharged, even during a typical power outage.

Adopted new §217.63(h) provides that for calculating the hydraulic capacity of spill containment structures or collection system storage, the owner must assume that the wet well is full to the pump activation level when the power outage begins. This provision provides assurance that an owner will not design a spill containment system that is too small, thus providing for greater protection of human health, safety and the environment, as well as enhancing compliance and enforceability.

Adopted new §217.63(i) describes the systems that an owner may use to prevent the discharge of wastewater. Gravity relief sewers were added as a system for preventing unauthorized discharges. The new language also describes the systems that may not be used to prevent the unauthorized discharge of wastewater, and requirements for portable generators, if used. The adopted new language provides that spill containment structures or collection system storage must not be used as a stand-alone system for preventing discharge. Both of these technologies have a fixed volume with only a finite capacity to absorb and contain flow, while pumps and other similar systems have the ability to control flow rates and volume accumulation. This subsection will provide consistency between wastewater treatment facilities and will provide for additional

protection of human health, safety, and the environment by ensuring that untreated or partially treated wastewater is not discharged, even during a typical power outage.

Adopted new §217.63(j) requires that the system for preventing the discharge of wastewater at a lift station must either be a permanent feature or must be deployable during an electrical power outage. The subsection also includes requirements for deployable systems. This subsection will provide consistency between wastewater treatment facilities and will provide for additional protection of human health, safety, and the environment by ensuring that untreated or partially treated wastewater is not discharged, even during a typical power outage.

Adopted new §217.63(k) provides the requirements for a spill containment structure. A detailed plan for cleaning and maintaining the spill containment structure is required. The provision also will ensure public safety by requiring an intruder-resistant fence that meets the requirements of §217.59(b).

Adopted new §217.63(l) provides that a lift station must be accessible during a 25-year, 24-hour rainfall event for the area where the facility is located. This provision will ensure that a collection system can be controlled under reasonably-foreseeable weather circumstances and creates conditions so that generators can be delivered, if necessary, to provide additional protection of human health and the environment.

Adopted new §217.63(m) requires that lift station pump controls must prevent over-pumping and surcharge when normal power resumes. This provision will ensure that lift stations do not cause an overflow further downstream in the collection system, to protect human health, safety, and the environment.

§217.64, Materials for Force Main Pipes

The adopted amendment to §217.64(d) deletes the phrase "suitable for the material being pumped" in the previously existing rule and replaces it with the term "non-corrosive" to clarify that any suitable material must also be non-corrosive.

§217.65, Force Main Pipe Joints

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual*, January 2015.

§217.66, Identification of Force Main Pipes

The adopted amendment to §217.66(a) clarifies that "detector tape" means "detectable underground warning tape." The adopted amendment to §217.66(b) also clarifies that the minimum size lettering is 1.5 inches tall.

§217.67, Force Main Design

The adopted amendment to §217.67(a)(1) clarifies that force main pipes may have a diameter of less than 4.0 inches, if approved by the executive director in writing, so that the executive director can determine whether the selected pipe diameter will ensure protection of human health, safety, and the environment.

The adopted amendment to §217.67(a)(3)(A) allows owners to calculate the velocity of flow in a force main based on the smallest pump operating at full speed. This amendment was based on comments from a stakeholder. The commission concurs with the recommended change, which will allow owners to reduce electricity consumption by reducing the operating speed of variable-speed pumps when their full capacity is not needed to accommodate the incoming flow. The adopted amendment to §217.67(a)(3)(B) increases the required flushing to twice per day. This change is expected to offset additional deposition of solids that might occur if pump operating speeds are reduced, to prevent solids buildup and corrosion.

The adopted amendment to §217.67(d)(1) provides specific locations and structures where a force main may terminate to prevent ambiguity and to enhance enforceability. The adopted amendment to §217.67(d)(2) clarifies that the discharge end of the force

main must be restrained to prevent movement, to ensure that the pipe will not be damaged by vibration and that the connection to the manhole will remain watertight.

The adopted amendment to §217.67(f)(1) requires that the flow entering a manhole from a force main must match the flowline of the gravity pipe leaving the manhole, based on comments from a stakeholder. The stakeholder noted that matching flowlines will minimize turbulence, odor, and corrosion issues. The commission concurs with the recommended change. The adopted amendment to §217.67(f)(2) requires an owner to implement odor control measures necessary to prevent a collection system from creating nuisance odor conditions.

The adopted amendment to §217.67(g)(4) requires that an air relief valve must be made of corrosion-resistant material to prevent deterioration of the valve and to protect human health, safety, and the environment.

Adopted §217.67(i) requires the engineering report to include fatigue life calculations that show the strength of a force main pipe, taking into consideration the fluctuation between the pressurized and a depressurized state of a pipe. This provision will help owners and the executive director determine whether pipes are likely to rupture during the design life of the force main.

Adopted §217.67(j) prohibits bending a segmented force main pipe unless the joints are welded or heat-fused and requires that alignment changes must be accomplished using a manufactured fitting. The provision also requires thrust blocks or joint restrains at force main pipe joints, unless calculations justify the absence of a restraint. These adopted provisions will ensure that pipes are not structurally compromised by bending, that pipe joints are sealed properly, and there is no leakage because of improper joining and bending techniques.

§217.68, Force Main Testing

The adopted amendment to §217.68(c) clarifies that a temporary valve used for pressure testing must be removed after a successful test has taken place. The adopted amendment to §217.68(g) updates the equation for determining the leakage rate for force main pipes so that the equation is based on the allowable leakage rate of 10.0 gallons per inch of diameter per mile of pipe per day.

§217.69, Maintenance, Inspection, and Rehabilitation of the Collection System

Adopted new §217.69 establishes minimum requirements for collection system rehabilitation projects, and requires a collection system owner to develop and implement a maintenance and inspection program in response to the petition for rulemaking filed by Eric J. Dupre on July 11, 2011. The petition requested that the commission adopt design criteria for rehabilitation of existing manholes, lift stations,

and other vital system components. The essence of the petition was that the effects of corrosion and improper rehabilitation result in substantial costs for taxpayers across the state.

Stakeholder meetings were held to receive public input on this issue. Stakeholders generally agree that corrosion and improper rehabilitation are problems that need to be addressed, but there was no consensus about how to address the issue. Some stakeholders strongly favored detailed design criteria for surface coating and rehabilitation projects to promote uniformity and provide guidance. Other stakeholders strongly opposed detailed design criteria and noted that extensive latitude for engineering judgment is necessary to ensure that the rehabilitation or protection method solves the underlying cause of corrosion for each project.

The adopted section seeks to address the essence of the petition request, while also providing engineering flexibility when deciding how to address this issue. Owners will be required to follow a surface preparation plan and the manufacturer's installation procedures to increase the effectiveness of rehabilitation product installations. Owners will also be required to conduct two post-installation inspections that are intended to identify failed installations before warranty periods expire. For maintenance programs, owners will be required to develop and follow a schedule for inspecting, cleaning, and

maintaining the collection system and estimating the remaining functional life of the collection system.

To accommodate adopted new §217.69, this rulemaking adopts the repeal of §217.69 and §217.70, and adopts them as renumbered §217.70 and §217.71.

Adopted new §217.69(a) requires an owner to develop and implement a collection system maintenance and inspection program that includes: 1) a schedule and methods for inspections, cleaning, and maintenance; 2) methods for estimating the life expectancy of each collection system unit; and 3) a requirement to estimate the structural integrity of collection system units. The requirements in this subsection are intended to help owners identify, halt, and prevent the effects of corrosion on collection system infrastructure. The section also makes the owner responsible for ensuring that all maintenance, inspection, and rehabilitation activity records are maintained by the collection system operator.

Adopted new §217.69(b) requires the plans and specifications for a rehabilitation project to include, at minimum, a surface preparation plan, a volatile chemical and dust management plan, a requirement to follow the manufacturer's installation procedures and specifications, a requirement to re-inspect a rehabilitation between six and 11 months after installation, and a requirement to re-inspect a rehabilitation 18 months

after installation. The requirements in this subsection are intended to improve the success and safety of rehabilitation projects and to identify failed installations within standard warranty periods to ensure protection of the environment and to minimize the impact of failed rehabilitation projects on ratepayers.

Adopted new §217.69(c) requires an owner to maintain records of all activities related to collection system inspection, maintenance, cleaning, and rehabilitation. This subsection is intended to assist the executive director in monitoring compliance with the requirements of this chapter.

§217.70, Reclaimed Water Facilities

Adopted new §217.70 was §217.69 in the previously existing rules, which the commission adopts to repeal and move to this section to accommodate new §217.69.

In adopted new §217.70, several subsections are re-lettered because of improvements to the structure of the section. For example, previously existing §217.69(d) is divided into §217.70(d) and (e). In adopted §217.70(f)(1), the phrase "accessible to authorized personnel" replaces the phrase "trained staff has access to" from the previously existing rules to clarify that authorized personnel may include non-staff, such as contract operators or consultants. Adopted §217.70(f)(2) provides additional flexibility by allowing a hose bib to be located in a non-lockable service box, if the hose bib can only

be operated by a special tool (e.g., not by hand or with a standard screw driver). The requirement to label the hose bib was deleted because it was redundant (*See* §217.70(f)(3)). Adopted §217.70(f)(3) updates the Spanish-language text in the required signage to prevent ambiguity.

Adopted new §217.70(g)(3) is rephrased for clarity and provides a cross-reference to requirements for public drinking water connections. Adopted §217.70(g)(3) also replaces the phrase "an appurtenance" with the phrase "backflow prevention" for clarity. Adopted §217.70(g)(4)(A)(i), requires a reclaimed water pipe to be located below a potable water pipe for consistency with §217.53(d). The requirements in §217.70(g)(4)(A)(iii) - (D) were rearranged from previously existing §217.69 for improved organizational structure. Adopted §217.70(g)(4)(B)(i) clarifies that a pipe segment centered on a crossing must be a full-length pipe segment. Adopted §217.70(g)(4)(B)(iii) adds that there must be a separation of at least six inches between the outsides of the pipes for consistency with the separation distances in §217.53 and to ensure protection of human health and safety. Adopted §217.70(g)(4)(D) clarifies that all portions of a reclaimed water pipe within 4.0 feet of a potable water pipe must be embedded in cement stabilized sand, to prevent ambiguity associated with the word "any." Adopted new §217.70(g)(4)(D)(i) and (ii) was moved from previously existing §217.69(f)(4)(A)(iv).

Adopted §217.70(i)(1)(A) replaces the phrase "operable during" with the phrase "protected from." This provision provides that reclaimed water facilities do not need to operate during a 100-year flood event because reclaimed water is used on an as-needed basis and is not needed during a flood event. Adopted §217.70(i)(2)(B) adds "readily" to clarify that replacement of a lift station pump should be a reasonably unhindered process. Adopted §217.70(i)(3)(B) adds that a check valve must have either an external lever or an external position indicator, based on comments from stakeholders that noted that the existing rules would not allow certain products capable of satisfying the requirement which are now available on the market. Therefore, the commission determined that it was appropriate to allow check valves with external position indicators because an external position indicator will also make it easy for an operator to see whether a valve is open or closed.

Adopted §217.70(j)(2) corrects the units for polyethylene sleeve thickness because mils (thousands of an inch), not millimeters, are the conventional unit of measurement.

§217.71, Storage Tanks for Reclaimed Water

Adopted new §217.71 was §217.70 in the previously existing rules, which the commission adopts to repeal and move to this section without changes to accommodate new §217.69.

Subchapter D: Alternative Collection Systems

§217.90, Applicability

Adopted new §217.90 was added to clarify the section's applicability with regard to conventional collection systems, alternative collection systems, and individual private grinder pumps or septic tank effluent pumps that discharge directly into a conventional collection system.

§217.91, Edwards Aquifer

The adopted amendment to §217.91 adds a cross reference to the definition of "recharge zone" in Chapter 213 for clarification and to improve consistency.

§217.92, Component Sizing

The adopted amendment to §217.92(a) replaces the phrase "similar system and service area" with "system and service area with similar characteristics" for clarity. The adopted amendment also adds paragraphs (1) - (6) to define what "similar characteristics" include, which will provide certainty for engineers and the executive director.

§217.93, General Requirements

The adopted amendment to §217.93(e) deletes the phrase "ponding of surface water is probable" and replaces it with the phrase "surface water accumulates" to improve clarity. Adopted §217.93(f), which was deleted from §217.94(a) to improve

organizational structure, adds language that requires an alternative wastewater collection system to discharge to a permitted wastewater treatment facility or to a collection system that flows to a permitted wastewater treatment facility to provide additional design options for alternative collection systems.

§217.94, Maintenance and Inspection Program

The commission adopts the repeal of §217.94 and adopts a new §217.94 that requires alternative collection system owners to comply with the adopted maintenance and inspection program requirements for a conventional collection system. This will provide consistency for the inspection and maintenance of all collection systems.

The requirements in the section that are repealed are no longer necessary because subsection (a) was moved to §217.93(f), subsection (b) did not provide any meaningful substantive requirements that were not already addressed by §217.95, and subsection (c) is no longer necessary based on the adopted amendment to §217.61(i).

§217.95, Alternative Collection System Service Agreements

The adopted amendment to §217.95 changes the title from "Service Agreements" to "Alternative Collection System Service Agreements" to better describe the contents of the section.

The adopted amendment to §217.95(a) clarifies that each real property owner served by the alternative collection system must sign the service agreement. Additionally, the amendment requires the service agreement to authorize the collection system owner to place and maintain the collection system components. These provisions will provide additional protection of human health, safety, and the environment by ensuring that the owner of the collection system has access to the collection system components. Additionally, the provision will enhance compliance and enforceability by ensuring the appropriate persons are parties to the service agreement.

The adopted amendment to §217.95(b) requires the owner of on-site components to be identified in the alternative collection system service agreement. The words "proper" and "competent" were deleted to reduce ambiguity.

The adopted amendment to §217.95(c) clarifies that a copy of the alternative collection system service agreement must be provided to the executive director. In the last sentence, the phrase "for the executive director to review" was added for clarity, certainty, and readability.

The adopted amendment to §217.95(d)(5) deletes the phrase "utility owned" to clarify that an alternative collection system owner can make emergency repairs to an on-site collection system component, regardless of ownership of the component. Adopted

§217.95(d)(6) requires a service agreement to include a statement of whether the alternative collection system owner or the property owner is responsible for non-emergency maintenance, to ensure that all parties are aware of who is responsible for maintenance. The previously existing §217.95(d)(7)(A)(i) and (ii) dealt with maintenance costs, but did not address which party would be responsible for performing non-emergency maintenance. Adopted §217.95(d)(7) replaces the previously existing §217.95(d)(7)(A)(i) and (ii), which dealt with maintenance costs, and also provides that maintenance costs may be shared between a property owner and an alternative collection system owner. Adopted §217.95(d)(8) replaces the previously existing §217.95(d)(6), which dealt with electrical power costs, and also provides that power costs may be shared between a property owner and an alternative collection system owner. Adopted §217.95(d)(9) and (10) replaces the previously existing §217.95(d)(7)(A)(iii) and (iv), and also provides that payment methods and payment schedules should be provided for costs that a property owner owes to an alternative collection system owner, and vice versa. Adopted §217.95(d)(11) was moved from previously existing §217.95(d)(7)(B)(i) to improve rule structure, and was also amended to allow an alternative collection system owner to inspect and approve pretreatment units before they are installed. Subsequent paragraphs were renumbered. The requirements in previously existing §217.95(d)(7)(B)(ii) and (iii) were deleted in this rulemaking because they are redundant.

§217.96, Small Diameter Effluent Sewers

The adopted amendment to §217.96(a)(3), Equation D.5. deletes the phrase "average daily flow" from the definition of "VIE" for consistency. Additionally, in the definition of "VCZ," 1.0 is inserted in front of "ADF" to improve clarity.

The adopted amendment to §217.96(b)(1) clarifies that residential contributors are not required to trap fats, oils, and grease from wastewater before it enters an interceptor tank.

The adopted amendment to §217.96(c)(5) adds that a check valve must be a swing-type valve with an external position indicator based on comments from a stakeholder. The commission adopts this amendment because, as with an external lever, it will be easy to see whether a valve is open or closed. The adopted amendment deletes §217.96(c)(6) because the odor control provision is contained in adopted §217.96(d)(3).

Adopted §217.96(d)(3) provides the requirements for odor control. This requirement was moved from §217.96(c)(6) to improve organizational structure and clarify that odor control devices must be permanent features of the alternative collection system to ensure that nuisance odors are prevented at all times.

§217.97, Pressure Sewers

The adopted amendment moves §217.97(d)(11) to §217.97(d)(7) to improve organizational structure. The subsequent paragraphs are renumbered. The adopted amendment to §217.97(d)(7) clarifies that a wet well must include an audiovisual alarm system. Additionally, the amendment clarifies that the alarm for an equivalent dwelling unit must activate at the high water level specified in the engineering report, plans, or specifications for the project, and that an alarm for a multiple equivalent dwelling unit must activate in the event of unit failure or in high water level conditions. The adopted amendment renumbers §217.97(d)(7) - (10) as §217.97(d)(8) - (11), respectively. The adopted amendment to §217.97(d)(13)(C) clarifies that the water level in a septic tank effluent pump system chamber should be independent of the water level in an interceptor tank to prevent the disturbance of settleable and floatable solids in the interceptor tank. The adopted amendment to §217.97(d)(14)(A) changes "or" to "and" to clarify that the housing must be both lockable and tamper-resistant.

The adopted amendment to §217.97(f)(8) deletes this paragraph and combines the information into paragraph (12) to improve clarity and organizational structure. The adopted amendment renumbers §217.97(f)(9) - (13) as §217.97(f)(8) - (12), respectively. The adopted amendment to renumbered §217.97(f)(11) deletes the word "public" to clarify that the paragraph applies to all buildings, and adds a requirement for the owner to implement odor control measures to prevent a collection system from becoming a

nuisance, which will protect human health, safety, and the environment; and will also enhance compliance and enforceability.

§217.98, Vacuum Sewer Systems

The adopted amendment to §217.98(b)(5) deletes the phrase "vented externally to the equipment housing" and replaces it with the phrase "on the lateral line" to clarify and correct the paragraph. The adopted amendment to §217.98(b)(12) only requires a service pipe to have a minimum 0.2% slope, to avoid confusion about whether a 2.0 inch minimum drop or a 0.2% slope is required.

The adopted amendment to §217.98(c)(3)(B) inserts the word "maximum" in front of "length" for clarification. The adopted amendment to §217.98(c)(5) adds, for clarity, a requirement that the vacuum sewer system be "designed to balance pressures within the system." The adopted amendment to §217.98(c)(8)(A) clarifies that the options for a division valve only include a plug valve or a resilient-seated gate valve.

The adopted amendment to §217.98(c)(8)(B) replaces "a" with "each" to clarify that a gauge tap is required downstream of each division valve so the pressure can be measured.

The adopted amendment to §217.98(e)(1) clarifies that the purpose of evacuating a vacuum sewer system is to restore the design vacuum pressure. The commission recognizes that a vacuum sewer system may reach the design vacuum pressure before the system is completely evacuated and does not expect that an evacuated system will be totally empty.

The adopted amendment to §217.98(g)(2) clarifies that the liquid from a vacuum pump must be piped to the top of the vacuum reservoir tank. The adopted amendment to §217.98(g)(8) adds the word "automatic" to clarify what type of vacuum switch controls are required, and clarifies that the controls must operate based on the liquid level in the reservoir tank. The adopted amendment to §217.98(g)(8) adds the word "audiovisual" to clarify the type of alarm required.

§217.99, Testing Requirements

The adopted amendment to §217.99(c)(1) adds that the hydrostatic head test must demonstrate that the tank in not leaking to prevent owners or their contractors from placing fill material around a tank that fails a hydrostatic head test. Additionally, the amendment replaces "rigid tank" with "tank" for clarity.

§217.100, Termination

The requirement in §217.100(c) was deleted because it unnecessarily limited where alternative collection systems could be located to areas near conventional collection systems. One major application of alternative collection systems is that they can serve areas that are impractical for a conventional collection system to serve. The adopted amendment re-letters §217.100(d) as §217.100(c), and adds the phrase "or the influent lift station" to allow another location option in determining where to terminate an alternative wastewater collection system and because discharge to an influent lift station is a commonly accepted practice in the industry.

Subchapter E: Preliminary Treatment Units

In the adopted amendments, the term "bypass channel" was changed to "emergency overflow" throughout the subchapter to ensure consistent use of defined terms. This change also avoids limiting emergency overflow structures to only bypass channels.

§217.120, General Preliminary Treatment Requirements

Adopted new §217.120 combines requirements from several preliminary treatment sections into a single section that broadly applies to preliminary treatment design. Specifically, the requirements from §217.121(e)(1) - (4) and §217.122(h) were consolidated into adopted new §217.120. Adopted new §217.120(a) requires that facilities be designed with the ability to add provisions for removal of fats, oils, and

grease (FOG). This requirement originally applied only to facilities using fine screens for preliminary treatment, but the executive director's staff noted that several existing facilities that use coarse screens have significant trouble managing FOG that the facilities were not designed to receive. Requiring facilities to be designed with the ability to add FOG treatment at a future date will help protect the environment and ensure that treatment infrastructure can be protected from the harmful effects of FOG.

Adopted new §217.120(b) requires that FOG removal must be provided if FOG has caused operational failures in a treatment unit that is being altered to ensure protection of the environment and treatment infrastructure.

The requirements of §217.120(c) - (h) were added to prevent damage to wastewater treatment facility pumps, ensure operator safety, and ensure protection of human health and the environment. Adopted new §217.120(c) requires a wastewater treatment facility to have a screening or grinding device. Adopted new §217.120(d) requires a screening or grinding device to be separated from offices and other work areas by a gas-tight partition if the areas are located in the same structure. Adopted new §217.120(e) requires an area that houses a screening or grinding device to be ventilated at a minimum rate of 30 air exchanges per hour. Adopted new §217.120(f) requires a screening or grinding device to be readily accessible for maintenance and screenings removal. Adopted new §217.120(g) requires any screening device located 4.0 feet or

more below ground level to include mechanical equipment capable of lifting the screenings to ground level. Adopted new §217.120(h) requires that screenings be collected, managed, and disposed of in accordance with §217.123 at a frequency that prevents creation of a nuisance.

§217.121, Coarse Screens

The adopted amendment changes the section heading from "Coarse Screening Devices" to "Coarse Screens" to better describe the section.

The adopted amendment to §217.121(a) adds that coarse screens are required, unless all flow entering a facility is processed through a grinder pump. This amendment was based on comments from a stakeholder, who noted that processing ground debris through a coarse screen would be ineffective and redundant.

Section 217.121(e) was deleted because the requirements were moved into adopted new §217.120 and subsequent subsections were re-lettered. The adopted amendment to re-lettered §217.121(e)(1) and (2) reduces the maximum spacing between bars in coarse screen devices from 1.75 inches to 1.0 inch to reduce the impact of debris and other solids on pumps, pipes, and treatment processes within a facility. The adopted amendment to §217.121(e)(4) clarifies that the purpose of the horizontal storage platform on a coarse bar screen is to prevent unauthorized discharges, which can be

caused by a clogged bar screen. Adopted §217.121(e)(5) requires the design of a mechanically cleaned coarse screen to include automatic disposal equipment because the executive director's staff observed that congested mechanically cleaned bar screens are commonly a source of unauthorized discharges.

§217.122, Fine Screens

The adopted amendment changes the section heading from "Fine Screening Devices" to "Fine Screens" to better describe the section.

The adopted amendment to §217.122(c) includes a cap of 35% on the BOD_5 reduction that can be claimed to ensure that appropriate food to microorganism ratios are maintained for efficient biological treatment processes.

The adopted amendment to §217.122(j) is a stylistic change that clarifies that fine screens must use a bar rack or perforated plate design.

§217.123, Screenings and Debris Handling

The adopted amendment to §217.123(b) clarifies that the purpose of the tight-fitting cover on a container that holds screenings or debris, or an alternative method approved by the executive director, is to reduce vector attraction. The amendment to §217.123(c) clarifies that the phrase "head of the facility" includes the influent lift station. The

amendment to §217.123(d) clarifies that grit must be collected in appropriate containers before disposal.

§217.124, Grit Removal Systems

The adopted amendment to §217.124(c) clarifies that a design needs to include a minimum of two grit removal units when grit removal is required by §217.124(a). A design may include a single grit chamber if grit removal is not required by §217.124(a).

§217.125, Grit Chambers

The adopted amendment to §217.125(b)(1) replaces the phrase "separate the size of grit planned for removal" with the phrase "not interfere with the removal of particles with the design particle size and density" because aeration inhibits the settling of grit. The adopted amendment to §217.125(b)(2) updates incorrect units of measurement. The adopted amendment to §217.125(d)(1) implements consistent terms used elsewhere in the rule and clarify that all possible modes of short-circuiting must be prevented, not just short circuits from the inlet to the emergency overflow during non-emergency conditions.

§217.126, Grit Handling

The adopted amendment to this section was made to improve sentence structure.

§217.127, Pre-aeration Units

The adopted amendment to this section deletes flocculation of solids from the list of pre-aeration units because flocculation typically requires inactive or dormant conditions. The section was also reorganized to enhance readability.

§217.128, Flow Equalization Basins

The adopted amendment to §217.128(a)(1) and (2) adds influent organic loading as a consideration for the flow equalization basin requirements to prevent chronic overloading or underloading of biological treatment processes. Section 217.128(a)(3) was deleted because unusually high peak flows are addressed in §217.32(a)(2).

The adopted amendment to §217.128(b) updates the subsection to include grinding devices for consistency with adopted new §217.120(b).

§217.129, Primary Clarifiers

The adopted amendment to §217.129(b)(5) clarifies that skimming is required for all primary clarifiers, and that mechanical or hydraulic differential skimming are both acceptable methods for a primary clarifier with a flow less than 25,000 gpd.

The adopted amendment to §217.129(c)(1) clarifies that an effluent weir must not cause a localized high vertical flow velocity that can draw solids over the weir. The adopted

amendment to §217.129(c)(3) clarifies that a clarifier weir must be leveled, not merely designed with the ability to be leveled. The adopted amendment to §217.129(c)(4) requires the effluent weir loading to be based on peak flow for a primary clarifier with a design flow less than 1.0 million gpd. This change makes §217.129(c)(4) consistent with the flow design basis for large clarifiers in §217.129(c)(5) and for secondary clarifiers in §217.152.

The adopted amendment to §217.129(d)(3)(a) clarifies that "the design criteria," as used in this section refers to surface loading rates and detention times for primary clarifiers. In the adopted amendment, the term "overflow rate" is deleted from §217.129(d)(3)(B)(iii) because the provision only applies to side water depth (SWD). The phrase "must be allowed for development of maximum return sludge concentration" in §217.129(d)(3)(B)(iv)(III) was deleted because the information is not necessary for compliance or the purposes of this chapter.

In the adopted amendment to §217.129(e) the definition of "side water depth" was added for consistency with the secondary clarifier requirements in §217.152.

The adopted amendment to §217.129(g)(1) requires drained liquid from a primary clarifier to be routed through a secondary treatment process to ensure that liquids drained from a primary clarifier do not bypass proper treatment.

The adopted amendment to §217.129(j)(1) clarifies that the purpose of removing sludge rapidly is to reduce the potential for nuisance odor development.

Subchapter F: Activated Sludge Systems

§217.151, Requirements for an Aeration Basin

The adopted amendment to this section was made to ensure consistent use of defined terms.

§217.152, Requirements for Clarifiers

The adopted amendment to §217.152 improves the organization of the section in general. Specifically, the language from §217.152(f) was moved to §217.152(b). Previously existing §217.152(b) - (e) were re-lettered as §217.152(c) - (f). Previously existing §217.152(b)(5) and (6) were moved to adopted §217.152(c)(1). The adopted amendment to §217.152 also contains substantive changes. Specific substantive changes and the reasons for organizational changes are discussed in this section of the preamble.

Adopted §217.152(b) contains all of the language from §217.152(f) so that requirements related to clarifier inlets and inflows will be grouped together. All subsequent subsections were re-lettered. The previously existing §217.152(f) was deleted.

The adopted amendment to §217.152(c)(1) ensures that all requirements related to scum removal are in the same location. Adopted §217.152(c)(1)(A) contains all of the language from the previously existing §217.152(c)(5), without changes. Adopted §217.152(c)(1)(B) contains the language from the previously existing §217.152(b)(6), but also adds that a mechanical skimmer must be used, if a hydraulic differential scum pickup is not capable of removing scum from the entire surface, to ensure that scum is not discharged to the environment. The adopted amendment to §217.152(c)(2) clarifies that a facility using either an activated sludge process or an aerated lagoon is required to either re-route scum within the facility for further processing, or dispose of the scum using a method that complies with 30 TAC Chapter 312. Adopted §217.152(c)(3) was added to require removal of debris and foreign materials before scum will be applied to the land because disposal of debris and foreign materials is not authorized by the land application rules in Chapter 312. Subsequent paragraphs were renumbered. Adopted §217.152(c)(6) prohibits scum from being stored in a vessel that is open to the atmosphere, which will help prevent odors and vectors, thereby ensuring protection of public health, safety, and the environment. This requirement will also provide for enhanced compliance and enforceability.

The adopted amendment to §217.152(e)(1) clarifies that the transfer of sludge within a wastewater treatment facility must not negatively affect the treatment efficiency of a treatment unit that receives the sludge.

Section 217.152(e)(3) was updated to make sludge velocity allowances, based on comments from a stakeholder, which noted that many small wastewater treatment facilities cannot meet a sludge velocity of 2.0 feet per second using pipes that are at least 4.0 inches in diameter. The commission concurs with the stakeholder recommendation.

Section 217.152(e)(4) was added to require a sludge pipe to be accessible for cleaning. The previously existing requirement only applied to blockages, and to enhance maintenance of the system, sludge pipes must also be accessible for cleaning, even if the pipe is not entirely blocked. Section 217.152(f)(2) was added to address sludge collection equipment requirements for a wastewater treatment facility with a design flow less than 10,000 gpd. This provision will ensure that smaller wastewater treatment plants will have a way to route sludge to the sludge collection pipe.

The adopted amendment to §217.152(g)(1)(B) clarifies that the SWD definition applies to all flat bottom clarifier tanks, whether or not the tank has a hydraulic sludge removal mechanism. The minimum SWD limit of 5.0 feet for hopper bottom clarifiers was moved from §217.152(g)(4) to §217.152(g)(3). A statement was added to the end of §217.152(g)(4) to clarify that the lower two-thirds of a hopper must not be included in SWD calculations.

The adopted amendment to §217.152(h) prohibits the use of hopper bottom clarifiers at a wastewater treatment facility with a design flow of 10,000 gpd or more, whether or not mechanical sludge collection equipment is provided.

The adopted amendment to §217.152(i)(2) requires two sludge return pumps. The adopted amendment to §217.152(i)(4) requires that a wastewater treatment facility be designed with the ability to control and vary the return sludge flow.

§217.153, Requirements for Both Aeration Basins and Clarifiers

Adopted §217.153(a)(1) - (3) enhance enforceability and ensure safety and infrastructure protection by preventing aeration basins and clarifiers from leaking, collapsing, or floating. The adopted amendment to §217.153(c)(1) clarifies that diffusers are included in the aeration equipment that must be removable for certain facilities to be exempt from the requirement to have at least two aeration basins and clarifiers.

§217.154, Aeration Basin and Clarifier Sizing--Traditional Design

The adopted amendment to §217.154(b)(1) establishes a minimum design dissolved oxygen concentration of 2.0 milligrams per liter to ensure adequate dissolved oxygen throughout an aeration basin for effective biological treatment and to enhance compliance and enforceability. The amendment provides that the executive director may consider different dissolved oxygen specifications for biological nutrient removal or

tapered aeration for energy conservation because uniform dissolved oxygen concentrations throughout a basin are not usually desirable for these designs. The adopted amendment to §217.154(b)(3) changes "reactor" to "aeration basin" to use consistent terms. The amendment also defines the characteristics to be used when identifying a similar wastewater treatment facility, which will improve consistency in the selection of a design temperature for water in an aeration basin.

The adopted amendment to §217.154(c)(1) deletes the phrase "an activated sludge" so that the requirement applies generally to all clarifiers, whether or not sludge is returned to an aeration basin, to enhance compliance and enforceability. Also, the adopted amendment to §217.154(c)(1) replaces "overflow" with "surface loading" in the fourth column heading of Table F.2. to use defined terms accurately. The adopted amendment to §217.154(c)(2) removes "proposed" from "proposed clarifier" to prevent ambiguity in the enforcement of these rules.

§217.155, Aeration Equipment Sizing

The adopted amendment to §217.155(a)(2) adds "whichever is greater" to clarify that the design aeration rate must never be lower than the minimum rates in §217.155(a)(3), Table F.3., based on comments from a stakeholder, and the commission agrees that the clarification is helpful to ensure proper design and improve enforceability.

The adopted amendment updates the first column, second row of §217.155(b)(1), Table F.4., to include all activated sludge process that are intended to nitrify, to be consistent with §217.155(a)(3), Table F.3.

The adopted amendment to §217.155(b)(2)(D) allows an engineer to use manufacturer-supplied oxygen transfer testing results to determine the design airflow rate under certain conditions, based on comments from a stakeholder. The stakeholder noted that actual test data is the most accurate information available. The commission concurs with the stakeholder's recommendation. If data from the manufacturer is not available, the engineer must adjust the design airflow rate using Table F.5. as required by the existing rule. Additionally, the adopted amendment to §217.155(b)(2)(D) clarifies that linear interpolation is allowed to reflect the executive director's current practice. The adopted amendment to §217.155(b)(3)(A) clarifies which edition of the referenced text should be used.

The adopted amendment to §217.155(b)(4)(A) and (B) requires blowers to provide enough air for biological treatment and mixing based on the maximum air requirements, for the specific conditions at the location of the wastewater treatment facility. A stakeholder recommended the rule amendment and the commission concurs with the recommendation. The adopted amendment to §217.155(b)(4)(G) requires that blowers and air compressor systems are able to provide the design aeration rate at 20

degrees Fahrenheit, regardless of location, to prevent ambiguity in the compliance and enforceability of this chapter. Adopted §217.155(b)(4)(H) requires a blower to include a governor or other means to regulate airflow so that the requirements of this chapter will not cause unnecessary electricity consumption. The adopted amendment to §217.155(b)(5)(A)(iii) provides more flexibility by allowing diffuser submergence to be less than 7.0 feet if certain conditions are met, based on comments from a stakeholder, which suggested that the previous prohibition was too absolute for small wastewater treatment facilities. The commission concurs with this comment.

The adopted amendment to §217.155(c)(1)(B)(i) requires an owner to provide the actual oxygen transfer efficiency (not theoretical) in the engineering report for a mechanical aeration system. The adopted amendment to §217.155(c)(3)(B)(iv) requires equipping certain mechanical components with a splash guard. In the adopted amendment to §217.155(c)(3)(B)(iv) and (v), "any" was changed to "each" to prevent ambiguity by clarifying that these requirements apply to all bearings, motors, and gear reducers in a mechanical aerator.

§217.156, Sequencing Batch Reactors

In the adopted amendment to §217.156(a)(5), "peak" replaces "design" because a sequencing batch reactor must always be designed with a decanting system that can accommodate the design flow.

The adopted amendment to §217.156(b)(6) clarifies that the performance of a decanter and related pipes and valves must not be affected by freezing, regardless of the location of the wastewater treatment facility.

The adopted amendment to §217.156(c)(14) requires that walkways shall be provided to allow inspection, maintenance, and process control sampling and to allow access to instrumentation, mechanical equipment, and electrical equipment. These changes will allow owners to verify adequate treatment of wastes. The adopted amendment to §217.156(c)(17) clarifies that there must be adequate treatment capacity when one tank is out of service, regardless of which tank is out of service.

The adopted amendment to §217.156(e)(1) requires that a sequencing batch reactor must be able to be operated manually to ensure that a facility can be controlled during an emergency that prevents electronic control, which will provide greater protection of human health, safety, and the environment.

§217.157, Membrane Bioreactor Systems

The adopted amendment to §217.157 adds adopted §217.157(b), which includes definitions that are specific to the rules for membrane bioreactor systems. These definitions were moved, without changes, from previously existing §217.2(18), (22), (24), (32), (46), and (47). It is more appropriate for these definitions to be in this

section, because the definitions are only used in this section. The subsections that follow adopted §217.157(b) were re-lettered.

The adopted amendment to §217.157(c)(2) defines the characteristics of a "similar" wastewater treatment facility for the purposes of this section, to ensure that the executive director has the information necessary to assist in the review of a project and to enhance compliance and enforceability.

The adopted amendment to §217.157(d)(1)(A) divides the requirements of §217.157(d)(1)(A)(i) into §217.157(d)(1)(A)(i) - (iii) to improve readability. In the adopted amendment to §217.157(d)(1)(C), "fat" is added to "fat, oil, and grease" to use consistent terms. The adopted amendment to §217.157(d)(1)(D) clarifies "excessive grit accumulation" as grit accumulation in any treatment unit following the headworks. The adopted amendment to §217.157(d)(3)(D) clarifies that the phrase "potential or actual oxygen deprivation" means that oxygen levels are outside of the design dissolved oxygen range or that the dissolved oxygen decreases rapidly. In the adopted amendment to §217.157(d)(4), "nutrient removal" replaces "treatment" to use consistent terms. The nutrient removal models in §217.157(d)(5)(B) were deleted, based on the commission's concurrence with comments from stakeholders, which suggested that the requirements should be as generic as possible because there are a variety of accepted nutrient removal models and because of the technological advancement occurring in that field. The

commission encourages innovation and progress in the field of advanced nutrient removal. The adopted amendment to §217.157(d)(8)(B) subdivides the requirements into §217.157(d)(8)(B)(i) - (iv) to improve readability. In the adopted amendment to §217.157(d)(8)(B)(iv), the phrase "design flow" replaces the term "average," and the phrase "peak flow" replaces the phrase "peak two-hour design" to use consistent terms. The term "peak day" was deleted because the peak flow is already a more limiting design value.

In the adopted amendment to §217.157(d)(9)(A), "design flow" replaces "daily average flow" to use consistent terms, and "the largest" replaces "one" to ensure adequate treatment capacity in a facility that uses more than one membrane bioreactor unit size.

Previously existing §217.157(d)(10)(B)(ii) and (iii) were deleted because they did not include substantive requirements. The adopted amendment to §217.157(d)(10)(C) requires that an alternative process or mechanism for cleaning and maintaining membranes must be approved by the executive director to approve, in writing, to enhance compliance and enforceability.

The adopted amendment to §217.157(e)(1)(D), deletes the phrase "which is short periods of air scouring without filtration" because it is an unnecessary definition within the context of this requirement.

The adopted amendment to §217.157(e)(2)(A) deletes the phrase "or an equivalent" to prevent ambiguity and require an alarm to notify the operator of high turbidity so that damaged membranes can be isolated and repaired or replaced. The adopted amendment to §217.157(e)(3) requires that a membrane bioreactor must be able to be operated manually in case of emergencies that prevent electronic control.

§217.158, Solids Management

In the adopted amendment to §217.158(a)(1), "as designed" replaces "satisfactorily" to prevent ambiguity. In the adopted amendment to §217.158(c)(2), the phrase "allow for cleaning without removal from a basin" was deleted and was replaced by a requirement to comply with the adopted new §217.162 (Air Lift Pump Design) because the adopted section contains comprehensive requirements for air lift pumps. The adopted amendment to §217.158(e)(2) provides more design flexibility by decreasing the minimum flushing flow velocity in a sludge pipe based on the solids wasting rate. The suggestion for the amendment was made by a stakeholder and the commission concurs with the suggestion.

§217.159, Process Control

The adopted amendment to §217.159(a)(1) deletes the phrase "from either a mixed liquor tank, a sludge re-aeration tank, or the return sludge" to avoid unnecessarily

limiting the locations where sludge can be wasted. The adopted amendment to §217.159(b)(1) changes the word "include" to the phrase "provide the operator with" to prevent ambiguity and also change the phrase "wastewater facility" to just "wastewater" because the wastewater is what actually exerts the oxygen demand.

Adopted §217.159(c) incorporates the process control requirement from the previously existing §217.162 (Internal Process Flow Measurement), except that totalized flow measurement is now required, so that owners and operators will have more accurate information about the amount of activated sludge returned within the process.

§217.160, Operability and Maintenance Requirements

The adopted amendment to §217.160(a) clarifies that a temperature controlled enclosure is mandatory if equipment is not able to operate at the temperature extremes of the wastewater facility location. The adopted amendment to §217.160(c) adds the word "safely" to clarify that the work area required to remove equipment must be sufficiently large, but must also provide a safe working area. For example, installing or removing equipment that is accessed by an elevated platform might require more working space than simply accessing the equipment for inspection.

§217.161, Electrical and Instrumentation Systems

The adopted amendment to §217.161(c) adds that the executive director may require an owner to monitor clarifier failure and other conditions as a condition for project approval. The suggestion for the amendment was made by a stakeholder and the commission concurs with the suggestion. The adopted amendment to §217.161(d) clarifies that a telemetry system must notify an operator of any malfunction listed in §217.161(c).

§217.162, Air Lift Pump Design

The contents of previously existing §217.162 were moved to §217.159(c). The commission, therefore, adopts the repeal of §217.162 and adopts new §217.162, which will establish minimum requirements for air lift pump design. A stakeholder suggested the commission establish minimum requirements for air lift pumps, and the commission concurs with the suggestion. Air lift pumps are commonly used at wastewater treatment facilities, but no set of minimum criteria for air lift pump design exists in this state.

Adopted new §217.162(a) requires the engineering report to include air lift pump calculations and certain information related to the design air and fluid flow rates, and also requires air lift pump systems to be designed to meet the range of required flow

rates. Adopted new §217.162(b) sets minimum design criteria for air lift pumps that address types of sludge that cannot be pumped, the minimum pump diameter, the relationship between submergence and airflow, splash prevention, cleaning, releasing trapped air, minimum dynamic submergence, and flow measurement. Adopted new §217.162(c) sets minimum requirements for air lift pump system redundancy, including a requirement to provide a backup pump or other means of transfer and a requirement that a system must be able to operate at full capacity with the largest pump out of service.

§217.163, Advanced Nutrient Removal

The adopted amendment to §217.163(b) states that fixed-film processes are not exempt from the innovative and non-conforming technology requirements in §217.7(b)(2). In the commission's experience, closer review and performance bonding is sometimes necessary for fixed-film processes because of the wide variety of designs and the accompanying variability in performance. The adopted amendment to §217.163(d) adds a requirement that chemical addition in an advanced nutrient removal process must be approved by the executive director in writing. The previously existing §217.163(e) was deleted because it is redundant.

§217.164, Aeration Basin and Clarifier Sizing--Volume-Flux Design Method

The adopted amendment to §217.164(a) clarifies that the volume-flux design method for aeration basins and clarifiers must not be used in conjunction with traditional design methods. In the adopted amendment to §217.164(b)(1), (c)(1)(A) - (D), and (c)(2) "BOD_5" replaces "$CBOD_5$" for consistency with the effluent limits in 30 TAC Chapter 309. Previously existing §217.164(d)(8) was deleted because it was unnecessary.

Subchapter G: Fixed Film and Filtration Units

§217.182, Trickling Filters--General Requirements

The adopted amendment to §217.182(a)(1) clarifies that the word "strength" means BOD_5 concentration.

The adopted amendment to §217.182(b)(2) more completely describe a secondary treatment filter to prevent ambiguity and to reference the appropriate BOD_5 and total suspended solids (TSS) requirements. The adopted amendment to §217.182(b)(3) more completely describe a combined BOD_5 and nitrifying filter to prevent ambiguity and to reference the appropriate BOD_5, TSS, and ammonia nitrogen requirements.

The adopted amendment to §217.182(d)(1)(B) replaces the word "have" with "remove" to clarify that the requirement intends for pretreatment preceding a trickling filter to remove particles rather than leave particles in place.

The adopted amendment to §217.182(e)(2)(C) clarifies the rule by replacing the word "fines" with the more descriptive phrase "other fine particles."

The adopted amendment to §217.182(f)(2) requires that the use of synthetic trickling filter media be approved by the executive director in writing, because potentially innovative or non-conforming technologies cannot be approved through an automatic approval process. The adopted amendment to §217.182(f)(2)(A) clarifies that the suitability of synthetic media material must be based on real performance data from similar media to ensure that the evaluation will be useful to the executive director during the review of a project.

The adopted amendment to §217.182(g)(1) changes the phrase "suitable flow characteristics must be used for the application of wastewater to a filter by" to "dosing rates to a trickling filter must be within the design dosing rate range, even if the trickling filter receives flow from a" to clarify the meaning of "suitable flow characteristics."

The adopted amendment to §217.182(i)(1)(A) adds a requirement to include a mechanism to maintain minimum circulation during periods of low flow to ensure active biological growth in the filter media at all times. The adopted amendment to §217.182(i)(1)(B) clarifies that this requirement applies specifically to all trickling filters with continuous recirculation. The adopted amendment to §217.182(i)(2)(A) adds the

word "compensatory" to clarify that the additional recirculating flow is required to compensate for a lack of influent flow under certain conditions.

The adopted amendment to §217.182(j)(1) deletes the phrase "area cross section" because it is unnecessary and adds ambiguity. The adopted amendment also clarifies that "for the initial year and the design year" means "for the flow expected in the initial year and at full design capacity."

The adopted amendment to §217.182(k)(5) requires that the manufacturer's recommendations for modular synthetic media design be included in the engineering report so that proper construction of the trickling filter can be verified. In the adopted amendment to §217.182(m)(7), "the trickling filter basin surface" area replaces "plan" area for clarity.

The adopted amendment to §217.182(m)(8) requires that the manufacturer's recommendations for synthetic media underdrain ventilating area be included in the engineering report so that proper construction of the trickling filter can be verified.

The adopted amendment to §217.182(n)(1)(C) establishes a minimum ventilation rate for passive ventilation of a trickling filter.

The adopted amendment to §217.182(o)(2)(A)(i), deletes the word "new" because it is not necessary within the context of these rules. The adopted amendment to §217.182(o)(2)(B) inserts the phrase "be designed to prevent sludge accumulation that attracts snails" to replace the phrase "minimize areas where sludge may accumulate" to reduce ambiguity and make the requirement more specific. The adopted amendment to §217.182(o)(3) inserts the phrase "must be designed to prevent" to replace the phrase "design must minimize" to prevent ambiguity.

The adopted amendment to §217.182(p) clarifies that a trickling filter system must include a means to measure the flow and recirculation flow of each trickling filter. In §217.182(q)(1)(A), "altered" replaces "expanded or materially altered" to use consistent terms. The adopted amendment to §217.182(q)(2) defines high influent organic strength as a BOD_5 concentration greater than 200 milligrams per liter to prevent ambiguity.

§217.183, Nitrifying Trickling Filters--Additional Requirements

The adopted amendment to §217.183(g)(2) deletes the phrase "and by control of influent instantaneous application rates, by means other than compensatory recirculation" to provide design engineers with additional flexibility. This deleted portion is not necessary to convey the minimum requirement and limits design flexibility.

In the adopted amendment to §217.183(h)(2), the second sentence was deleted because it is not necessary to convey the minimum requirement and it limited design flexibility. The adopted amendment to §217.183(h)(2) deletes language that states "the design must not take credit for nitrification in sections of the filter having soluble BOD_5 of <20 mg/l" because the effluent quality requirement alone is a sufficient performance criteria. The adopted amendment to §217.183(h)(3) added "BOD_5" to the phrase "combined BOD_5 and nitrification filter design" for consistency with the rest of the section.

§217.184, Dual Treatment Using Trickling Filters

The adopted amendment to §217.184(c) lists pretreatment, snail control, return sludge, aeration, sludge age, hydraulic residence time, and nitrification design to clarify that they must be addressed in the design of a suspended and attached growth system and to improve the rule structure. The adopted amendment to §217.184(c)(3)(B) adds the phrase "design that uses" to clarify that trickling filters in this scenario incorporate a vertical flow design that uses fully corrugated media.

§217.185, Rotating Biological Contactors

The adopted amendment to §217.185(a)(1) clarifies disposal requirements for grit, debris, and excess oil and grease by adding references to §217.123 and §217.126. The adopted amendment to §217.185(a)(2) clarifies that primary clarification, fine screening,

or grit removal may be required before influent enters a rotating biological contactor (RBC) to protect the RBC from damage or upset.

In the adopted amendment to §217.185(b)(1), the phrase "at least six complete air exchanges per hour" replaces the phrase "appropriate levels of ventilation" for clarity. In the adopted amendment to §217.185(f), the phrase "filamentous bacteria that oxidize sulfur compounds (e.g., *Beggiatoa* species)" replaces the word "beggiatoa" to clarify that the requirement applies to species other than *Beggiatoa*.

The adopted amendment to §217.185(g)(2) clarifies that an RBC system must be designed to treat the design flow, even when the largest process train is out of service for maintenance or cleaning. The adopted amendment to §217.185(h) adds that bearings in an RBC must be easily accessible for replacement, based on comments from a stakeholder. The commission concurs because the change will ensure that an RBC will not be out of service for an excessive amount of time during repairs.

The adopted amendment to §217.185(k)(1) clarifies that justification for less than three RBC stages must demonstrate equivalent treatment.

§217.186, Nitrifying Rotating Biological Contactors

The adopted amendment to §217.186(b) clarifies that the nitrification rate of a system must be justified using calculations, to ensure that the executive director has all of the information necessary to determine whether a project will be protective of the environment.

§217.187, Submerged Biological Contactor

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.188, Submerged Biological Contactor

The adopted amendment to §217.188(a)(1) defines the term "submerged biological contactor" for the purposes of this section. The adopted amendment to §217.188(c) clarifies that if a submerged biological contactor has moving parts, they must have lubrication access above the water level to ensure that the submerged biological contactor can be maintained.

§217.189, Dual Treatment Systems Using Submerged Biological Contactor

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.190, Filtration

The adopted amendment to §217.190(a)(1) defines the term "tertiary effluent limits" for the purposes of this section. The adopted amendment to §217.190(b)(1) clarifies the requirement by replacing "filter units" with "independent, fully functional filter basins with independent, fully functional equipment," based on comments from a stakeholder, who noted that the effect of all types of repairs should be considered in determining whether duplicate equipment is required. The commission concurs. The adopted amendment to §217.190(d) gives design engineers additional flexibility for routing filter backwash within a wastewater treatment facility by adding the phrase "or to the influent lift station."

§217.191, Additional Requirements for Deep Bed, Intermittently Backwashed, Granular Media Filters

The adopted amendment to §217.191(b)(3) changes the phrase "perform an hydraulic grading of material during backwash" to "maintain stratification of media during

backwash, based on the particle size distribution" for improved clarity. The adopted amendment to §217.191(b)(3) also deletes the phrase "that will result in a filter bed with a pore space graded from progressively coarse to fine from the top of the media to the supporting layer" to allow for upflow, downflow, and other design configurations.

The adopted amendment to §217.191(c)(2)(A) adds "not" to clarify that if a facility does not have flow equalization or other means of surge control, a backwash tank must be provided. The adopted amendment to §217.191(c)(2)(B) and (C) gives design engineers additional flexibility for routing filter backwash within a wastewater treatment facility. The adopted amendment to §217.191(d) requires that the manufacturer's recommendations for maximum filtration head loss be included in the engineering report so that proper construction can be verified.

§217.192, Additional Design Requirements for Multi-Compartmented, Low Head, Automatically Backwashed Filters

The adopted amendment to §217.192(a)(1) adds the phrase "multi-compartmented, low head, automatically backwashed (multi-compartmented) filter" to prevent ambiguity. The adopted amendment to §217.192(a)(2) requires that the manufacturer's recommended application rates be included in the engineering report to ensure that the executive director has all of the information needed to review the project.

The adopted amendment to §217.192(b) clarifies that an engineer must use calculations to justify different media sizes or depths from those listed in §217.192(b), Table G.5.

The adopted amendment to §217.192(c)(2) clarifies that "expand the media a minimum of 20%" does not refer to individual pieces of media, but instead refers to all of the media that is in fluid. The adopted amendment to §217.192(c)(2) also clarifies that the manufacturer's data provided to support an exemption from the backwash duration or media expansion requirements must justify the shorter backwash duration or decreased expansion of the fluidized media.

The adopted amendment to §217.192(e) deletes the phrase "and regular" to prevent ambiguity.

§217.193, Cloth or Disk Filter Systems

The commission adopts the repeal of §217.193 and replaces it with new §217.193. The commission adopts previously existing §217.193 as new §217.194 so that similar sections will be grouped together.

Adopted new §217.193 introduces new requirements for cloth or disk filter systems, based on comments from a stakeholder, who requested minimum design criteria for these types of filters. Cloth and disk filter systems are becoming more common, and

minimum design standards will provide certainty that designs proposed by owners, engineers, and manufacturers will be acceptable to the executive director.

Adopted new §217.193(a) requires a cloth or disk filter system to meet the requirements in §217.190, which contains general requirements for filtration systems. Adopted new §217.193(b) sets a minimum average pore size of 30 microns for filtration media, requires media thickness to be based on the manufacturer's recommendations, and requires the media to be resistant to disinfectants and chlorine to ensure the integrity of the media. Adopted new §217.193(c) sets minimum standards for filtration rates and backwashing requirements to ensure effective filtration. Adopted new §217.193(d) sets minimum standards for the disposal of filter backwash to ensure that the disposal of filter backwash material will not be harmful to the environment. Adopted new §217.193(e) sets minimum requirements for monitoring and controls to ensure that the integrity of the media will be maintained and that an operator will be able to monitor a filter for process control. Adopted new §217.193(f) requires a filter to be protected from freezing conditions, ultraviolet light (UV) exposure, and similar environmental concerns to ensure that protection of the environment and the integrity of the media will be maintained at all times.

§217.194, Alternative Designs for Effluent Polishing

Adopted new §217.194 is previously existing §217.193 verbatim, except that the word "alternative" was added to prevent ambiguity.

Subchapter H: Natural Treatment Units

The adopted amendment to Subchapter H changes the title from "Natural Treatment Facilities" to "Natural Treatment Units" to better describe the contents of the subchapter.

§217.201, Applicability

The adopted amendment to §217.201(a) clarifies that all lagoons used to store treated, untreated, or partially treated domestic wastewater must be lined to control seepage, including raw influent storage lagoons. The adopted amendment also clarifies that lagoons used to store reclaimed water must comply with 30 TAC Chapter 210.

§217.202, Primary and Secondary Treatment Units

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.203, Design Criteria for Natural Treatment Units

The adopted amendment to §217.203 changes the section title from "Design Criteria for Natural Treatment Facilities" to "Design Criteria for Natural Treatment Units" to clearly describe the section.

The adopted amendment to §217.203 combines language related to the section's applicability from the previously existing §217.203(a) and (c)(5) into adopted §217.203(a) to enhance readability and organization in the section. Subsequent subsections were re-lettered.

The adopted amendment to §217.203(b) deletes the requirement for uniform sheet flow for overland flow terraces because it was moved to §217.212(b).

The adopted amendment to §217.203(c)(1) rephrases "presents a risk of contact with the public" as "could cause spray to drift off of the property" to prevent ambiguity. The adopted amendment to §217.203(c)(2) clarifies that the executive director's approval of windbreaks or vegetative screening is only valid if given in writing.

The adopted amendment to §217.203(d)(3) deletes language related to variances because it unnecessarily duplicates language in §217.4.

Adopted §217.203(e)(1) - (3) were revised to improve organizational structure and to ensure consistent requirements for pre-construction soil sampling, liner construction, and post-construction soil sampling. However, preconstruction sampling requirements differ between unamended in-situ soils and amended or imported soils because the composition of amended or imported soils can be controlled during liner construction. Undisturbed core samples are required for unamended in-situ soil liners before construction to verify that the native soil has suitable characteristics before final compaction. These adopted revisions allow molded samples of the liner material (pre-construction) for amended or imported soil liners. Also, these adopted revisions provide additional flexibility related to the thickness of soil lifts before and after compaction, and the moisture content at which soils are compacted. These adopted revisions clarify that post-construction sampling must include samples from the bottom and the sides of a pond to ensure that no portion of soil liner below a pond waterline will be susceptible to leakage rates in excess of those prescribed in this rule. Finally, these revisions require that, for synthetic liners, soil compaction below the liner must meet the synthetic liner manufacturer's requirements.

The adopted amendment to §217.203(f)(4) clarifies that the executive director's approval of any erosion control method not identified in §217.203(f)(4) must be in writing.

The adopted amendment to §217.203(g) clarifies that chemical or UV disinfection is not required for a natural wastewater treatment facility, unless required by the facility's wastewater permit. The adopted amendment clarifies that the phrase "entire, free water surface," for the purposes of ensuring wastewater disinfection, means "the plant-free water surface with full sun exposure."

The adopted amendment to §217.203(h) deletes the previously existing §217.203(h)(2) because the statement does not always correspond to actual permitting practice, as sampling points can be located between treatment lagoons. Permits sometimes designate more than one sampling point, with different pollutants monitored at each sampling point. In addition, a lagoon downstream of a permitted sampling point may be a reclaimed water storage lagoon regulated under to Chapter 210. Adopted §217.203(j) ensures that all lagoons will have piping that allows flow to be re-routed for lagoon maintenance.

Adopted §217.203(k) contains requirements that were moved from the previously existing §217.207(d)(5) and (6) because freeboard requirements should apply to all types of wastewater lagoons. Adopted §217.203(l) was moved from the previously existing §217.203(d)(4)(D).

§217.204, Imhoff Tanks

The adopted amendment to §217.204(a)(3) contains septum wall overhang requirements that were moved from the previously existing §217.204(a)(6) to improve organizational structure.

The adopted amendment to §217.204(d)(1) requires the final engineering report to include the Imhoff tank surface area, so that proper construction can be verified.

The adopted amendment to §217.204(f) restates the minimum depth requirements for an Imhoff tank to clarify that the minimum depth from the water surface is 16.5 feet, which includes a 1.5 foot zone for digesting solids. The adopted amendment to §217.204(i) deletes paragraph (3) to remove an invalid design assumption about the performance of subsequent treatment units. The performance of treatment units should be addressed on the design and merits of those subsequent treatment units.

§217.205, Facultative Lagoons

The adopted amendment to §217.205(a)(1) deletes the phrase "unless other dimensions are justified in the engineering report" so that the executive director will have an opportunity to determine whether alternative dimensions are reasonable. Alternative dimensions can be considered according to the variance procedures in §217.4.

In the adopted rules, §217.205(d)(2), the phrase "but not further below the water surface than a distance equal to one-half the depth of the lagoon at the outlet" replaces the phrase "and not disturb the anaerobic zone" to establish a clear and consistent standard.

§217.206, Aerated Lagoons

In the adopted amendment to §217.206, subsection (c) was deleted because the necessary piping is covered in adopted §217.203(j). The re-lettered §217.206(c) more thoroughly defines expectations for alarms systems at a wastewater treatment facility with an aerated lagoon. This amendment was based on comments from a stakeholder, which noted that the rules need to clarify the level of telemetry required, and the commission agrees with the recommendation. Equation H.1. in the re-lettered §217.206(d) was corrected by inserting "1 -" before the rest of the expression so that the pollutant removal efficiency will increase with the aeration volume. In the adopted amendment to the re-lettered §217.206(d)(2) and (3), "must" replaces "may" to clarify that adjustment of the reaction rate constant for temperature or high strength wastes is not optional.

§217.207, Stabilization Lagoons

The adopted amendment to §217.207(b) replaces the phrase "so that the local prevailing winds will be toward a less populated area" with the phrase "so that odors from the

stabilization lagoon will not cause a nuisance" to clarify that facilities should minimize nuisance odors to the extent practicable. Previously existing §217.207(d)(5) was deleted and its contents moved to §217.203(k)(1); and previously existing §217.207(d)(6) was deleted and its contents moved to §217.203(k)(2). Adopted amendment to §217.207(e)(2) changes the phrase "during normal operating depths per day at the available head" to the phrase "based on the normal water level at design flow and the corresponding pressure head" to prevent ambiguity.

§217.208, Evaporative Lagoons

The adopted amendment to §217.208(a)(3) defines the evaporation rate used for design purposes as the lowest annual evaporation rate in the past 25 years from the Texas Water Development Board's precipitation and lake evaporation dataset for the quadrangle where the evaporation lagoon is located. This new language will prevent ambiguity and ensure that evaporative lagoons are sized to prevent unauthorized discharges.

The adopted amendment to §217.207(b) replaces the phrase "so that the local prevailing winds will be toward a less populated area" with the phrase "so that odors from the evaporative lagoon will not cause a nuisance" to clarify that facilities should minimize nuisance odors to the extent practicable.

Section 217.208(c) was deleted and the requirements were moved to §217.203(d)(3). Subsequent subsections were re-lettered.

The adopted amendment to re-lettered §217.208(c)(2)(A) clarifies that the phrase "the area around an inlet must be designed for solids deposition" means that there needs to be a deeper area around the inlet to store deposited solids, and that the deeper area must be designed according to §217.205.

Section 217.208(d)(3)(D) was deleted because it is redundant.

Section 217.208(f)(4)(B) was deleted so that the executive director will have an opportunity to determine whether the alternative discharge apron materials under consideration for use are reasonable. The adopted amended rule intends that alternative materials should be considered according to the variance procedures in §217.4.

§217.209, Constructed Wetlands

The adopted amendment to §217.209(b) defines the meaning of the term "natural wetland" for the purposes of this chapter to provide additional guidance to owners regarding which lands are prohibited from use for wastewater treatment.

In the adopted amendment to §217.209(c)(4), "will" replaces "may" to clarify that designing a constructed wetland to meet effluent limits in a wastewater permit is not optional.

In the adopted amendment to §217.209(d), "must" replaces "may" to clarify that the inclusion of plant species is not optional. In this subsection, *Typha* species (cattails) are removed from the approved plant list because of their tendency to displace other plant species and inhibit plant diversity. Additionally, the section adds to the list "other appropriate emergent plant species approved in writing by the executive director" to provide design engineers with more flexibility in choosing plant species.

The adopted amendment to §217.209(e)(2)(A) requires designing each cell of a constructed wetland so that algal mats and floating plant material can be removed because plant material and detritus could interfere with downstream cells when it is produced within a wetland cell. In the adopted amendment to §217.209(e)(2)(B), "must" replaces "may" to clarify that selecting a plant removal method is not optional. Removal methods not explicitly listed in §217.209(e)(2)(B) must be approved by the executive director in writing prior to use. The adopted amendment to §217.209(e)(3) adds that a constructed wetland maintenance plan must include a schedule for removing overabundant live plant material and dead plant material so that the executive director can ensure that removal of excess vegetation will be done in a way that promotes a

healthy wetland system and that the disposal of dead plant material will not harm the environment.

The adopted amendment to §217.209(f) clarifies that a constructed wetland must have an established plant community.

Adopted amendment to §217.209(g) updates cross references and adds a reference to the amended §217.203(e) because that section contains liner construction requirements.

The adopted amendment to §217.209(h) deletes all of the existing berm design requirements because embankment design and construction is addressed in §217.203(f). While §217.209 provides the details for constructed wetlands, the berm of a constructed wetland must comply with the design requirements for an embankment around a natural treatment facility, therefore, the change to §217.209(h) will ensure that the design requirements for berms and embankments are consistent throughout the chapter.

§217.210, Constructed Wetlands--Free Water Surface (FWS) Design

The adopted amendment to the section heading changes "system" to "surface." The adopted amendment to §217.210(a) primarily includes changes that clarify syntax, except that the phrase "based on" was changed to "have" to enhance enforceability.

The adopted amendment to §217.210(b)(2) clarifies that a free water surface wetland that contains floating plants must also contain emergent plants, to ensure that treatment occurs throughout the constructed wetlands under all flow conditions. This amendment is partially based on comments from a stakeholder and is also necessary because the previously existing paragraph conflicted with §217.209(d).

In the proposal, §217.210(e)(2) was rewritten to clarify that the purpose of having a range of water depths is to support the growth of the selected wetland plant species under all operational flow conditions. The adopted amendment to §217.210(e)(2) requires an owner to select plants for a free water surface wetland that are compatible with the water depths under all operational flow conditions. This change from the proposal accommodates the common practice of designing wetlands for hydraulic efficiency before selecting suitable plants.

The adopted amendment to §217.210(h)(2) clarifies that multiple inlets devices (e.g., an inlet manifold) are required to prevent scouring because of the shallow depth of wetland cells.

The adopted amendment to §217.210(i)(1) clarifies that a constructed wetland design must be based on the design organic loading of the influent to the constructed wetland. The adopted amendment to §217.210(i)(2) requires that the organic removal efficiency

for a free water surface wetland must be calculated using the area-based loading equation provided in the paragraph. The adopted amendment to §217.210(i)(2) primarily involves syntax, but also clarifies that calculations must be performed.

§217.211, Constructed Wetlands--Subsurface Flow System (SFS) General Design

The adopted amendment to §217.211(a) clarifies that the subsurface media must be identified in the engineering report.

The adopted amendment to §217.211(e)(3)(A) changes the minimum 6.0 inches of dry media cover to a range between 6.0 and 9.0 inches to be consistent with the previously existing §217.211(e)(4)(B). Previously existing §217.211(e)(4)(B) was deleted and the requirements were moved to §217.211(e)(3)(A). The adopted amendment to §217.211(e)(3)(B) clarifies that the engineering report must identify any alternate design method used, not just the source of the method and supporting calculations. The previously existing Equation H.4. was not the correct Darcy's Law equation, therefore, it was entirely replaced with the correct Darcy's Law equation. The adopted amendment to §217.211(f)(3) adds "maintenance" to "inspection and cleaning" because inlet and outlet devices must be maintained to function properly.

In §217.211(f)(4) the phrase "a high influent BOD_5" was ambiguous, therefore, the phrase was replaced with a defined average BOD_5 concentration greater than 200 milligrams per liter in the adopted amendment.

In the adopted amendment, §217.211(g)(1) was rewritten to clarify that a constructed wetland design must be based on the design organic loading of the influent to the constructed wetland. The adopted amendment to §217.211(g)(2) requires the engineering report to include any alternate design method used, the source of the method, and supporting calculations for consistency with the amendment to §217.211(e)(3)(B). In Equation H.5., the C* value for TSS in the calculations was corrected because the commission concurs with the comments from a stakeholder, which noted that the coefficient in the previously existing rule was inconsistent with *Treatment Wetlands* (authored by Robert Kaldec, 1996).

In the adopted amendment to §217.211(i), "limit" replaces "prevent" to recognize that mosquito production is not entirely preventable. In the adopted amendment to §217.211(j)(7), "prevent" replaces "avoid" to prevent unnecessary ambiguity. Additionally, to clarify the purpose of the requirement to use light-weight equipment the phrases "clogging of the media" and "damage to the liner" replace the phrase "to avoid creating ruts in the subgrade."

§217.212, Overland Flow Process

Adopted §217.212(b) was moved from previously existing §217.203(a).

§217.213, Integrated Facultative Lagoons

The adopted amendment to §217.213(b)(1) deletes the phrase "unless other dimensions are justified in the engineering report" so that the executive director will have an opportunity to determine whether alternative dimensions are reasonable. Alternative dimensions can be considered according to the variance procedures in §217.4. The adopted amendment to §217.213(b)(2) changes the requirement that a pit must have a minimum total surface area of 0.40 acre to 0.25 acre based on recommendations from a stakeholder, who documented that the smaller pit area provided equivalent performance in actual applications of the technology. The adopted amendment to §217.213(b)(4)(B) replaces the phrase "hydraulic retention time" with the phrase "design flow" for clarity and to use defined terms. The adopted amendment to §217.213(b)(6) clarifies the volume of flow that must be sent to each pit is relative to the size of the pit by replacing the phrase "each pit must receive an amount of wastewater influent equivalent to the size of a pit" with the phrase "influent flow must be split proportional to the pit volumes." The adopted amendment to §217.213(b)(9) clarifies that the buffer zones must be met and eliminates unnecessary restrictions on how lagoons are arranged by replacing the phrase "a design must locate an integrated facultative lagoon in a central location with regards to surrounding secondary lagoons and" with the phrase "an integrated facultative lagoon must." In §217.213(b)(10)(B), the phrase "or other deflection devices" was deleted to prevent unnecessary ambiguity. Adopted §217.213(b)(12)(B) was moved from previously existing §217.213(b)(12)(C) to improve

readability. The adopted amendment to §217.213(b)(13)(B), deletes the phrase "which is 20% of the original BOD_5" because the phrase is confusing within the context of the existing requirement. Adopted §217.213(b)(13)(C) was added to state the requirement affirmatively as "the design organic removal efficiency for the entire integrated facultative lagoon must not exceed 80%." The adopted amendment to §217.213(b)(14) clarifies that hydraulic retention time must be based on design flow to prevent ambiguity.

Subchapter J: Sludge Processing

The subchapter name was changed from "Sludge Treatment Units" to "Sludge Processing" to better describe the contents of the subchapter.

§217.242, Control of Sludge and Supernatant Volumes

The adopted amendment to §217.242(a) provides additional design flexibility by allowing supernate, filtrate, and centrate to be returned to either the wastewater treatment facility headworks or the influent lift station, which is necessary because many wastewater treatment facilities route return and recycle flows through the influent lift station. The adopted amendment to §217.242(c) deletes the previously existing language and adds language that clarifies that the returned supernate, filtrate or centrate that is returned to the headworks must not interfere with the wastewater treatment process in other treatment units.

§217.243, Sludge Pipes

In the adopted amendment to §217.243(g), the terms "primary sludge" and "digested" were deleted to clarify that all sludge pipes must allow for sludge removal. Adopted §217.243(k) requires that sludge pipes must not contain any bends that form acute angles, to prevent trapping of solids and facilitate cleaning.

§217.244, Sludge Pumps

In the adopted amendment to §217.244, subsection (c) was moved to adopted subsection (f) to improve organizational structure. Previously existing §217.244(f) was deleted because it was redundant (see the re-lettered §217.244(e)).

§217.245, Exclusion of Grit, Grease, and Debris from Sludge Processing Units

The updated section heading references debris in addition to grit and grease, and "processing" replaces "treatment" to use consistent terms. The adopted amendment to §217.245(c) clarifies the requirements by adding the phrase "before land application of the sludge" to replace the phrase "which must be disposed of separately from the sludge." Grit, grease, and debris do not need to be separated from sludge disposed of in a landfill or sludge-only monofill.

§217.246, Ventilation and Odor Control

In the adopted amendment to §217.246(a), the phrase "adversely impact health, safety, welfare, or the environment" replaces the phrase "might be a health hazard or a threaten air quality" to prevent ambiguity and use consistent terms across TCEQ programs. In the adopted amendment to §217.246(b)(1) and (2), the units used to express air exchanges were changed to prevent ambiguity.

§217.247, Chemical Pretreatment of Sludge

The adopted amendment to §217.247(a) adds that a chemical used to treat sludge must not adversely affect any other treatment unit to prevent a treatment unit upset that could be harmful to human health or the environment.

The adopted amendment to §217.247(c) adds that each chemical must be handled and disposed of according to its safety data sheet to ensure protection of human health and the environment, and enhance compliance and enforceability.

In the adopted amendment to §217.247(f), the phrase "are present" is replaced with "or conditions may occur" to prevent ambiguity. The adopted amendment also clarifies that owners must follow the National Fire Protection Association 70 National Electrical Code® in effect when the storage or handling area was constructed, which will ensure

protection of human health and the environment, and enhance compliance and enforceability.

The adopted amendment to §217.247(l) adds that chemicals must only be combined in a feed solution to clarify the existing prohibition and prevent ambiguity.

The adopted amendment to §217.247(m) clarifies that a container that stores concentrated acid must be enclosed and acid-resistant. This adopted amendment will also ensure protection of human health and the environment, and enhance compliance and enforceability.

The adopted amendment to §217.247(r)(8)(B) sets minimum standards for protecting potable water supplies for chemical solution water to ensure protection of human health and to provide consistency with Chapter 290.

§217.248, Sludge Thickening

In the adopted amendment to §217.248(b)(1)(A)(i), the phrase "within the zone of sludge concentration" was deleted to prevent ambiguity. In the adopted amendment to §217.248(b)(1)(B), "must" replaces "may" to clarify that the requirement is not optional. In the adopted amendment to §217.248(c)(1)(B), the phrase "or secondary effluent" was deleted because it was redundant.

§217.249, Sludge Stabilization

The adopted amendment to §217.249(b) clarifies that any deviations from the requirements must be documented in the variance request for consistency with other variances in this chapter.

The adopted amendment to §217.249(c)(2) clarifies that anaerobic digesters may be operated in a series or parallel.

The adopted amendment to §217.249(j)(3) clarifies the basis for the minimum anaerobic sludge digestion temperature to prevent ambiguity. The adopted amendment to §217.249(j)(4) incorporates §217.249(j)(5) from the previously existing rules for improved organizational structure and clarity.

The adopted amendment to §217.249(l)(1) clarifies that a waste gas burner must specifically be accessible for inspection and maintenance activities. The adopted amendment to §217.249(q)(1)(A) clarifies that a perched water table must be considered in identifying the shallowest water table when constructing a digester, for purposes of passive temperature control.

The adopted amendment to §217.249(r)(2)(C) adds that the engineering report must specify where the emergency overflow for the digester supernatant is routed to enhance

compliance and enforceability. In the adopted amendment to §217.249(r)(4)(B), "must" replaces "may" to clarify that supernatant treatment is not optional, and clarifies that executive director approval of an alternate method must be in writing. The adopted amendment to §217.249(r)(4)(D)(ii) clarifies that "per capita" refers to the population of the area served by the wastewater treatment facility.

The adopted amendment to §217.249(t)(2) clarifies that the design temperature for an aerobic digester is based on the temperature of the water in the aerobic digester. The adopted amendment to §217.249(t)(7)(C) clarifies that removable diffusers are not required if the wastewater treatment facility is designed with a redundant basin.

The adopted amendment to §217.249(u)(8) clarifies that a sludge grinder installed to protect a heat exchanger must protect the heat exchanger from damage or clogging from any sort of debris.

The adopted amendment to §217.249(w)(7) clarifies that the engineering report must include specifications about external heat necessary for sludge stabilization, to prevent ambiguity.

§217.250, Sludge Dewatering

The adopted amendment to §217.250(c)(2) changes the word "threatens" to the phrase "adversely impact" to prevent ambiguity and adds that human health, safety, or welfare must not be impacted. The adopted amendment to §217.250(c)(3)(B) clarifies that mechanical dewatering units must be capable of dewatering the daily average sludge flow in all circumstances. The adopted amendment to §217.250(c)(6) adds that the engineering report must specify in the engineering report where the dewatering unit bypass flow is routed to assist the executive director during review of a project. The adopted amendment will also enhance compliance and enforceability.

The adopted amendment to §217.250(d)(1) deletes the existing language and adds language to clarify that both the design and location of a chemical addition point must consider interactions of the chemical with other chemicals used in the wastewater treatment facility to ensure that chemicals are applied in a way that will be effective and will not cause harm. In the adopted amendment §217.250(d)(7) and (8) were rewritten for clarity and were modified so that the storage requirements for both chemical and batch processes are based on the maximum chemical demand and the total amount of chemical needed per shift, instead of amount of chemical needed every eight hours, which will help ensure effective and safe operation of the treatment unit. Adopted §217.250(d)(7) incorporates the previously existing §217.250(d)(9). The adopted amendment to renumbered §217.250(d)(9) clarifies that the engineering report must

justify any storage volume reduction and any other method used to ensure a continuous supply of chemicals by accounting for chemical use throughout a full operating day or a full batch.

The adopted amendment to §217.250(e)(2)(A)(ii) and (iii) requires that weather data be derived from the nearest National Oceanic and Atmospheric Administration weather station that has at least 10 years of data and that the entire period of record for the weather station must be used in calculations to set a clear and consistent standard for ambient temperature data used for the design of wastewater treatment facility components. The adopted amendment to §217.250(e)(2)(A)(iv) clarifies that accelerated sludge dewatering is intended to ensure dewatering during times when the local climate is abnormally wet and adds that a sludge drying bed must be designed to prevent unauthorized discharges. The adopted amendment to §217.250(e)(2)(B) clarifies that the gravel around underdrains must be sized to allow proper drainage and clarifies that the design requirements in the current rule apply to gravel around the underdrain. Adopted §217.250(e)(2)(D)(iii) requires the engineering report to specify where flow from drying bed underdrains will be routed to assist the executive director in the review of a project and to enhance compliance and enforceability. The adopted amendment to §217.250(e)(2)(E) adds that decanted liquid from a sludge drying bed must be routed to the headworks or the beginning of a secondary treatment process for processing before discharge to ensure that no unauthorized discharge of waste occurs. The adopted

amendment to §217.250(e)(5)(C) clarifies that "adequate" storage must be based on the disposal process used by the facility. For example, disposing of sludge at an adjacent landfill that is open 365 days per year may only require one day's worth of storage capacity for a centrifugal dewatering system. The adopted amendment to §217.250(e)(7)(A)(ii) clarifies that the executive director's approval of alternate methods must be in writing. The adopted amendment to §217.250(e)(7)(B)(i) - (ix) provides consistent structure for the items in the list. The adopted amendment to §217.250(e)(7)(H)(iii) adds that all electrical equipment subject to corrosion in a belt press area must be protected from splashes and corrosive gases, or must be located outside of the belt press area to ensure that electrical panels will not be exposed to a corrosive environment that could cause them to fail.

§217.251, Sludge Storage

The adopted amendment to §217.251(c)(1) prevents ambiguity, recognizing that a small degree of vector attraction is expected, so the requirement was changed to "minimize" vector attraction.

In the adopted amendment to §217.251(d)(2), "must" replaces "may to clarify that compliance is mandatory and a requirement was added requiring storage basins to include gas release valves and control measures to prevent explosive pressure conditions.

The adopted amendment to §217.251(e)(1) incorporates container materials (steel and concrete) from the previously existing §217.251(e)(3) and deletes the re-wetting prevention requirement that was incorrectly applied to open stockpiles. The adopted amendment to §217.251(e)(2) incorporates the previously existing §217.251(e)(4).

The adopted amendment to §217.251(g)(1) clarifies that dried solids must be stored in a covered bin or container (to prevent rewetting) and include a storage time limit of two years for consistency with federal regulations. The adopted amendment to §217.251(g)(2) clarifies that air exchanges for ventilation must be complete air exchanges and not partial air exchanges.

§217.252, Final Use or Disposal of Sludge

The adopted amendment to §217.252(b) combines the previously existing §217.252(b)(1) and (2), and adds additional flexibility by allowing design engineers to use actual data for design purposes. The amendment also adds that the methods, calculations, and analyses must be included in the engineering report to assist the executive director during the review of the project and enhance compliance and enforceability of this chapter. The adopted amendment to §217.252(d) changes the methods for determining the concentrations of metals in sludge to those methods approved in 40 Code of Federal Regulations §136.3 for consistency with federal regulations.

Subchapter K: Chemical Disinfection

The terms "gaseous chlorine" and "sulfur dioxide" were added throughout the subchapter, where appropriate, in place of "Cl_2" and "SO_2."

§217.271, Gaseous Chlorine (Cl_2) Disinfection and Sulfur Dioxide (SO_2) Dechlorination System Redundancy Requirements

The updated section heading clarifies that the contents apply to gaseous chlorine disinfection systems. The adopted amendment to §217.271(a) reduces the number of additional chlorine cylinders required from two full banks of cylinders to at least one additional cylinder, based on comments from a stakeholder, who noted safety and storage hazards associated with storing large volumes of unused chlorine gas. The commission concurs with the recommended change.

The adopted amendment to §217.271(b) clarifies that the requirement applies to both chlorination and dechlorination chemicals, and allows a device to switch between cylinders, instead of only banks of cylinders, for consistency with the adopted amendment to §217.271(a).

The adopted amendment to §217.271(c) changes the storage space required for empty cylinders by setting the minimum storage space as the space required to store the number of cylinders required for normal operation at peak flow.

The adopted amendment to §217.271(e) requires a duplicate backup pump, to clarify that the backup pump must deliver the same performance as the booster pump.

The adopted amendment to §217.271(f) references the emergency power requirements in §217.37 to prevent any conflicting language with that section. The commission adopts deleting the phrase "of the minimum flow necessary to keep the facility from being inundated by influent" to prevent a conflict with §217.37.

§217.272, Capacity and Sizing of Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The updated section heading clarifies that the contents apply to gaseous chlorine disinfection systems.

§217.273, Cylinder Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The updated section heading clarifies that the contents apply to gaseous chlorine disinfection systems. The adopted amendment to §217.73(a)(1), Equation K.2. and Table

K.2. changes lb/EF/day to lb/°F/day to correct a transcription error. The adopted amendment to §217.73(a)(1)(A) establishes that the averaging method for ambient temperature records must be based on seven consecutive days, and require that the temperatures used come from the nearest National Oceanic and Atmospheric Administration weather station that has at least 10 years of temperature records to set a clear and consistent standard for ambient temperature data used for the design of wastewater treatment facility components. In §217.273(b), the phrase "required for normal operation at peak flow" replaces "per cylinder bank" to prevent ambiguity.

§217.274, Dosage Control for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The updated section heading clarifies that the contents apply to gaseous chlorine disinfection systems. The adopted amendment to the section deletes the specific reference to "a new, expanded or materially altered" system to prevent potential conflict with §217.1 and §217.5 of this adoption.

§217.275, Requirements for 150 Pound Cylinders used in Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The updated section heading clarifies that the contents apply to gaseous chlorine disinfection systems and makes it clear that the section applies to 150-pound cylinders.

The adopted amendment to §217.275(a)(1) clarifies that the minimum temperature for a room where cylinders are stored indoors is 65 degrees Fahrenheit. The phrase "all connected" clarifies that disconnected cylinders do not need to be stored at 65 degrees Fahrenheit. The adopted amendment to §217.275(a)(2) clarifies that the minimum temperature of a cylinder before it is connected to a disinfection system is based on the surface temperature. The adopted amendment to §217.275(a)(4) clarifies that the maximum temperature of a sulfur dioxide cylinder that uses a heating blanket is based on the surface temperature.

The adopted amendment to §217.275(b)(2)(A) incorporates the previously existing §217.275(b)(2)(B) and subsequent subparagraphs are re-lettered. The word "dechlorination" replaces "disinfection" in the adopted amendment to §217.275(b)(2)(B) to make it clear that heating blankets should only be used on dechlorination chemical cylinders. The adopted amendment to §217.275(b)(2)(C) clarifies that heating blankets must shut down automatically if high pressures are detected in the cylinders or at any point in the disinfection system between the cylinders and the point where the chemicals are applied.

Adopted §217.275(c) establishes criteria for outdoor storage of 150-pound cylinders to address unsafe cylinder storage conditions. The commission moved the previously existing §217.275(c) and incorporated it into §217.278(e).

§217.276, Requirements for One-Ton and Larger Cylinders used in Gas-Withdrawal Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The section heading was updated to improve readability. The adopted amendment to §217.276(b)(3) clarifies that the provision is intended to prevent chlorine gas from liquefying in the pipes that transfer the chlorine from the cylinder to the point of use.

The adopted amendment to §217.276(c)(2) clarifies that heating blankets may only be used on cylinders that store sulfur dioxide, establish that the averaging method for ambient temperature records must be based on seven consecutive days, and require that the temperatures used come from the nearest National Oceanic and Atmospheric Administration weather station that has at least 10 years of temperature records to set a clear and consistent standard for ambient temperature data used for the design of wastewater treatment facility components. The adopted amendment to §217.276(c)(4) requires the engineer to provide calculations in the engineering report that document that the heating blanket settings will be maintained at less than 100 degrees Fahrenheit as an additional safety measure to ensure that heating blankets are evaluated before being put into use. Adopted §217.276(c)(5) and (6) rephrase the previously existing §217.276(c)(5) for consistency with §217.275(b)(2)(C).

Previously existing §217.276(d) was moved to adopted §217.278(e), except that previously existing §217.276(d)(2)(A) and (B) were deleted to prevent storing chlorine and sulfur dioxide gas cylinders together to ensure the safety of operators and the public.

§217.277, Requirements for One-Ton and Larger Cylinders used in Liquid-Withdrawal Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The section heading was updated to improve readability. The adopted amendment to §217.277(b) clarifies that withdrawal rates from cylinders must be based on calculations from §217.273(a)(2).

§217.278, Safety Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The section heading was revised to more appropriately describe the section content. The amendment to §217.278(a) requires that drainage from floor drains must be routed for safe disposal or processing at a rate that does not cause interference with the wastewater treatment process or violate a water quality permit requirement, to ensure that chemicals in the drainage will be handled in a way that is protective of the environment.

The adopted amendment to §217.278(b)(2) clarifies that an exterior door on a chlorine room must be gas-tight to ensure operator safety. The adopted amendment to

§217.278(b)(3) requires that all windows be gas-tight in a room that houses chlorine or sulfur dioxide to ensure operator safety.

The adopted amendment to §217.278(c)(1) requires ventilation equipment to run continuously in a disinfection chemical storage or feed room to prevent toxic gasses from accumulating and to ensure operator safety. The phrase "one complete" replaces "1.0" in the required ventilation air exchange rate to clarify there should be one complete air exchange every 3.0 minutes. The adopted amendment to §217.278(c)(3) defines minimum standards for the position of exhaust vents and fans in a chlorine room, and provide a figure that illustrates the new minimum standards. The word "vacuum" replaces "negative" for clarity in §217.278(c)(4). The adopted amendment to §217.278(c)(5) enhances safety by providing specific areas where not to locate a chlorine or sulfur dioxide exhaust vent, setting a minimum font size of four inches for language on signs that identify hazardous exhaust from disinfection and dechlorination chemical rooms, and prescribing specific language on warning signs.

The adopted amendment to §217.278(d)(2)(A) clarifies that both respiratory and protective equipment must be immediately accessible at a wastewater treatment facility and requires information regarding the location and use of respiratory and protective equipment be included in the wastewater treatment facility's operation and maintenance manual. Additionally, the adopted amendment to §217.278(d)(2)(A)

clarifies that instructions for using both respiratory and protective equipment must be kept with or posted next to the equipment.

Adopted §217.278(e) incorporates the chlorine and sulfur dioxide separation requirements from the existing §217.275(e) and §217.276(f).

§217.279, Equipment and Material Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems

The updated section heading clarifies that the contents apply to gaseous chlorine disinfection systems. The adopted amendment to §217.279(c) removes the requirement for a chlorine scale to report the amount of chemical used daily, and clarify that a chlorine scale must be capable of weighing every cylinder that is connected to the chlorine delivery system (disconnected cylinders and empty cylinders do not need to be weighed).

The adopted amendment to §217.279(d)(1) changes the structure to clarify that the existing schedule 80 steel pipe equivalent standard applies to pipes, and that the existing 2,000 pound forged steel standard applies to fittings. The adopted amendment to §217.279(d)(7) defines the corrosion resistance and brittle strength as the minimum considerations for comparison with 316 stainless steel to ensure consistent understanding of the phrase "equivalent to 316 stainless steel."

The adopted amendment to §217.279(f)(1) defines the corrosion resistance as a minimum consideration for comparison with 316 stainless steel, to ensure consistent understanding of the phrase "equivalent to 316 stainless steel." The adopted amendment to §217.279(g) prevents ambiguity by clarifying that an owner is exempt from providing calculations to justify chlorine or sulfur dioxide mixing if the diffuser has a mechanical mixer.

§217.280, Design of Sodium Hypochlorite Disinfection and Sodium Bisulfite Dechlorination Systems

In the adopted amendment to §217.280(b)(2)(C), "sodium bisulfite" replaces "chemical" for clarity.

The adopted amendment to §217.280(d)(1)(A) removes the ambiguous term "bulk," to clarify the daily supply is based on the design average daily consumption, and establish that a storage facility with a residual analyzer or oxidation-reduction potential monitor must not be sized to store more than a 30-day supply of sodium hypochlorite (moved from §217.280(d)(1)(B)) and clarifies that the daily supply is based on the design average daily consumption. The adopted amendment to §217.280(d)(1)(C) clarifies that duplicate chemical storage tanks for each chemical are required if the design flow of the wastewater treatment facility is greater than or equal to 1.0 million gpd. The adopted

amendment to §217.280(d)(2)(B) requires that the temperatures used must come from the nearest National Oceanic and Atmospheric Administration weather station that has at least 10 years of temperature records to set a clear and consistent standard for ambient temperature data used for the design of wastewater treatment facility components.

The adopted amendment to §217.280(f)(3)(B) establishes a containment standard for tanks with manifold piping that is designed to prevent a combined release, with the intent that a chemical spill will be completely contained within a secondary containment structure. The adopted amendment to §217.280(f)(3)(C)(ii) clarifies that secondary spill containment structures must be drainable to prevent the tank from floating, based on comments from a stakeholder, who asked the commission to clarify the phrase "positive drainage from below the tank."

§217.281, Application of Chlorination and Dechlorination Chemicals

Previously existing §217.281(a)(1) was moved into the following paragraph and the paragraphs were renumbered. The adopted amendment in the renumbered §217.281(a)(1) deletes the phrase "of an existing facility" for consistency between new and existing facilities. The adopted amendment in the renumbered §217.281(a)(2) allows owners to use a serpentine disinfection channel in place of turbulent initial mixing if the length-to-width ratio is at least 40-to-1 and complete mixing is

demonstrated by a dye test, based on comments from a stakeholder and commission concurrence with those comments. This amendment may allow some owners to save on modeling costs by using a well-established disinfection technology. In the renumbered §217.281(a)(3)(A), "permitted effluent limits" replace "all relevant permit requirements" to more accurately portray the intent of the requirement and the units for the velocity gradient were corrected.

The adopted amendment to §217.281(b)(2) clarifies that chlorine contact basin sizing must be based on peak flow, for consistency with requirements in wastewater permits. Adopted §217.281(b)(3) requires rectangular chlorine contact chambers to have rounded corners to prevent accumulation of chlorine-demanding solids and promote effective disinfection. Adopted §217.281(b)(4) requires certain design features in a facility with more than one chlorine contact basin, so that appropriate sampling points are provided, and contact time and residual chlorine concentration can be verified. Adopted §217.281(b)(5) requires a design analysis that ensures the chlorine feed rate will be capable of offsetting chlorine volatilization for an aerated chlorine contact chamber.

In the adopted amendment to §217.281(c)(1), "dechlorination" replaces "disinfection" because the subsection applies to dechlorination.

§217.282, Other Chemical Disinfection and Dechlorination Processes

Adopted §217.282(b) requires that chemical disinfection processes not discussed in this chapter must be flow-paced and must use chemicals approved by the manufacturer for the purpose of wastewater disinfection. This requirement will prevent the use of chemical disinfectants that are not designed to disinfect wastewater, such as chlorine tablets designed for use in swimming pools, and will ensure that wastewater treatment plant operators are kept safe from chemical vapor and explosion hazards that are associated with certain products not designed to disinfect wastewater.

§217.283, Post-Disinfection Requirements

The adopted amendment to §217.283(a) adds that there must be enough sampling points to allow monitoring of permitted effluent limits to assist operators with compliance monitoring. The existing requirement to identify sampling points in the engineering report was moved within the section to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015 regarding parallel structure. The adopted amendment to §217.283(b) provides additional design flexibility by requiring the facility design to include the ability to add post-aeration if needed to meet wastewater permit effluent limitations for dissolved oxygen. The commission recognizes that a wastewater treatment facility may be able to consistently meet effluent limits for dissolved oxygen in its wastewater permit without post-aeration.

Subchapter L: Ultraviolet Light Disinfection

§217.291, Ultraviolet Light Disinfection System Definitions

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.292, Ultraviolet Light Disinfection Systems Effluent Limitations

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.293, Ultraviolet Light Disinfection Systems Effluent Limitation

The adopted amendment to §217.293(c) includes adding "quartz sleeves" to the replacement equipment that the owner must maintain in inventory to match the existing inventory requirements in §217.298(b). The adopted amendment to §217.293(c) also includes a reference to the minimum inventory requirements in §217.298(b).

§217.294, Ultraviolet Light Disinfection Systems Monitoring and Alarms

The adopted amendment to §217.294(a)(2) changes "a lamp" to "the lamps" to more accurately reflect the industry standard for monitoring the relative intensity in one bank of a disinfection channel. The adopted amendment to §217.294(a)(5) adds "the lamps in" to clarify that it is the number of operating hours of the lamps in each bank that shall be continuously monitored. Adopted §217.294(a)(7) adds a requirement to monitor the transmissivity of UV light in the disinfection channel because effective disinfection is dependent on the transmissivity.

The adopted amendment to §217.294(b) rewrites the sentence to require flow pacing and clarify that UV light banks must be automatically turned on or off in proportion to effluent flow. This measure was added to help insure adequate disinfection regardless of flow and to optimize energy usage.

The adopted amendment to §217.294(c)(1) adds a requirement for the telemetry system to be able to distinguish between major and minor alarms so that the operator will know the difference when notified by the telemetry system. The adopted amendment to §217.294(c)(2)(A)(i) and (B)(i) adds wording to clarify that "relative" is relative to the peak intensity after the 100-hour burn-in of the lamps. Adopted §217.294(c)(2)(B)(v) provides a basis for determining when transmissivity is low by basing it on the manufacturer's recommendations.

§217.295, Ultraviolet Light Disinfection Dosage and System Sizing

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.296, Ultraviolet Light Disinfection Bioassay Test Procedure

The adopted amendment to §217.296(a) deletes the bioassay protocol in paragraph (1) because this protocol is significantly older than the other two and it has not been updated or revised. Subsequent paragraphs (2) and (3) were renumbered. The adopted amendment in renumbered paragraph (1) revises the National Water Research Institute's *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse* from "May 2003" to "3rd edition, 2012." The adopted amendment to §217.296(b)(5) and (6) adds wording to clarify the intent that all test results are to be reported in order for the bioassay to be valid.

§217.297, Ultraviolet Light Disinfection Reactor Design

The adopted amendment to §217.297(d) modifies the wording requiring UV lamps to remain submerged "according to the manufacturer's recommendations" instead of "at a near constant depth," which was ambiguous. The adopted amendment to §217.297(e)

rewrites the subsection to clarify that the intent is not to cover the UV reactor channel, but rather prevent an individual's exposure to UV light from the UV system. Adopted §217.297(f) adds a requirement that an enclosed UV system must have a dehumidifier or be designed to prevent corrosion of electrical components to prevent premature failure of the unit and discharge of non-disinfected effluent.

§217.298, Ultraviolet Light Disinfection System Cleaning and Maintenance

In the adopted amendment to §217.298(a), "an ultraviolet (UV) disinfection system" replaces "a design" for clarity. The adopted amendment to subsection (a) also adds that drainage from a disinfection channel must be routed to another treatment unit within the wastewater treatment facility. The adopted amendment to §217.298(c) clarifies that a UV system must ensure continuous disinfection during maintenance. The commission intends that available spare parts will be used to ensure continuous disinfection.

§217.299, Ultraviolet Light Disinfection System Safety

The adopted amendment to §217.299 adds a requirement to post warning signs, in English and Spanish, in UV reactor areas to improve safety precautions for individuals entering UV areas.

§217.300, Post-Disinfection Requirements

The adopted amendment to §217.300(a) adds that there must be enough sampling points to allow monitoring of permitted effluent limits and clarify that the existing requirement for an operator to monitor the system relates to process control. The existing requirement to identify sampling points in the engineering report was moved within the section to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015 regarding parallel structure.

The adopted amendment to §217.300(b) consolidates the requirements from the existing paragraphs (1) and (2), and provide additional design flexibility by requiring the facility design to include the ability to add post-aeration, if needed, to meet wastewater permit effluent limitations for dissolved oxygen. The commission recognizes that a wastewater treatment facility may be able to consistently meet effluent limits for dissolved oxygen in its wastewater permit without post-aeration.

Subchapter M: Safety

§217.321, Safety Design

Adopted §217.321 changes the title from "Safety Design" to "Safety Design of a Wastewater Treatment Facility" for clarification. The adopted amendment to §217.321 deletes subsection (e) because it is redundant. The adopted amendment to §217.321(a) specifies the 5th edition of the Water Environment Federation Manual of Practice No. 8

as the edition that must be used to design safety aspects of a wastewater treatment facility because it is the most current edition available. The adopted amendment to subsection (a) adds a provision that other safety design guidelines may only be used if submitted in the design submittal and approved in writing by the executive director to ensure that alternate safety guidelines are reasonable.

§217.322, Safety and Security Audits

The adopted amendment to §217.322(a)(1) changes the requirements for an existing wastewater treatment plant owner to conduct a safety audit, regardless of whether the facility has been materially altered or expanded, and clarifies that the safety audit should be conducted annually. The amendment also adopts to include the collection system in the safety audit and to change the evaluation period from the prior three years to just the prior year. Adopted §217.322(a)(1)(A) and (B) adds a definition for "injury" and "incident" as it applies to this subchapter. The adopted amendment to §217.322(a)(2) and (3) adds a requirement for the owner to develop a corrective action plan with a reasonable risk-based schedule for implementing corrective action to address the cause of injuries and incidents, to ensure worker and commission staff safety.

The adopted amendment to §217.322(b)(1) clarifies that the annual security audit is mandatory rather than optional. The adopted amendment to §217.322(b)(2) clarifies

that the security audit requires the use of the *Asset Based Vulnerability Checklist for Wastewater Utilities* instead of allowing it to be optional.

§217.323, Hazardous Operation and Maintenance

The adopted amendment to §217.323(a) changes "analysis of operational and maintenance tasks" to the more commonly used term "job safety analysis" and clarify the "facility" means "wastewater treatment unit or collections system unit."

§217.324, Chemical Handling

To provide additional safety, the adopted amendment to §217.324(a) adds a requirement that the owner make additional protective equipment recommended by the safety data sheets available for all individuals, and not just operating staff.

The adopted amendment to §217.324(b) clarifies that "in all appropriate locations" means "within the chemical work area" to prevent ambiguity and require that the design specifications must reference a recognized national reference standard for the location of eye wash stations and showers to ensure that they are installed according to accepted industry standards. The adopted amendment to §217.324(c) replaces "stored near but outside" with "immediately accessible outside" to prevent ambiguity and to allow personal protective equipment to be stored elsewhere as long as it is transported to the

work area and immediately available for use. These changes are expected to increase operator safety by reducing the potential for theft of personal protective equipment.

§217.325, Railings, Ladders, Walkways, and Stairways

The adopted amendment to §217.325(a) adds that a guard rail with an opening designed to provide access must have a removable chain across the opening when it is not in use. The new language clarifies that a chain should be across the opening whenever the opening is not in use. The purpose of the chain is to ensure safety of individuals by preventing a fall through a guard rail opening.

The adopted amendment to §217.325(b) sets a minimum railing height of 4.0 feet above ground level and for an open valve box, pit, tank, or basin that is recessed into the ground with walls that extend less than 4.0 feet above ground level to ensure safety.

The adopted amendment to §217.325(c) rewords the subsection to clarify that a ladder cannot be used to access equipment or work areas that are more than 4.0 feet above or below ground level. Additional wording was added requiring a stairway for access for equipment and work areas that are more than 4.0 feet above or below ground level to improve worker and commission staff safety, unless the work area is a manhole or similar confined space.

The adopted amendment to §217.325(d) sets a minimum standard of 4.0 feet above ground level for railings on open valve boxes, pits, tanks, and basins to prevent ambiguity in the phrase "capable of preventing a person from falling into it."
The adopted amendment to §217.325(e) changes the term "raised edge" to "toe board at least four inches tall" for clarification and consistency with the Occupational Safety and Health Administration's standards.

The adopted amendment to §217.325(f) specifies that the vertical rise between adjacent steps on a stairway must not exceed 9.5 inches and stairways must be designed with no horizontal gap between the tread run of adjacent steps, to be consistent with the Occupational Safety and Health Administration's standards.

The adopted amendment to §217.325(g) adds that all overhead obstructions must meet the same 7.0-foot clearance requirement as overhead pipe.

Adopted §217.325(h) adds a requirement that basins with vertical walls terminating more than 4.0 feet above or below ground level must be designed with a stairway, to ensure safety and consistency.

Adopted §217.325(i) adds a requirement that guard rails on walkways must have adequate clearance space for maintenance operations to ensure safer working conditions for wastewater treatment facility staff and TCEQ inspectors.

Adopted §217.325(j) requires a grating across the discharge pipe in the launder or stop bars across the launder before the discharge pipe, to prevent an individual from being swept into the discharge pipe from the clarifier.

Adopted §217.325(k) requires all guard rails, railings, ladders, walkways, and associated appurtenances to be designed and constructed to ensure the safety of individuals at the wastewater treatment facility.

§217.326, Electrical and Fire Code Compliance

Adopted §217.326(c) adds a requirement that electrical elements must be protected from environmental hazards with a housing, and lists specific environmental conditions (moisture, extreme temperatures, and pests) that are included within the term environmental hazard. The provision ensures that controls and electrical components are reasonably protected from corrosive and destructive forces and ensures safer working conditions for operators.

§217.327, Non-Potable Water

The adopted amendment to §217.327 adds a requirement to include signs in both English and Spanish, and the Spanish translation was revised for consistency with rules in Chapter 210.

§217.328, Facility Access Control

The adopted amendment to the section heading for §217.328 changes it from "Facility Access Control" to "Wastewater Treatment Facility Access Control" for consistent use of terms. The adopted amendment to §217.328(a) clarifies that the required fence around a wastewater treatment facility must be intruder-resistant. Adopted §217.238(a)(1) requires the fence to have a locked gate at each access point. Adopted §217.238(a)(2) requires that the intruder-resistant fence be at least 6.0 feet tall and the bottom of the fence close enough to the surface grade to prevent human access. Adopted §217.238(a)(3) defines what materials should be used when constructing an intruder-resistant fence and allows other materials if approved in writing by the executive director. Adopted §217.238(a)(4) adds a requirement that the top of the intruder-resistant fence must have at least three strands of barbed wire, the top of the fence may instead have outwardly-directed iron bars spaced on four-inch centers instead of barbed wire. Adopted §217.238(a)(5) allows a five-strand barbed wire fence in a rural area for fencing lagoons or overland-flow plots if approved in writing by the executive director.

The adopted amendment to §217.328(b) requires the posting of wastewater treatment facility hazard signs whether a facility has an open tank or not. It also specifies posting outward-facing signs that read "DANGER - NO TRESPASSING" in both English and Spanish on each side of the fence and on the gate.

The previously existing §217.328(c) and (c)(1) were revised and moved to §217.328(a) to improve organizational structure. The adopted amendment to §217.328(d) re-letters it to §217.328(c) and clarify that a wastewater treatment facility must also be accessible by truck during all weather conditions, including a 25-year, 24-hour rainfall event, to ensure that a wastewater treatment facility is reasonably accessible during inclement weather for the purpose of protecting human health and the environment from improperly treated wastewater discharges.

§217.329, Color Coding of Pipes

The adopted amendment to §217.329(b) changes the term "tracer tape" to "detectable underground warning tape" for clarity. The adopted amendment to §217.329(d) changes the stenciled wording on a non-potable water pipe to read "NON-POTABLE WATER, DO NOT DRINK" and adds the Spanish translation "NO BEBA EL AGUA" for rule consistency.

§217.330, Drinking Water Supply Connections

The adopted heading for §217.328 deletes the word "public" to clarify that the rule applies to connections with any drinking water supply. The adopted amendment to §217.330(a) deletes the word "public" to clarify that the rule applies to connections with any drinking water supply and collection systems were added to ensure public safety.

The adopted amendment to §217.330(b) adds additional wording to clarify that each reduced-pressure backflow assembly has to pass an annual test by a commission-licensed backflow prevention assembly tester, and that a reduced-pressure backflow assembly that fails a test must be repaired or replaced and then retested. Adopted §217.330(d) requires vacuum breakers on all potable water spigots as added measure to protect a drinking water supply system.

§217.331, Freeze Protection

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.332, Noise Levels

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

§217.333, Confined Spaces

To conform with commission and Texas Register formatting requirements, non-substantive revisions are made throughout the section to correct citations, acronym usage, and other minor issues. The commission also adopts the amendment to conform to the drafting rules in the *Texas Legislative Council Drafting Manual,* January 2015.

Final Regulatory Impact Analysis Determination

The commission reviewed the adopted rulemaking in light of the regulatory analysis requirements of Texas Government Code, §2001.0225, and determined that the rulemaking action is not subject to Texas Government Code, §2001.0225 because it does not meet the definition of a "major environmental rule" as defined in that statute. "Major environmental rule" is defined as a rule, the specific intent of which, is 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 adversely affect, in a material way, the economy, a section of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state.

The adopted rules will add definitions and clarify existing definitions; add design criteria and approval requirements for rehabilitation of existing infrastructure; add design criteria for new technologies, including cloth filters and air lift pumps; update existing requirements or include new requirements to reflect modern practices, standards and trends; and to modify rule language to enhance understanding and clarity. The adopted amendments to Chapter 217 do not meet the definition of "major environmental rule" because they are not specifically intended to protect the environment or reduce risks to human health from environmental exposure. Therefore, the commission finds that this rulemaking is not a "major environmental rule."

Furthermore, the rulemaking does not meet any of the four applicability requirements listed in Texas Government Code, §2001.0225(a). Texas Government Code, §2001.0225 only applies to a state agency's adoption of a major environmental rule that: 1) exceeds a standard set by federal law, unless the rule is specifically required by state law; 2) exceeds an express requirement of state law, unless the rule is specifically required by federal law; 3) exceeds 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; or 4) adopts a rule solely under the general powers of the agency instead of under a specific state law.

Specifically, the adopted rules do not exceed federal standards because no applicable federal standards exist. Also, the adopted rules do not exceed an express requirement of state law nor exceed a requirement of a delegation agreement. Finally, the adopted rules were not developed solely under the general powers of the agency; but also under the specific authority of Texas Water Code, §26.034. Under Texas Government Code, §2001.0225, only a major environmental rule requires a regulatory impact analysis. Because the adopted rules do not constitute a major environmental rule, a regulatory impact analysis is not required.

The commission invited public comment regarding the Draft Regulatory Impact Analysis Determination during the public comment period. No comments were received on the Draft Regulatory Impact Analysis Determination.

Takings Impact Assessment

The commission performed an assessment of these rules in accordance with Texas Government Code, §2007.043. The specific purpose of the rulemaking is to add definitions and clarify existing definitions; add design criteria and approval requirements for rehabilitation of existing infrastructure; add design criteria for

technologies, including cloth filters and air lift pumps; update existing requirements or include new requirements to reflect modern practices, standards and trends; and to modify rule language to enhance understanding and clarity. Promulgation and enforcement of these rules will constitute neither a statutory nor a constitutional taking of private real property. This rulemaking will impose no burdens on private real property because the adopted rules neither relates to, nor has any impact on the use or enjoyment of private real property, and there is no reduction in value of the property as a result of this rulemaking.

The commission invited public comment regarding the Takings Impact Assessment during the public comment period. No comments were received on the Takings Impact Assessment.

Consistency with the Coastal Management Program

The commission reviewed the adopted rulemaking and found that it is subject to the Texas Coastal Management Program (CMP) in accordance with the Coastal Coordination Act, Texas Natural Resources Code, §§33.201 *et. seq.*, and therefore, it must be consistent with all applicable CMP goals and policies. The commission conducted a consistency determination for the adopted rules in accordance with Coastal

Coordination Act Implementation Rules at 31 TAC §505.22 and found the adopted rulemaking is consistent with the applicable CMP goals and policies.

CMP goals applicable to the adopted rules include: to protect, preserve, restore, and enhance the diversity, quality, quantity, functions, and values of coastal natural resource areas and to ensure sound management of all coastal resources by allowing for compatible economic development and multiple human uses of the coastal zone. Promulgation and enforcement of these rules will not violate or exceed any standards identified in the applicable CMP goals and policies because the adopted rules are consistent with these CMP goals and policies, and because the adopted rules do not create or have a direct or significant adverse effect on any coastal natural resource areas.

The commission invited public comment regarding the consistency of the proposed rules with the CMP during the public comment period. No comments were received on the consistency of the proposed rules with the CMP.

Public Comment

The commission held a public hearing on June 23, 2015. The comment period closed on June 29, 2015. The commission received comments from Binkley and Barfield, Inc.; Harris County, Texas (Harris Co.); Hartwell Environmental Corporation on behalf of Aqua-Aerobic Systems, Inc. (Aqua-Aerobic); Jones and Carter, Inc. (Jones and Carter);

Process Engineered Equipment Company (PEECO); River City Engineering; Texas Association of Clean Water Agencies (TACWA); and Water Environment Association of Texas (WEAT).

Response to Comments

Preamble

Comment

Harris Co. requested that the original effective date of Chapter 317 be identified in Figure: 30 TAC Chapter 217--Preamble.

Response

The commission agrees that adding the effective date of Chapter 317 would provide additional clarity. The table was revised to reflect the effective date of Chapter 317. Chapter 317 was adopted to be effective April 16, 1990 with amendments effective October 3, 1991; March 23, 1994; January 1, 1996; March 3, 1997; and January 6, 2005.

Comment

Harris Co. commented that all plants should be grandfathered to the set of adopted rules that were in effect at the time of their most recent plan approval. The current table only grandfathers those plants constructed under current Chapter 217 rules and those

approved under the last revised version of Chapter 317 rules. To assist all involved, TCEQ should post online or make otherwise accessible all historical updates to the Chapter 217/317 rules and amendments, including the adoption dates of each version.

Response

The commission agrees that all wastewater treatment plants and collection systems should be regulated by the set of adopted rules that were in effect at the time of their plan approval. However, a new project at an existing facility must meet the current design criteria, regardless of the rules in effect at the time of the most recent plan approval for the facility. The concurrent rulemaking to re-adopt Chapter 317 will not only re-adopt the last revision of that chapter, but also all previous versions of that chapter through the savings clauses in place during its amendments.

The commission only provides the current version of rules online. This eliminates confusion as to which version is the most current. Official copies of TCEQ Rules, including previous versions of rules, are available from the Office of the Secretary of State by e-mail at *register@sos.texas.gov*, or by phone at (512) 463-5561. No change was made in response to this comment.

Subchapter A

Comment

WEAT and TACWA commented that §217.1(b) includes language that seeks to address existing facilities that do not have a Texas Pollutant Discharge Elimination System permit or Texas Land Application Permit, and imposes the amended rules on those facilities for compliance. While the intent of this is understood, it is not uncommon for permittees to not meet the statutory and regulatory deadlines for filing a permit renewal. These permittees already have to apply for a new permit, and saddling them with the burden of upgrading technology to comply with Chapter 217 could be excessive. WEAT and TACWA recommend some grace period be given for permittees that experience a lapse in permit coverage.

Response

Although the commission recognizes the significant cost of upgrading a wastewater treatment facility or collection system, the commission respectfully disagrees that a grace period be given to permittees that allow their permit to expire. Providing a grace period simply moves the date of compliance and it is expected that some permittees will exceed the grace period. The adopted rule allows a permittee to request variances to the requirements in Chapter 217. This variance process can be used by permittees that let their permit expire to avoid unnecessary costly upgrades. No change was made in response to this comment.

Comment

WEAT and TACWA commented that §217.2(5) includes language addressing what it means to alter a technology. They encourage the commission to consider some percentage adjustment and clarity. For example, there is no percentage of capacity adjustment that triggers this definition, so any minor alteration could be considered. Likewise, this would apply to the configuration. These concerns come into play when addressing what constitutes "maintenance" pursuant to §217.2(43).

Response

An alteration requires the owner to submit a summary transmittal letter to TCEQ. Following review of the summary transmittal letter, TCEQ will determine if a full review of the plans and specifications is needed. The commission respectfully disagrees that an arbitrary percent change is adequate to determine the impact of an alteration. Some alterations may be a small percentage of equipment being replaced, but the impact of the replacement could result in an inability to meet permitted effluent limits or other design requirements in these rules. Additionally, the cumulative effects of several small percentage changes could result in an inability to meet permitted effluent limits. The commenter also requested clarification of the terms "intended function" and "major design assumption." For

example, converting a chlorine contact basin into a tertiary filtration basin would be a change in the intended function. Changing the design operating temperature range for a process beyond what was considered in the original design is an example of a change in a major design assumption. No change was made in response to this comment.

Comment

Jones and Carter requested that the definition of "alteration" be modified to clarify "any alteration" is limited to the equipment or process basin being altered. Replacement of equipment or repair of a process basin should not necessitate upgrading the entire facility and all process basins and equipment. This is not practical or possible in many cases at existing facilities.

Response

The commission respectfully disagrees that it is necessary to modify the definition of "alteration." The definition of "alteration," as currently worded, does not require an entire facility or all process basins and equipment to be upgraded if they are outside the scope of the project being considered. The definitions of "appurtenance," "collection system unit," "project," and "treatment unit" already provide the requested clarification as they are currently worded.

The term "alteration" is important for determining which projects require a summary transmittal letter for the engineering design and will possibly be subject to further review of the project plans and specifications. The following examples illustrate the concept. For example, if an entire lift station is removed and replaced: 1) this action would be an alteration because a lift station meets the definition of "collection system unit," 2) a summary transmittal letter is required, and 3) the entire lift station must meet the current design criteria.

If a pump at a lift station is replaced with a pump that has a different flow rate or pressure head characteristics: 1) this action meets the definition of "alteration," 2) a summary transmittal letter is required, 3) the pump and any pump appurtenances must comply with the current rules, and 4) the remainder of the lift station must comply with the rules in effect when the lift station was approved. An owner may choose to upgrade additional portions of the lift station to meet the current rules, but there is no duty to do so unless it is found to be necessary during the commission's review of the project plans and specifications.

If a pump in a lift station is replaced by a pump with the same flow rate and pressure head characteristics: 1) this action would meet the definition of "maintenance," 2) no summary transmittal letter is required, 3) the pump and any appurtenances must comply with the rules in effect when the lift station was approved, and 4) the remainder of the lift station must comply with the rules in effect when the lift station was approved. However, if the replacement pump has a different flow rate, this action would meet the definition of "alteration" and the new pump would be required to comply with the requirements of the adopted rule. In neither case would the adopted rule require upgrading the entire lift station. An owner may choose to upgrade additional portions of the lift station to meet the current rules. No change was made in response to this comment.

Comment

Harris Co. requested that TCEQ add a definition for "commercial wastewater."

Response

The commission respectfully disagrees that a definition for "commercial wastewater" is needed. The term "wastewater" is defined in the adopted rule and the adjective "commercial," as used throughout the adopted rules,

is defined as the term is commonly understood. No change was made in response to this comment.

Comment

Harris Co. requested that TCEQ add a definition of "debris" to include wipes, rags, cleaning cloths, other similar products, and other pollutants not normally found in domestic wastewater.

Response

The commission respectfully disagrees that a definition for "debris" is needed. The term "debris," as used in the adopted rules, is defined as the term is commonly understood. No change was made in response to this comment.

Comment

WEAT and TACWA recommended that the definition of "domestic wastewater" be revised as follows: "Domestic wastewater may contain commercial or industrial wastewater contributions, in so much as the commercial or industrial wastewater is amenable to biological treatment at the receiving facility."

Response

The commission respectfully disagrees that the suggested change in the definition of "domestic wastewater" is needed. TCEQ permitting staff will determine whether a facility would be more appropriately regulated under an industrial or a domestic wastewater permit. An industrial permit may be required if the characteristics of the wastewater require treatment or effluent limits uncommon to domestic permits. The definition in the adopted rule is broad enough to capture all reasonably foreseeable circumstances that should be regulated by these rules. No change was made in response to this comment.

Comment

Harris Co. requested that TCEQ add a definition of "domestic wastewater treatment facility" which should include publicly and privately-owned treatment facilities.

Response

The commission respectfully disagrees that a definition for "domestic wastewater treatment facility" is needed. The adopted rule defines "domestic wastewater" and "wastewater treatment facility." The applicability section clearly states that this chapter applies to domestic wastewater treatment facilities. No distinction is made between publicly

and privately owned facilities in these definitions, so the chapter clearly applies to both. No change was made in response to this comment.

Comment

Harris Co. requested that TCEQ add a definition for "industrial wastewater."

Response

The commission respectfully disagrees that a definition for "industrial wastewater" is needed. The term "wastewater" is defined in the adopted rule and the adjective "industrial," as used throughout the adopted rules, is defined as the term is commonly understood. No change was made in response to this comment.

Comment

Harris Co. requested that TCEQ add a definition for "municipality."

Response

The commission respectfully disagrees that a definition for "municipality" is needed. The term "municipality," as used in the adopted rules, is defined as the term is commonly understood. No change was made in response to this comment.

Comment

WEAT and TACWA commented that the definition for "rehabilitate" only applies to collection systems. Other technologies can be rehabilitated as well.

Response

At this time, the commission finds that it is necessary to define "rehabilitate" only in the context of collection systems to make it clear when an owner has a duty to submit a summary transmittal letter for the engineering design. Coating a collection system unit may reduce the diameter of the unit which can impact its carrying capacity. This type of change triggers a duty to submit a summary transmittal letter for the engineering design so that TCEQ has an opportunity to review the plans and specifications.

Although treatment units within a wastewater treatment plant can be coated for a variety of reasons, coating these structures does not impact the ability of the unit to function properly. This activity would meet the definition of maintenance which does not trigger a plans and specifications review by TCEQ or a duty to submit a summary transmittal letter. No change was made in response to this comment.

Comment

WEAT and TACWA requested that TCEQ add a definition for "repair." Given the potential for a disagreement between the commission and the regulated interests on what actions constituted an alteration, we would strongly recommend some clarity be given to defining repair activities pursuant to the rules. Most of the daily activities of operating a utility involve repair work and should not be governed by these rules.

Response

The commission respectfully disagrees that a definition for "repair" is needed. The adopted rule defines "maintenance," "rehabilitate," and "alteration." A repair can fit within maintenance, rehabilitation, or alteration depending on the facts of the repair. The existing definitions provide the necessary clarity based on the types of changes occurring during the repair.

The term "alteration" identifies specific changes to a treatment unit or collection system unit. Alterations require an owner to submit a summary transmittal letter to TCEQ. The term "rehabilitate" is specific to collection system repairs using trenchless technologies for lining pipes or using any other lining or coating method. Rehabilitations require an owner to submit

a summary transmittal letter to TCEQ. The term "maintenance" includes preventative care; repairs to existing appurtenances, treatment units, or collection system units without replacement; and replacement of appurtenances or components of treatment units or collection system units that do not meet the definition of alteration. Maintenance does not require an owner to submit a summary transmittal letter to TCEQ. No change was made in response to this comment.

Comment

Regarding the definition of "treatment unit," Harris Co. asked how a lift station is a treatment unit.

Response

The adopted rule defines "collection system unit" and "treatment unit." Both definitions include lift stations. In the context of the adopted rule, the location of the lift station determines whether it is a collection system unit or a treatment unit. Lift stations located at the wastewater treatment facility must be treatment units subject to the 30 TAC Chapter 309 buffer zone requirements for nuisance odors. No change was made in response to this comment.

Comment

WEAT and TACWA commented that §217.16 should not require operation and maintenance manuals to include staff names for contacts, but only titles instead. Names of staff may change frequently.

Response

The commission agrees that staff names may change frequently and that the contact's job title is sufficient. In response to this comment, §217.16(b)(1)(D) was revised to include "or job titles."

Comment

Harris Co. requested that §217.11(d) be revised as follows: "A person is prohibited from allowing a bypass discharge of untreated or partially treated wastewater during construction without a commission order for such discharge, such as an Emergency Order or a Temporary Order according to the requirements of chapter 35 of this title (relating to Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions), and without notification to the local pollution control authority, prior to the discharge."

Response

The commission respectfully disagrees that the local pollution control authority must be notified prior to discharging. The adopted rule requires a person to obtain an emergency or temporary order from TCEQ prior to initiating bypass discharges during construction. However, the local pollution control authority may request to be placed on mailing lists maintained by TCEQ's Office of the Chief Clerk for emergency and temporary orders issued by TCEQ. No change was made in response to this comment.

Comment

WEAT and TACWA commented that §217.13(c)(1)(A) should not apply to trenchless technologies.

Response

The commission respectfully disagrees that trenchless technologies should be exempt from final construction drawings. Final construction drawings provide the final locations of system components. No change was made in response to this comment.

Comment

Harris Co. recommended that §217.14(a)(3) be revised to allow the operation and

maintenance manual to be located at the wastewater treatment facility or at a reasonably accessible location if document storage facilities are not available at the wastewater treatment facility.

Response

The commission respectfully disagrees that the operation and maintenance manual can be located offsite. This manual provides essential information, including emergency operation procedures, shut down procedures, emergency contacts, the location and method of use for personal protective equipment, and evacuation and shelter-in-place plans. During emergency situations, it may not be feasible to obtain the operation and maintenance manual from an offsite location in a timely manner. No change was made in response to this comment.

Subchapter B

Comment

PEECO recommended that TCEQ use a design peak flow factor of 4Qa (four times the average design flow) to determine design peak flow.

Response

The commission acknowledges this comment and notes that §217.32(a)(2)

already requires that the wastewater treatment plant peak flow design be based on a factor of four times the design flow. No change was made in response to this comment.

Comment

Harris Co. recommended revising §217.33(c)(4)(A) to require a non-resettable totalizing meter.

Response

The commission agrees with the comment and a new definition for "totalizing meter" was added as §217.2(73) and subsequent definitions were renumbered.

Comment

Harris Co. recommended revising §217.35(c) to require the design of a proposed treatment unit within a 100-year flood plain to provide flood protection to an elevation 18-inches above the effective 100-year flood plain elevation for all open process tanks and electric units.

Response

The commission respectfully disagrees that open tanks and electric units must be protected to an elevation 18 inches above the 100-year flood plain. The adopted rule requires the design to provide protection from inundation during a 100-year flood event, which the commission finds to be a reasonable minimum standard. Additionally, the commenter did not provide rationale for the recommended 18 inches. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ either revise §217.36(i) to remove portable generators as an allowable alternate power source at wastewater treatment plants or revise §217.36(i)(3) to state that if a portable generator is used, then it must be sized to run the entire wastewater treatment plant, be stored on-site, and used to run the wastewater treatment plant during the entire power outage without interruption. Jones and Carter commented that unless power is provided continuously at the wastewater treatment facility, then there is no way to prevent partially treated wastewater from passing through the plant, which violates §217.36(h). Portable generators cannot be utilized in conjunction with any other facility and still provide full treatment.

Response

The commission respectfully disagrees with this comment, but recognizes that engineers must use sound engineering judgment when selecting and designing systems to prevent unauthorized discharge during power outages. Section 217.36(h) provides the requirement to have either permanent or temporary emergency power equipment to prevent untreated or partially treated wastewater. Section 217.36(h) also requires that temporary power systems be capable of being made operational before an unauthorized discharge occurs during any power outage. Wastewater that is treated to the level required by the wastewater permit is considered to be treated wastewater. Section 217.36(i) provides a list of options, including various types of equipment and operational processes, that can be used to meet the requirement in §217.36(h). The following example illustrates how an off-site portable generator can be used in combination with other systems to comply with §217.36(h). In this example, a city owns a wastewater treatment facility and determines that emergency power may be needed for a minimum of six hours. The owner only has four hours of guaranteed collection system storage and onsite retention at the wastewater treatment facility. However, enough portable generators to run the wastewater treatment facility can reliably be delivered from a city warehouse and made operational in less than two hours. Then, the city may use portable generators to comply with §217.36(h).

Section 217.36(i)(3) and (j)(4) provide additional restrictions on the use of portable generators and additional information that must be included in the engineering report if portable generators are used to guarantee service during a power outage. The commission recognizes that clarification is necessary in §217.36(j)(1) and (2) and §217.37(a) because of the issues raised in this comment. The language in those sections was revised to clarify that primary treatment and disinfection are required during all power outages, including outages that are longer than the outage predicted based on the power reliability determination required in §217.36(e).

Comment

Jones and Carter recommended that TCEQ revise §217.36(i)(3)(A) to replace "automatic" with "manual," noting that a manual transfer switch is required with a portable generator. A portable generator will not remain hooked up and the switch must be manual to allow the operator the ability to hook up a portable generator and then switch power over safely.

Response

The commission respectfully disagrees that a transfer switch should be manual. The purpose of an automatic transfer switch is to change the power

source from grid power to generator power. It is not to activate (turn on) the generator. This switch prevents sending generator power to the grid. The switch is not located on the generator. It is part of the wastewater treatment facility's electrical system. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ either delete §217.36(j)(3), which requires return activated sludge pumps to be operational during any power outage lasting longer than four hours, or revise §217.36(j)(3) to require return activated sludge pumps to be operational at any point during a power outage. Jones and Carter commented that the proposed requirement conflicts with §217.36(h), which prohibits the discharge of partially treated wastewater.

Response

The commission agrees with this comment and revised §217.36(j)(3) to remove the language "lasting longer than four hours." This change will help ensure that a facility will be able to meet permitted effluent limits during a reasonably foreseeable power outage.

Subchapter C

Comment

WEAT and TACWA questioned why §217.53(d)(4) requires a collection system pipe that is above and runs parallel to a water supply pipe to be encased. WEAT and TACWA commented that this should pertain to §217.53(d)(5) "when a collection system pipe crosses above a water supply pipe," not parallel and requested that TCEQ switch the language of §217.53(d)(4) with §217.53(d)(5).

Response

The commission respectfully disagrees with this comment. Because the collection system pipe is running parallel to the water supply pipe, there is an increased risk of cross-contamination along the length of the pipe. Therefore, a collection system pipe located above and running parallel to a water supply pipe must be encased to provide cross-contamination protection for the water supply pipe. However, an owner can request a variance for an alternative design that provides equivalent cross-contamination protection. The variance process provides the executive director an opportunity to review the request to determine if the design is protective of the water supply pipe. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ revise §217.53(h) and §217.59(d) by adding "Should odor become a nuisance," to the beginning of these subsections. Jones and Carter commented that a design should consider odor concerns and include anticipated mitigation needs, but in many instances, odor is not anticipated and the ability to react to the nuisance should be allowed in lieu of the uneconomical preemptive approach that will install many unneeded odor control systems.

Response

The commission partially agrees with this comment. The rule requires the owner to implement odor control measures to prevent nuisance conditions from occurring. It does not require the owner to implement odor control measures to prevent all odors. The commission expects prompt action will be taken to mitigate emergent nuisance conditions. No change was made in response to this comment.

Comment

Harris Co. recommended that TCEQ revise §217.55(i) as follows: "A manhole must not be located in an area that prevents access to the manhole. If the manhole is located in a stream bed or other area in which inundation may occur, provisions to prevent the entry of inflow into the system are constructed."

Response

The commission respectfully disagrees with the recommended change that would allow manholes in a stream bed; however, an owner can request a variance to install a manhole in a stream bed. The variance process provides the executive director an opportunity to review the request to determine if additional requirements are necessary. The accessibility requirement in §217.55(i) refers to access to a manhole during high water or flooding conditions. Section 217.55(j) provides requirements for personnel and equipment access to a manhole. No change was made in response to this comment.

Comment

WEAT and TACWA recommended that TCEQ revise §217.56(c) to remove cement mortar lining as a trenchless technology to rehabilitate existing collection system pipes. Cement mortar lining should not be used in wastewater applications due to the potential for corrosion with the application of any cement based product.

Response

The commission agrees with this comment and revised §217.56(c) to remove cement mortar lining as a trenchless technology to rehabilitate existing collection system pipes.

Comment

Harris Co. recommended that TCEQ revise §217.60(a)(5) to require motor control centers to be mounted at least 6.0 inches above grade and be protected from the entrance of corrosive gases from wet well or piping.

Response

The commission partially agrees with this comment. The commenter did not provide justification for raising the height from 4.0 inches to 6.0 inches. However, 4.0 inches is required as a minimum distance, but may not be sufficient to prevent water intrusion. Adding a requirement to prevent the entrance of corrosive gasses into the motor control center protects human safety and prevents equipment failures. In response to this comment, the commission revised §217.60(a)(5) to read:

"(5) Motor control centers must be mounted high enough above grade, but in no case less than 4.0 inches above grade, to prevent water intrusion and corrosion from standing water in the enclosure. Motor control centers must also be protected from the entrance of corrosive gases from wet wells or piping."

Comment

Harris Co. recommended that TCEQ revise §217.60(b)(4) to require a gravity pipe discharging to a wet well to be located so that the invert elevation is at least 6 inches above the liquid level of the lead pump's "on" setting.

Response

The commission respectfully disagrees that the change recommended in this comment is necessary. The design of each wet well and the height of the invert elevation above the pumps "on" setting need to be established as part of the engineer's design, based on physical characteristics of the wet well, such as elevations of other incoming pipes and the potential for nuisance odors. No change was made in response to this comment.

Comment

Harris Co. recommended that TCEQ revise §217.60(b)(6) to add a requirement that valve vaults must be designed for continuous occupancy.

Response

The commission partially agrees with this comment and revised §217.60(b)(6) to add that valve vaults shall be ventilated according to §217.60(d).

Comment

Harris Co. recommended that TCEQ add a new §217.60(b)(9) to address disposable cleaning products and rag build up.

Response

While the commission recognizes that disposable wipes and rag buildup pose a problem in collection systems, the commission is not aware of appropriate and effective minimum design criteria to prevent or remove blockages. No change was made in response to this comment.

Comment

Harris Co. recommended that TCEQ revise §217.60(c)(1) to require an underground dry well to be accessible for maintenance and designed for continuous occupancy.

Response

The commission partially agrees with this comment and revised §217.60(c)(1) to add that an underground dry well shall be ventilated according to §217.60(d).

Comment

Jones and Carter recommended that TCEQ revise §217.60(d)(2)(B)(iii) to add "Should odor become a nuisance," to the beginning of this requirement. Jones and Carter commented that a design should consider odor concerns and include anticipated mitigation needs, but in many instances, odor is not anticipated and the ability to react to the nuisance should be allowed in lieu of the uneconomical pre-emptive approach that will install many unneeded odor control systems.

Response

The commission partially agrees with this comment. The rule requires the owner to implement odor control measures to prevent nuisance conditions from occurring. It does not require the owner to implement odor control measures to prevent all odors. The commission expects prompt action will be taken to mitigate emergent nuisance conditions. No change was made in response to this comment.

Comment

WEAT and TACWA commented that §217.69(a)(4) includes a requirement to evaluate the structural integrity of each collection system unit material. Estimating the wall thickness for all corrodible pipes can only be performed through either excavation and coring or more generally estimated through the application of sonar/laser internal pipe inspection technologies. This is a very expensive undertaking for most utilities and a

specialized service offering from a limited number of pipe inspection companies. Determining the thickness of a manhole wall and any associated coatings is readily performed from wall coring and repair.

Response

The commission agrees that estimates of wall thickness and coating integrity are not required by the rule. Additionally, the commission revised §217.69(a)(4) to remove the following language: "including the thickness of the walls for all corrodible pipes, and the integrity of any coatings."

Comment

WEAT and TACWA recommended that TCEQ revise §217.69(b) as follows:

"(b) The plans and specifications for a rehabilitation project must include, at a minimum:

(1) a pre-rehabilitation preparation plan that includes:

(A) a cleaning plan to facilitate the rehabilitation process being applied;

(B) references for the cleaning method to be applied;

(C) dewatering or bypassing provisions, as required by the method; and

(D) field installation and rehabilitation process logs.

(2) a confined space entry plan, as required for the rehabilitation process being applied;..."

WEAT and TACWA commented that the current wording only applies to manhole coating applications and the wording above should apply to pipe, manhole, and lateral rehabilitation.

Response

The commission respectfully disagrees with this comment. Nothing in §217.69(b) or the definitions of "rehabilitate" or "project" limits the applicability of a rehabilitation project to manholes. Section 217.69(b), as written, applies to pipes, manholes, lateral rehabilitation, and any other collection system unit that is rehabilitated. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ revise §217.70(f)(1) to remove the prohibition and add language allowing an above-ground hose bib so long as it is secured within a lockable enclosure. Jones and Carter commented that an aboveground lockable enclosure is as safe as below ground lockable enclosure.

Response

The commission agrees with this comment and revised §217.70(f)(1) to add the following language: "a lockable, secured area that is only accessible to authorized personnel."

Subchapter D

Comment

WEAT and TACWA commented that §217.96(c)(4) and (5) address minimum pipe sizes. Language should be added to state that these are the minimum sizes unless the system cannot ensure that the velocity requirements of §217.96(f)(2) will be met.

Response

The commission assumes that this comment is referring to §217.97(c)(4) and (5) and is responding accordingly. The commission agrees that the sizes in §217.97(c)(4) and (5) are minimum pipe sizes. However, the commission respectfully disagrees that the minimum sizes are based on ensuring

velocity. The minimum pipe size ensures that the pipe can pass debris and solids that make it through the pumps. No change was made in response to this comment.

Comment

WEAT and TACWA commented that §217.96(f)(1) added language requiring system pressure maintained in every part of the system. They commented that this requirement is overly burdensome and will increase the cost of pressure systems, and can lead to subsequent disputes over compliance based on actual hydraulic conditions and requested that TCEQ delete the proposed additional language.

Response

The commission assumes that the commenter is referring to §217.97(f)(1) and is responding accordingly. The adopted rule does not require the owner to maintain pressure in the pressure sewer, but does require the owner to design the system to reach a velocity of three feet per second at least once per day. No new requirements were proposed in §217.97(f)(1). No change was made in response to this comment.

Subchapter E

Comment

Jones and Carter recommended that TCEQ revise §217.120(a) to provide design criteria for FOG removal that clarifies the level and type of treatment required.

Response

The commission respectfully disagrees with this comment and has elected not to establish prescriptive criteria for FOG removal at this time. The design engineer must determine the level and type of FOG treatment depending on the amount of FOG in the influent, whether or not FOG has caused operational failures in the past, and whether or not the facility is meeting the effluent limits in its wastewater permit. If additional FOG treatment is needed, §217.120(a) ensures that the wastewater treatment facility was designed with the ability to add provisions to remove FOG. The commission's interest in owners addressing operational issues caused by FOG is addressed by §217.120(b).

Comment

WEAT and TACWA commented that §217.120(a) requires wastewater treatment facilities to be designed with the ability to add provisions for removing FOG from the wastewater. They commented that the previous version of Chapter 217 required FOG removal only prior to fine screen facilities which is still appropriate. Since FOG affects the collection system and is a major focus of TCEQ's Sanitary Sewer Overflow Initiative,

they recommend that FOG control remain in pretreatment provisions.

WEAT and TACWA recommend that TCEQ delete this provision because the new §217.120(b) is adequate to require FOG removal.

Response

The commission respectfully disagrees with this comment, and finds that FOG not only affects collection systems and fine screens, but also the performance of other treatment units and pumps at a wastewater treatment facility. Section 217.120(a) requires the facility to be designed so that an owner has the ability to add FOG treatment in the future. Section 217.120(b) requires the addition of FOG removal if FOG has caused operational failures in a treatment unit that is being altered. Without the design requirement in §217.120(a), the owner may not have the ability to add FOG removal to comply with §217.120(b). No change was made in response to this comment.

Comment

WEAT and TACWA recommended that TCEQ revise §217.121(e)(5) as follows:

"Mechanically cleaned coarse screens must be designed with equipment that automatically collects and disposes of screenings for a wastewater treatment facility with a design flow greater than 1.0 million gpd. All mechanically cleaned coarse screens

must be designed for daily removal to covered storage or with equipment that automatically conveys screenings to a storage area or processing unit that complies with §217.123 of this title (relating to Screenings and Debris Handling)."

WEAT and TACWA commented that the previous version of Chapter 217 required this only for fine screens which is appropriate. They further comment that there are some smaller treatment facilities where the coarse screenings volume can be handled by manual daily removal to covered storage.

Response

The commission respectfully disagrees with this comment. Inadequate frequency of screenings disposal has been a recurring operational issue with mechanically cleaned screens. The requirements of §217.121(e)(5) are intended to prevent unauthorized discharge from the bar screen area and to ensure odor and vector control. Owners of smaller wastewater treatment facilities are not obligated to select mechanically cleaned coarse screens, as manually cleaned coarse screens may be selected instead. If there is a compelling reason why automatic screenings removal is unnecessary for a mechanically cleaned bar screen, then an owner may request a variance. The variance process provides the executive director an opportunity to review the request and to determine whether the design will prevent

unauthorized discharge and ensure odor and vector control. No change was made in response to this comment.

Comment

Harris Co. recommended that TCEQ revise §217.122(a) to add the following sentence: "A fine screen or similar debris removal device is required for all facilities > 0.4 mgd."

Response

The commission respectfully disagrees that the additional requirement proposed in this comment is necessary. Coarse screens may be acceptable in some facilities whereas other facilities may need fine screens. The type of screen must be determined as part of the engineering design. No change was made in response to this comment.

Comment

WEAT and TACWA recommended that TCEQ revise §217.128(a) as follows:

"(a) A wastewater treatment facility must be designed with the use of a flow equalization basin if:

(1) the total daily influent organic loading occurs during a period of time less than or

equal to ten hours unless process modeling shows the treatment system can handle the organic load or other procedures are used to handle the organic loading; or

(2) the wastewater treatment facility receives an influent organic loading less than 10% of its design organic loading during a period of time equal to or greater than 48 hours in any period of seven consecutive days unless the treatment facility has multiple treatment trains and demonstrates that adequate minimum loading of 25% per treatment train/unit can be maintained through operational procedures."

WEAT and TACWA commented that fluctuations in organic loading can be handled with the use of multiple treatment trains in addition to flow equalization.

Response

The commission respectfully disagrees that the modifications proposed in this comment are necessary. An owner may request a variance to use multiple treatment trains in lieu of an equalization basin. Multiple treatment trains may or may not accommodate fluctuations in organic loadings. The variance process provides the executive director an opportunity to review the request to determine if multiple treatment trains are adequate to reduce fluctuations in organic loadings. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ revise §217.129(e) by changing the minimum SWD to 10 feet for clarifiers with a diameter less than or equal to 40 feet, 11 feet for 41 to 69 feet diameter clarifiers, 12 feet for 70 to 99 feet diameter clarifiers, 13 feet for 100 to 139 feet diameter clarifiers, and 14 feet for clarifiers with a diameter greater than or equal to 140 feet. Jones and Carter commented that the current minimum depth is only adequate for small plants and that settleability in larger clarifiers is a real concern. They recommend increasing the minimum depths to those recommended by Manual of Practices (MOP) 8, Table 11.17, to prevent overly shallow, large clarifiers.

Response

The commission agrees that some facilities may require deeper clarifiers, but disagrees that the recommended revision is necessary. Although MOP 8 is one of several reliable design references, the design engineer must take into account the settleability of the solids in a primary clarifier and the sludge removal system to determine the appropriate clarifier depth. The rule establishes a minimum SWD. No change was made in response to this comment.

Subchapter F

Comment

Harris Co. had a question concerning §217.152(d)(2): What about weirs that are part of a concrete wall?

Response

The commission agrees that weirs attached to the wall would not be able to be located a minimum of 6.0 inches from an outer wall and revised §217.152(d)(2) to add the following language: "except for a clarifier effluent weir and launder that is attached to a wall."

Comment

Jones and Carter recommended that TCEQ revise §217.152(g) by changing the minimum SWD to 10 feet for clarifiers with a diameter less than or equal to 40 feet, 11 feet for 41 to 69 feet diameter clarifiers, 12 feet for 70 to 99 feet diameter clarifiers, 13 feet for 100 to 139 feet diameter clarifiers, and 14 feet for clarifiers with a diameter greater than or equal to 140 feet. Jones and Carter commented that the current minimum depth is only adequate for small plants and that settlability in larger clarifiers is a real concern. They recommend increasing the minimum depths to those recommended by MOP 8, Table 11.17, to prevent overly shallow, large clarifiers.

Response

The commission agrees that some facilities may require deeper clarifiers, but disagrees that the recommended revision is necessary. Although MOP 8 is one of several reliable design references, the design engineer must take into account the settleability of the solids in a secondary clarifier and the design of the sludge removal system to determine the appropriate clarifier depth. The rule establishes a minimum SWD. No change was made in response to this comment.

Comment

PEECO recommended that TCEQ revise §217.152(g) to: 1) require a minimum SWD for any hopper type clarifier to be 8 feet and excluding any part of the hopper or sump; 2) add the following requirement:

"Calculate the proposed volume (Vp) for the proposed basin above the top of any hopper or sump.

Surface area proposed: SA = Vp / 8 feet SWD.

Surface settling rate proposed: SSR = Qp / SA

SSR proposed should be less than maximum value shown in Table 2."; and

3) require that the maximum vertical depth for a hopper or sump for clarifiers with Qp up to 50,000 gpd (12,500 gpd Qa) to be 4 feet.

Response

The commission partially agrees with this comment. The commission revised §217.152(g)(3) by removing the equation for the SWD and replacing it with a minimum depth of 8.0 feet. The commission added a surface loading equation similar to that requested by the commenter. The commission revised §217.152(g)(4) to set a minimum depth of 4.0 feet for the hopper portion of a hopper bottom clarifier.

Comment

PEECO commented that §217.152(g) and (h) limit design average daily flow of facilities using hopper bottom clarifiers to 10,000 gpd or less. PEECO recommended that the maximum design daily flow allowed be calculated using the retention time values in Figure: 30 TAC §217.154(c)(1), Table F.2. and a minimum 8 feet SWD. PEECO further recommended that the flow limit be on the clarifier instead of the facility. PEECO stated that they have furnished treatment plants to several users who experience periodic, or seasonal flows, like state parks, recreation area and schools, where the use of two

parallel clarifiers have been very beneficial. The owner can close one clarifier down during periods of low flow and prevent problems of long detention time, and if maintenance is required one clarifier can be taken off line for short periods by closing its inlet gate. PEECO stated that they are confident in recommending design average daily flows of up to 25,000 gpd if two clarifiers per the above calculations and minimum 8 feet SWD are provided.

Response

The commission partially agrees with this comment. The commission recognizes the benefit of using two hopper bottom clarifiers in a parallel arrangement. However, the inherent difficulty with operating and maintaining hopper bottom clarifiers outweighs any benefit of increasing the maximum capacity. For example, hopper bottom clarifiers, by design, must be manually cleaned. If the clarifiers are not cleaned daily, the wastewater treatment facility may have difficulty meeting their permitted effluent limitations. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ revise §217.153(c)(1) by deleting the statement "Aeration basins are exempt from this requirement if the aeration equipment, including the diffusers, is removable without taking the aeration basin out of service."

Jones and Carter commented that the redundancy requirement should remain in the rules because removable aeration equipment is not a realistic substitute for redundancy.

Response

The commission respectfully disagrees that the revision recommended in this comment is necessary. The previous Chapter 217 rule required two aeration basins unless the aeration equipment was removable. The adopted rule did not add the exemption, but rather revised the language to improve readability and understanding. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ replace §217.155(b)(2)(A)(iii) with a table showing maximum allowed percent transfer efficiency at depths varying from 7 - 22 feet for coarse and fine bubble systems. Jones and Carter commented that the percent value maximums are dependent on depth. Equipment is capable of producing transfer efficiencies far in excess of the values in §217.155(b)(2)(A)(iii) in deeper tanks. For example, a typical 16 feet deep tank can commonly achieve a 30 percent transfer efficiency. No matter what values are listed, the rules should require testing lab data to support the manufacturer's equipment.

Response

The commission respectfully disagrees with the request to add a depth-based table for percent transfer efficiencies based on depth and the requirement to submit lab data to support the manufacturer's equipment for all transfer efficiency percentages used. The rule provides an equation that accounts for criteria other than depth. If the owner wants to use a different percentage for transfer efficiency based on the type of diffuser and water depth, the owner can request a variance. The variance process provides the executive director with an opportunity to review the request to determine if the transfer efficiency used is consistently achievable. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ revise §217.155(b)(5)(A)(iii) by removing the prohibition on wastewater treatment systems with a design flow over 5,000 gpd. Jones and Carter commented that prohibition is too strong for a situation that may be applicable and not harmful to the environment. Shallow basins used for RBCs or similar equipment have been successfully converted to diffused air activated sludge in the past to comply with ammonia-nitrogen limits. This should be an allowable variance.

Response

The commission agrees with this comment and revised the first sentence in §217.155(b)(5)(A)(iii) to read: "The submerged depth for a diffuser must be at least 7.0 feet."

Comment

WEAT and TACWA commented that §217.156(a)(2) currently states that a sequencing batch reactor (SBR) must have a minimum decantable volume that is sufficient to pass the design flow without changing cycle times with the largest basin out of service. Precluding changing cycle times to pass the higher flows through the tanks in service is not necessary. Most SBR systems make adjustments to cycle structures when a tank is taken off line, but are designed to still meet minimum effluent limits. For example, less anoxic fill time and/or idle time is used and more aeration time is used to accommodate the higher organic loading experienced by the tanks still in service. Therefore, WEAT and TACWA recommend that TCEQ revise §217.156(a)(2) as follows:

"An SBR must have a minimum decantable volume that is sufficient to pass the design flow, and must be capable of meeting permitted effluent limits, with the largest basin out of service."

Response

The commission agrees with this comment and revised §217.156(a)(2) as

recommended.

Comment

Aqua-Aerobics commented that §217.156(c)(14) should not require a platform for sampling on a complete mix SBR basin. This environment is no different for SBR basins than traditional flow through activated sludge.

River City Engineering recommended that TCEQ revise §217.156(c)(14) to remove the requirement for a walkway that bisects the tank because it would make it difficult to remove certain types of equipment located below the walkway in the basin, i.e. jet aeration headers, sludge collection headers and/or diffusers; it is not necessary to provide visibility to the entire surface area of the basin for inspection or to allow process control sampling; and it would create additional project costs. River City Engineering commented that the number and location of walkways needed depends on whether the tank is rectangular or circular, size of the tank, and type and location of any equipment and/or instrumentation located in the basin. River City Engineering commented that the rule should allow the engineer and owner to determine the location of walkways necessary to provide for the purposes intended in the proposed language, and suggested the following language:

"All equipment must be accessible for inspection, maintenance, and operation.

Adequate walkways shall be provided to allow inspection and process control sampling and to allow access to any instrumentation and any mechanical or electrical equipment."

Response

The commission agrees with these comments and revised §217.156(c)(14) to read: "All equipment must be accessible for inspection, maintenance, and operation. Walkways shall be provided to allow inspection, maintenance, and process control sampling and to allow access to instrumentation, mechanical equipment, and electrical equipment."

Comment

Aqua-Aerobics recommended that TCEQ revise §217.156(d)(3) because it is common for SBR systems to have anoxic and anaerobic periods within their fill cycle and a dissolved oxygen concentration of 2.0 milligrams per liter would not be maintained during these periods.

Response

The commission respectfully disagrees with this comment. If the engineer designs the SBR process for nutrient removal, the owner can request a variance. The variance process provides the executive director with an opportunity to review the request and to determine if the dissolved oxygen

concentration is appropriate for the designed modes of operation. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ delete §217.159(c). Jones and Carter commented that TCEQ should only require the instantaneous flow rate because this information is not necessary to adequately operate small wastewater treatment facilities and the equipment and controls necessary to obtain the instantaneous flow rate is difficult to install, especially in package plants.

Response

The commission partially agrees with this comment. A totalizing flow meter is not needed to operate small wastewater treatment facilities. However, no change was made in response to this comment because the adopted language only requires a totalizing flow meter for a wastewater treatment facility with a design flow greater than 0.4 million gallons per day.

Comment

Jones and Carter recommended that TCEQ revise §217.162(b)(8) and (9) by changing "static submergence" to "dynamic submergence." Jones and Carter commented that the dynamic submergence is the telling factor in the operating efficiency of an airlift and

must be considered in the design.

Response

The commission agrees with this comment and revised §217.162(b)(8) and (9) as recommended.

Comment

Aqua-Aerobics noted that in Subchapter F, Activated Sludge Systems, the aeration calculations are still unique, but they can live with them.

Response

The commission acknowledges this comment.

Subchapter G

Comment

Harris Co. recommended that TCEQ revise §217.188(c) as follows: "If an SBC has any moving parts that require lubrication or replacement, an SBC must have lubrication access above the water level and provisions for safe removal without affecting process."

Response

The commission respectfully disagrees the revision recommended in this comment is necessary. Section 217.188(b) requires the SBC system to meet the criteria in §217.185, which requires redundant basins to allow for maintenance, including replacement; therefore the requested revision is not necessary. No change was made in response to this comment.

Comment

Aqua-Aerobics commented that the redundancy requirement in §217.190(b)(1) for a minimum of two independent and fully functional filter basins makes sense to ensure safe operation. The filter is not fully operational when an individual disk/plate is being isolated and replaced. To safely remove the individual disk/plate, the backwash mechanism is required to be isolated, too. Once the backwash mechanism is disabled, even just for a short time period, the filter is no longer fully operational. In addition, the failure of mechanical components including motors, pumps, and valves etc. can also put the filter out of service. Therefore, it is prudent to have at least two filters to meet the redundancy requirement.

Response

The commission agrees with this comment. However, the adopted rule already requires two independent and fully functional filter basins. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ clarify §217.190(b)(2). Jones and Carter questioned if the redundancy requirement is full peak flow treatment in each independent basin or if it is just multiple basins with a combined treatment capacity of peak flow. Jones and Carter recommended that the design be based on full peak flow in each basin if filters are needed for permit compliance.

Response

The commission partially agrees with this comment. The composition of a filter unit varies between manufacturers and may vary based on design. The design of a filtration system must specify the filter surface area required to treat the peak flow with the largest filter unit out of service. No change was made in response to this comment.

Comment

Aqua-Aerobics recommended that TCEQ revise §217.190(b)(2) to require that the filter surface area be the effective submerged filter surface area; and for partially submerged filters, the effective submerged filter surface area should be the average of maximum and the minimum submerged area.

Response

The commission partially agrees with this comment and revised §217.190(b)(2) to read: "The design of a filtration system must specify the submerged filter surface area required to treat the peak flow with the largest filter unit out of service."

Comment

Aqua-Aerobics recommended that TCEQ revise §217.193(c)(1) to define the submerged filter surface area needs as the effective submerged filter surface area. For the partially submerged filters, the effective submerged media surface area is variable depending on the operational mode.

Response

The commission agrees with this comment and revised §217.193(c)(1) to read: "The design filtration rate must be based on the effective submerged surface area of the media. If the submerged surface area of the media varies based on the operational mode, the design filtration rate must account for the variability."

Comment

Aqua-Aerobics recommended that TCEQ revise §217.193(c)(3). Aqua-Aerobics

commented that with one cloth media filter in backwash mode, only a fraction of the number of disks are backwashed while the remaining cloth media disks still do the filtration work. In addition, the cloth media backwash shoes only contact a very small surface area of the disks, which leaves the vast amount of cloth media surface area available for filtration regardless the backwash mode. Therefore, even with one cloth media filter unit in backwash mode, filtration still takes place simultaneously.

Response

The commission agrees with this comment. The process described by the commenter meets the requirements of §217.193(c)(3) as that paragraph is currently worded; therefore, no change was made in response to this comment.

Comment

Aqua-Aerobics questioned whether the media surface area is based on the total effective submerged filtration area or only the media surface area that contacts the backwash shoe. Aqua-Aerobics also questioned the basis of the 6.0 gallons per minute per square foot (gpm/ft^2) requirement in §217.193(c)(4), stating that due to the difference of filter media and configuration, it seems reasonable that different backwash flux rates are required. Aqua-Aerobics further commented that for their cloth media filters, approximately 1.2 gpm/ft^2 based on total effective submerged filtration area has proved

to provide effective cleaning.

Response

The commission used the phrase "based on the portion of the filter surface that is being actively backwashed" to allow for different backwash designs. For a design that uses a backwash shoe, the media area that is directly sprayed with water from the backwash shoe at a given instant is the area being actively backwashed. The commission respectfully disagrees with the remainder of this comment. Although cloth filters are not a new technology, the inclusion of this technology in the design criteria is new. The commission prefers to adopt conservative initial minimum design criteria for this technology. Based on discussions with stakeholders, including manufacturers and retailers of cloth filters, the commission determined that 6.0 gpm/ft^2 is a reasonable minimum standard backwash rate to maintain filter efficiency. However, an owner can request a variance. The variance process provides the executive director an opportunity to review the request to determine if a lower backwash rate will maintain the filter efficiency. No change was made in response to this comment.

Comment

Aqua-Aerobics recommended that TCEQ revise §217.193(b)(3) to require the media to

be chlorine-resistant if the filter will be exposed to chlorine.

Response

The commission agrees with this comment and revised §217.193(b)(3) to add "if the filter will be exposed to disinfectants" to the end of the paragraph.

Comment

Binkley and Barfield, Inc. recommended that TCEQ revise §217.193(c)(2) as follows: "The maximum design filtration rate for peak flow must be between 3.25 and 6.5 gallons per minute per square foot of submerged media." Binkley and Barfield, Inc. stated that the design filtration rates (hydraulic loading requirements) should be lower than 3.25 gpm/ft^2, in order to provide sufficient filtration surface area; while the peak filtration rate should not exceed 6.5 gpm/ft^2.

Response

The commission agrees with this comment and revised §217.193(c)(2) to read: "The maximum design filtration rate for peak flow must not exceed 6.5 gallons per minute per square foot of submerged media." The lower design limit of 3.25 gpm/ft^2 of submerged media was removed because it was not necessary, as Binkley and Barfield, Inc. suggested in the comment.

Subchapter H

Comment

WEAT and TACWA commented that §217.203(e)(1)(C) requires four samples per 11,000 cubic feet of loose material, or one sample per 2,750 cubic feet, and noted that each of these samples must include a permeability test. They commented that the number of permeability tests required for imported and amended in-situ soil liners is disproportionately high in comparison to that required for in-situ soil liners. WEAT and TACWA noted that §217.203(e)(1)(B) requires one permeability test every 0.25 acres and for a 2-foot thick liner, this equates to one permeability test for every 21,780 cubic feet of in-situ soil liner material. The rule as proposed requires 10 times more preconstruction permeability tests for imported soil liner material than for in-situ soil liners. Furthermore, the finished imported soil liner must still undergo post-construction sampling with one permeability test every 0.25 acres. It is recognized that frequent analysis of imported materials is important in ensuring a quality linter; however, the number of permeability samples as proposed for preconstruction sampling is an onerous burden. WEAT and TACWA recommended that TCEQ revise §217.203(e)(1)(C) as follows:

"(C) Preconstruction Sampling for Imported Soil Liners and Amended In-situ Soil Liners. Molded samples of the liner material are allowed for imported soil liners and

amended in-situ soil liners. Four samples are to be analyzed per 11,000 cubic feet of loose liner material or amended in-situ soil liner mixture in accordance with subparagraphs (e)(1)(A)(ii), (iii) and (iv). One sample every 22,000 cubic feet of loose liner material or amended in-situ soil liner mixture shall be analyzed for permeability in accordance with subparagraph (e)(1)(A)(i)."

Response

The commission partially agrees with this comment. It is recognized that amending or importing soil is sometimes necessary to meet the permeability standard of less than 1 x 10^{-7} centimeters per second. When soil is amended or imported, more samples are required to ensure that the completed soil liner meets the permeability standard. However, the commission also recognizes the need to clarify the requirements in §217.203(e)(1)(C). The revised language will actually result in fewer permeability samples than the commenters proposed, but will provide enough samples to establish a reasonable relationship between permeability and the results of the analyses for clay content, liquid limit, and plasticity index. These changes allow the commission to reasonably verify that the liner meets the permeability requirement without placing an onerous burden on owners.

Comment

WEAT and TACWA requested clarification on §217.203(e)(1)(C). They questioned if "loose liner material" means the soil amendment only, or the mixture of amendment material and in-situ soil. They assumed that it means the mixture.

Response

The commission agrees that "loose liner material" is the mixture of amendment material and in-situ soil. In response to this comment, the commission revised §217.203(e)(1)(C) to provide clarity.

Comment

WEAT and TACWA recommended that TCEQ revise Figure: 30 TAC §217.206(d), Equation H.1., as follows:

"E = fraction of five-day biochemical oxygen demand removed in aerated lagoon"

Response

The commission agrees to make this correction and revised Equation H.1. as recommended.

Comment

WEAT and TACWA commented that §217.207(e)(2) includes a requirement to "evacuate the top 6.0 inches of a lagoon volume within a 24 hour period" seems to imply that the inlet and outlet structures must be designed to drain the top 6 inches, essentially creating a decreasing head condition within the lagoon. WEAT and TACWA recommended revising this paragraph as follows:

"(2) The inlet and outlet structures must be sized to convey the volume contained within the top 6.0 inches of the lagoon within a 24-hour period, based on the normal water level at design flow and the corresponding pressure head."

Response

The commission agrees with this comment and revised §217.207(e)(2) as recommended.

Comment

WEAT and TACWA commented that §217.207(g)(2) addresses algae, which is prevalent throughout the entire water column; however duckweed is a floating plant commonly found in stabilization lagoons. WEAT and TACWA recommended revising this paragraph as follows:

"(2) An outlet must be at least 18 inches but not more than 24 inches below the water

surface in a stabilization lagoon to control the discharge of duckweed or floating algae."

Response

The commission agrees with this comment and revised §217.207(g)(2) to read: "An outlet must be at least 18 inches but not more than 24 inches below the water surface in a stabilization lagoon to control the discharge of duckweed and floating algae."

Comment

WEAT and TACWA commented that §217.207(g)(3) addresses multi-purpose flow control structures to prevent the discharge of floatable materials as addressed in §217.207(g)(1) and (2). Also the phrase "construction sites" is ambiguous and the intent would be more clearly represented by replacing this with the phrase "flow control structures." Given these comments, WEAT and TACWA recommended revising §217.207(g)(3) as follows:

"(3) A multipurpose control structure may be used to facilitate normal operational functions such as drawdown, flow distribution, adjusting water depth, flow measurement, sampling, access for pump recirculation, chemical addition, and exclusion of floating materials. A multipurpose control structure may also be used to minimize the number of special purpose structures in a stabilization lagoon."

Response

The commission agrees with this comment and revised §217.207(g)(3) as recommended.

Comment

WEAT and TACWA commented that §217.208(e)(2) addresses sufficient gradient to install an inlet manhole with the invert located above the maximum high water level of the downstream evaporation lagoon. It is assumed that the reason for this requirement is to prevent backflow into an upstream unit. If so, WEAT and TACWA recommended revising this paragraph as follows to allow for other arrangements that accomplish the same goal:

"(2) An inlet manhole invert must be a minimum of 6.0 inches above the maximum high water level of a primary evaporative lagoon or provide other means to prevent backflow into an upstream treatment unit."

Response

The commission agrees with this comment and revised §217.208(e)(2) as recommended.

Comment

WEAT and TACWA commented that §217.209(d) implies that a constructed wetland must include all plants from the list of emergent plants, floating plants or both. WEAT and TACWA recommended revising the second sentence as follows: "A constructed wetland must include a diversity of plants selected from the following categories of emergent plants, floating plants, or both."

Response

The commission agrees with this comment and revised §217.209(d) to read: "Vegetation. A constructed wetland must have a diverse vegetative community of emergent and floating plants to minimize any adverse impact from potential disease, insect pests, or species-specific toxicity. A constructed wetland must include a diversity of plants selected from the following categories of emergent plants, floating plants, or both."

Comment

WEAT and TACWA recommended that TCEQ revise §217.209(d)(1)(A) and (F) as follows:

"(A) Schoenoplectus spp. (bulrush)"

"(F) Carex spp. (sedges)"

Response

The commission agrees with this comment and revised §217.209(d)(1)(A) and (F) as recommended.

Comment

WEAT and TACWA recommended that TCEQ delete §217.209(d)(1)(G) because *Caladium* spp. (elephant ear) is an exotic plant not native to Texas.

Response

The commission partially agrees with this comment. Although the *Caladium* spp. of elephant ear is not native to Texas, it is not known to be an invasive plant in Texas and it works well in subsurface constructed wetland systems. However, the *Colocasia* spp. of elephant ear is an invasive plant, and it is therefore not included in the list of approved wetland plants. No change was made in response to this comment.

Comment

WEAT and TACWA commented that §217.209(e)(3) addresses harvesting, which is not a recommended measure for nutrient removal or for reducing thatch. WEAT and TACWA

recommended revising the paragraph as follows: "The operation and maintenance manual for a wastewater treatment facility that has a constructed wetland must include a detailed description and schedule for maintaining the constructed wetland. The maintenance plan must include a schedule and procedure for addressing excessive accumulated thatch."

Response

The commission notes that the term "harvesting" was intended to mean the removal of excess vegetation to maintain a healthy wetland system. In response to this comment, the commission revised the last sentence of §217.209(e)(3) to read: "...The maintenance plan must include a schedule and procedure for removing overabundant live plant material and dead plant material."

Comment

WEAT and TACWA commented that §217.210(e)(2) appears to require the designer to create multiple water depths within a wetland cell to accommodate the plants, whereas in practice, the wetland cell is designed to achieve hydraulic efficiency and then selects the plants as needed to accommodate the resulting water depths. WEAT and TACWA recommended revising the paragraph as follows:

"(2) Plants selected for a FWS wetland cell shall be compatible with the water depths under all operational flow conditions."

Response

The commission agrees with the comment and revised §217.210(e)(2) as recommended.

Comment

WEAT and TACWA commented that in §217.210(i)(2) Equation H.3., the first order areal rate constant for TSS is mistakenly placed on the line defining the area. WEAT and TACWA recommended moving "(1,000 m/yr @ 20 degrees C for TSS)" within the line defining "K."

Response

The commission agrees with this comment and revised the variable definitions for the first-order areal rate constant and required wetland area in Figure: 30 TAC §217.210(i)(2), Equation H.3.

Comment

WEAT and TACWA commented that in Figure: 30 TAC §217.211(g)(2), Equation H.5., the first order areal rate constant for TSS is mistakenly placed on the line defining the

area. WEAT and TACWA recommended moving "(3,000 m/yr @ 20 degrees C for TSS)" within the line defining "K."

Response

The commission agrees with this comment and revised the variable definitions for the first-order areal rate constant and required wetland area in Figure: 30 TAC §217.211(g)(2), Equation H.5.

Subchapter J

Comment

Harris Co. recommended that TCEQ revise §217.246(b) by adding language as follows: "(b) An enclosed area that is accessible to individuals must have automatic mechanical ventilation and be designed for continuous occupancy."

Response

The commission respectfully disagrees that the revision recommended in this comment is necessary. The automatic mechanical ventilation requirements in §217.246(b)(1) or (2) are protective of human health while accessing an enclosed area. No change was made in response to this comment.

Comment

Jones and Carter recommended that TCEQ revise §217.249(t)(4)(B) by adding "If a multi-stage aerobic digester is used, the minimum detention time may be reduced in accordance with EPA published standards for multi-stage digesters." Jones and Carter commented that the stabilization time in a multi-stage digester is significantly less and facilities designed for this do not need 40 days.

Response

The commission agrees that an owner can meet the requirements for sludge land application with less than 40 days in the aerobic digester depending on such factors as the temperature of the digester. However, the commission did not make a change to the rule because the owner can ask for a variance to the rule. The variance process provides the executive director an opportunity to review the request to determine if a shorter detention time will meet the pathogen and vector attraction requirements.

Subchapter K

Comment

Jones and Carter recommended that TCEQ revise §217.272(c) as follows: "A dechlorination system must provide a least one unit of sulfur dioxide gas for each unit of residual chlorine." Jones and Carter commented that the sulfur dioxide system should

not be sized on the influent chlorine amount. It should be sized to remove excess residual chlorine.

Response

The commission agrees with this comment and revised §217.272(c) to read: "At the point of dechlorination, a dechlorination system must provide a least one unit of sulfur dioxide gas for each unit of residual chlorine."

Comment

Harris Co. recommended that TCEQ add the following requirement to §217.281(b): "(5) Install floor drain to remove sludge accumulation."

Response

The commission partially agrees with this comment and revised §217.281(b) to add the following requirement: "(7) A chlorine contact basin must include a drain to facilitate removal of accumulated settled solids."

Subchapter M

Comment

Harris Co. requested that TCEQ revise §217.328(b) to require sign placement "at a minimum of one on each side and on each gate" and not requiring the signs to be placed

within 50-feet of each other minimum.

Response

The commission partially agrees with this comment. The adopted rule requires at least one clearly visible and legible hazard sign to be placed on each gate and each side fence. The adopted rule does not require signs to be placed within 50 feet of each other. No change was made in response to this comment.

Comment

WEAT and TACWA commented that the color coding specified in §217.329 is inconsistent with the American Society of Mechanical Engineers (ASME) standard and Occupational Safety and Health Administration (OSHA) provisions in 29 Code of Federal Regulations, Part 1910. WEAT and TACWA recommended that TCEQ revise these accordingly.

Response

The commission partially agrees with this comment; however, the ASME and OSHA standards are not universally recognized and the commission is choosing not to adopt retroactive requirements. The commission therefore finds that keeping the existing color codes at facilities in Texas will

maintain consistency between wastewater treatment facilities across the state. Maintaining the existing color codes also prevents a facility from using two conflicting sets of color codes if a treatment unit or collection system unit is constructed or altered after the effective date of these amendments. To differentiate between reclaimed water and gray water, the commission revised §217.329(e)(10) and added §217.329(e)(11) to read as follows and renumbered subsequent paragraphs:

"(10) reclaimed water - purple with black writing;

(11) gray water - purple with yellow writing;..."

Comment

Jones and Carter recommended that TCEQ either delete §217.332(b) or provide clarification of what is intended. Sound enclosures for items such as blowers and generators have and require removable panels for maintenance access.

Response

The commission agrees with this comment and revised §217.332(b) to read: "Removable noise attenuation equipment, such as removable mufflers or removable noise reducing panels, must remain attached to the equipment

at all times to reduce noise, unless the noise attenuation equipment is removed for maintenance activities."

SUBCHAPTER A: ADMINISTRATIVE REQUIREMENTS

[§217.1]

Statutory Authority

The repeal of this section is adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted repeal of this section implements TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.1. Applicability.

SUBCHAPTER A: ADMINISTRATIVE REQUIREMENTS

§§217.1, 217.2 - 217.17, 217.18

Statutory Authority

The amendments and new sections are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new sections implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.1. Applicability.

(a) Applicability.

(1) This chapter applies to the design, operation, and maintenance of:

(A) domestic wastewater treatment facilities that are constructed with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter;

(B) treatment units that are altered, constructed, or re-rated with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter;

(C) collection systems that are constructed with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter;

(D) collection system units that are altered, constructed, or re-rated with plans and specifications received and approved by the executive director after the effective date of the amendments to this chapter;

(E) existing domestic wastewater treatment facilities that do not have a current Texas Pollutant Discharge Elimination System permit or a Texas Land Application Permit and are required to have an active wastewater permit;

(F) existing wastewater treatment facilities and collection systems that never received approval for plans and specifications from the executive director; and

(G) collection system rehabilitation projects covered in §217.56(c) and §217.69 of this title (relating to Trenchless Pipe Installation; and Maintenance, Inspection, and Rehabilitation of the Collection System).

(2) Domestic wastewater treatment facilities, treatment units, collection systems, and collection system units with plans and specifications approved by the executive director that were received on or after August 28, 2008 and before the effective date of this chapter must comply with the rules in this chapter, as they existed immediately before the effective date of the amendments to this chapter. The rules in effect immediately before the effective date of the amendments to this chapter are continued in effect for that purpose.

(3) This chapter does not apply to:

(A) the design, installation, operation, or maintenance of domestic wastewater treatment facilities, treatment units, collection systems, or collection system units with plans and specifications that were approved by the executive director on or before August 27, 2008, which are governed by Chapter 317 of this title (relating to Design Criteria Prior to 2008) or design criteria that preceded Chapter 317 of this title; and

(B) systems regulated by Chapter 285 of this title (relating to On-Site Sewage Facilities); or collection systems or wastewater treatment facilities that collect, transport, treat, or dispose of wastewater that does not have the characteristics of domestic wastewater, although the wastewater may contain domestic wastewater.

(b) The executive director may grant variances from new requirements added by the amendments of this chapter to a person who proposes to construct, alter, or re-rate a collection system or wastewater treatment facility if the plans and specifications for the project are submitted within 180 days after the date the amendments to this chapter are effective, provided the plans and specifications comply with the rules in effect immediately prior to the amendment.

§217.2. Definitions.

The following words and terms, when used in this chapter, have the following meanings unless the context clearly indicates otherwise.

(1) Activated sludge--A collection of actively growing biological organisms that results from combining wastewater, organisms, and air in an aerated treatment process.

(2) Activated sludge process--A biological wastewater treatment process in which activated sludge is aerated. The activated sludge microorganisms are subsequently separated from the wastewater and wasted or returned to the process.

(3) Advanced nutrient removal--A process to remove phosphorus, nitrogen, or both, that is intended to produce higher quality effluent than is normally achieved by secondary treatment processes.

(4) Air gap--The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet conveying water to a tank, fixture, receptor, sink, or other assembly and the flood level rim of the receptacle.

To qualify as an air gap under this chapter, the vertical, physical separation must be at least twice the diameter of the water supply outlet, but never less than 1.0 inch.

(5) Alter or alteration--

(A) To replace a treatment unit or a collection system unit.

(B) To modify a treatment unit, a collection system unit, or an associated appurtenance, in a way that changes any of the following for a treatment unit or collection system unit:

(i) the capacity;

(ii) the intended function;

(iii) the process;

(iv) the mode of operation;

(v) the configuration;

(vi) a design parameter;

(vii) a major design assumption; or

(viii) the function of any other treatment unit or collection system unit.

(6) Alternative collection system--A collection system that uses components such as grinder pumps, septic tanks, or vacuum valves, which are installed throughout the collection system, specifically including the types of collection systems identified in Subchapter D of this chapter (relating to Alternative Collection Systems). An alternative collection system is comprised of both on-site and off-site components.

(7) Annual average flow--The arithmetic average of all daily flow determinations taken within a period of 12 consecutive months.

(8) Appurtenance--An appliance or a component associated with a treatment unit or collection system unit that is not considered integral to the identity of the unit.

(9) Auxiliary pump--A secondary or supplementary pump that is available for use as needed.

(10) Biotower--A biological filtration system that involves biological film on a plastic media that reduces the biochemical oxygen demand of the effluent.

(11) Building lateral--A pipe that conveys raw wastewater and connects the plumbing of a structure to a collection system pipe. For an alternative collection system, a pipe that conveys raw wastewater and connects the plumbing of a structure to an on-site component (e.g., grinder pump, vacuum valve pit, septic tank effluent pump). A building lateral is not a part of a collection system.

(12) Bypass--The intentional diversion of a waste stream from any portion of a wastewater treatment facility or collection system.

(13) Collection system--Pipes, conduits, lift stations, force mains, and all other constructions, devices, and appurtenant appliances used to transport domestic wastewater to a wastewater treatment facility.

(14) Collection system unit--A part of a collection system that performs a basic step in the transport of wastewater to a wastewater treatment facility, provides

access to the collection system, or is an integral safety feature of the collection system (e.g., pipeline, lift station, manhole, air release valve, etc.).

(15) Completely mixed aerated lagoon--A lagoon in which oxygen is supplied mainly through mechanical or diffused aeration, and in which the aeration system is designed to keep solids in suspension.

(16) Construct--To build, erect, place, assemble, remodel, alter, or otherwise create a treatment unit, a collection system unit or an associated component or appurtenance of a treatment unit or collection system unit. For purposes of this chapter, construction also includes installation of fencing, excavation, site preparation, and placement of skid-mounted or modular units.

(17) Constructed wetland--A wastewater treatment unit designed to replicate the processes that occur in natural wetlands. Constructed wetlands are complex, integrated systems in which wastewater, plants, animals, microorganisms, and the environment (including sun, soil, and air) interact to improve water quality.

(18) Day--A period of 24 consecutive hours beginning at 12:00 a.m. local time.

(19) Decanter--A device used to draw off liquid without disturbing solids that are in the process of sedimentation.

(20) Design flow--The highest anticipated 30-day average flow rate.

(21) Design life--The length of time that an engineered structure or device is intended to function without failing.

(22) Diurnal flow--The daily cycle of high and low influent flows to a wastewater treatment facility.

(23) Domestic wastewater--Wastewater which originates primarily from kitchen, bathroom, and laundry sources, including waste from food preparation, dishwashing, garbage grinding, toilets, baths, showers, and sinks of a residential dwelling. Domestic wastewater may contain commercial or industrial wastewater contributions.

(24) Dry Well--The portion of a pumping station where non-submersible pumps and controls are housed separately from the liquid being pumped.

(25) Effective size--The particle diameter that represents the smallest 10th percentile of a sample of filter media particles on a mass basis. In other words, 10% of the sample mass consists of particles that are smaller than the effective size and 90% of the sample mass consists of particles that are larger than the effective size.

(26) Effluent--Liquid that flows out of a process or confined space. This term may also be used to identify items or properties associated with effluent (e.g., effluent constituents, effluent limits, or effluent pump).

(27) Emergency overflow--A conduit or spillway designed to prevent an unauthorized discharge of wastewater by redirecting excess flow for processing in a treatment unit.

(28) Engineer--A professional engineer, licensed by the Texas Board of Professional Engineers, with expertise in design and construction of wastewater treatment facilities and collection systems.

(29) Engineering Report--The final engineering design report prepared, signed, and sealed by the engineer. The report must include calculations and written descriptions of processes, equipment, and structures that demonstrate compliance with

this chapter, as described in §217.10 of this title (relating to Final Engineering Report) and as required throughout this chapter.

(30) Equalization basin--A treatment unit designed primarily to dampen fluctuations of flow or concentration before wastewater flows into a subsequent treatment unit.

(31) Equivalent dwelling unit--Any building or section of a building that produces wastewater of a composition and quantity equal to that discharged by a single, private residence. For calculation purposes, an equivalent dwelling unit is occupied by 3.5 individuals, unless a different number is justified by actual data.

(32) Filter media--The material placed in a filter containment structure to separate solids from a liquid.

(33) Firm pumping capacity--The maximum flow rate achievable, under design conditions, with the largest pumping unit out of service.

(34) Force main--A pressure-rated conduit that conveys wastewater from a lift station.

(35) Free water surface wetland--A constructed wetland designed to have the water surface above the wetland bed or substrate.

(36) Gravity relief sewer--A part of a collection system built to manage the flow of wastewater that exceeds the capacity of the existing collection system.

(37) Grinder pump--A collection system unit that receives raw wastewater, grinds the solids in the wastewater into a slurry, and provides the motive force for transporting the slurry to a lift station or a collection system.

(38) Headworks--The location where wastewater enters a wastewater treatment facility and preliminary treatment occurs, typically by removing large solids or grit.

(39) Influent--Liquid that flows into a process or confined space. This term may also be used to identify items or properties associated with influent (e.g., influent constituents, influent limits, or influent pump).

(40) Innovative technology--A process, method, product, or material not addressed in this chapter or a process specifically identified as innovative by this chapter.

(41) Interceptor tank--A collection system unit that receives raw wastewater, removes floatable and settleable solids, stores the removed solids, and provides flow attenuation.

(42) Lift station--A structure that collects wastewater and uses pumps to raise it to a higher elevation. The term lift station applies to a structure in which the static head exceeds the frictional head losses.

(43) Maintenance--The scheduled preventative care, repair, or equivalent replacement of components or appurtenances of a treatment unit or a collection system unit (e.g., replacing a pump with an equivalent pump - not replacing an entire lift station, and not replacing a pump in a lift station with a pump that will operate at a different flow rate or pressure). Replacement must not cause alteration, as defined in this chapter. Maintenance does not include replacement of a treatment unit or a collection system unit.

(44) Membrane bioreactor system--An activated sludge process that uses membrane filtration rather than clarification to remove solids.

(45) Minimum grade effluent sewer--An alternative collection system pipeline with a constant downward slope that transports effluent from an interceptor tank by gravity flow.

(46) Multiple equivalent dwelling unit--Either:

(A) a group of two or more residences served by a common service connection; or

(B) a commercial, industrial, institutional, or other non-residential establishment that produces wastewater:

(i) in excess of 1,500 gallons per day; or

(ii) not comparable in composition to that discharged by a single private residence.

(47) Non-conforming technology--Technology or a process that does not conform to the design criteria of this chapter or a technology or process specifically identified as non-conforming in this chapter.

(48) Off-site component--A collection system component that includes collection system pipes, force mains, pump stations, lift stations, vacuum stations, and related appurtenances not located at a wastewater treatment facility.

(49) On-site component--Alternative collection system equipment placed on private property.

(50) Overflow--An unauthorized flow of untreated or partially treated wastewater from a collection system or from a treatment unit at a wastewater treatment facility.

(51) Owner--A person who owns a collection system or a wastewater treatment facility or part of a collection system or wastewater treatment facility. For the purposes of this chapter, "owner" refers to the owner and to the owner's representatives, agents, and designees (for example, an operator, an engineer, a staff member, a contractor).

(52) Partially mixed aerated lagoon--A lagoon in which oxygen is supplied mainly through mechanical or diffused aeration, in which the aeration system is designed to allow solids to settle out of suspension.

(53) Peak flow--The highest two-hour flow expected under any operational conditions, including times of high rainfall, based on a two-year, 24-hour storm or a prolonged period of wet weather.

(54) Plans--Construction drawings or other documents that show details of the design of a project.

(55) Preliminary treatment--Removal of wastewater constituents such as rags, sticks, floating material, and grit that may cause maintenance or operational problems in subsequent treatment units.

(56) Pressure sewer--A collection system that is pressurized by pumps at each service connection.

(57) Primary sedimentation unit--A treatment unit that removes solids from the wastewater by physical settling before the wastewater enters a unit that removes waste by biological conversion.

(58) Primary treatment--A physical treatment process, other than preliminary treatment, that removes biologically available wastewater constituents primarily by settling or floatation.

(59) Processing unit--A component of a wastewater treatment facility that performs a basic step in preparing sludge for disposal after the sludge has been separated from the wastewater (e.g., sludge thickener, digester, sludge drying bed, belt press). Processing units are considered a subset of treatment units for the purposes of this chapter.

(60) Project--A construction, repair, alteration, or rehabilitation of a collection system, a wastewater treatment facility, or an associated component, beginning with design initiation and ending with permanent decommissioning.

(61) Pump--A device that raises, transfers, or compresses fluids by suction, pressure, or both.

(62) Rehabilitate--To repair a collection system using a technology that is described in §217.56(c) of this title (relating to Trenchless Pipe Installation) or using any other lining or coating method.

(63) Re-rate--To change the design flow or design organic loading of a treatment unit, without altering the unit, based on actual performance data.

(64) Secondary treatment--The level of treatment defined as secondary treatment in §309.1(b) of this title (relating to Scope and Applicability).

(65) Sequencing batch reactor (SBR)--A fill and draw activated sludge treatment system where secondary aeration and secondary clarification processes are carried out sequentially in the same tank. An SBR system has the following five steps that are carried out in the following sequence:

(A) fill - the basin is filled with the influent;

(B) react - the influent in the basin is aerated;

(C) settle - the mixed liquor within the basin is settled (clarification);

(D) draw - the basin is decanted; and

(E) idle - the sludge is removed from the basin.

(66) Sludge stabilization--The process of destroying or inactivating pathogens in sludge and reducing volatile solids content.

(67) Small diameter effluent sewer--A collection system that receives effluent from an interceptor tank and transports the flow by gravity. A small diameter effluent sewer may include minimum grade and variable grade effluent sewers.

(68) Specifications--Precise standards of performance for construction work, materials, and manufactured products, which make possible the expression of expected value when they are purchased or contracted for and which provide means of determining their conformance with expectations after they are purchased or constructed.

(69) Stabilization lagoon--A shallow lagoon used to achieve secondary treatment through natural processes. In this chapter, "stabilization lagoon" is synonymous with "stabilization pond," "oxidation lagoon," and "oxidation pond."

(70) Subsurface flow wetland--A wetland system that maintains the water level below the surface of the gravel or other media placed in the wetland bed or cell.

(71) Summary transmittal letter--A letter submitted to the executive director that provides basic information about a project so that the executive director can determine whether to require a full review of the project plans and specifications.

(72) Surcharge--The hydraulic overloading of a portion of a gravity collection system. A surcharge causes wastewater to rise within manholes and may cause an overflow.

(73) Totalizing meter--A water measuring device that registers or accumulates total flow. The totalizing meter shall be non-resettable.

(74) Treatment unit--A component of a wastewater treatment facility that performs a basic step in the wastewater treatment process (e.g., lift station, bar screen, aeration basin, clarifier, chlorine contact chamber).

(75) Twenty-five-year, 24-hour rainfall event--The maximum rainfall event with a probable recurrence interval of once in 25 years, with a duration of 24 hours, as defined by the National Weather Service in Technical Paper Number 40, *Rainfall Frequency Atlas of the United States*, May 1961; or equivalent regional or state rainfall information.

(76) Two-year, 24-hour rainfall event--The maximum rainfall event with a probable recurrence interval of once in two years, with a duration of 24 hours, as defined by the National Weather Service in Technical Paper Number 40, *Rainfall*

Frequency Atlas of the United States, May 1961; or equivalent regional or state rainfall information.

(77) Variable grade effluent sewer--A small diameter gravity collection system that does not require a uniform gradient, but will allow for both positive and negative gradients. A variable grade effluent collection system may be used with septic tank effluent pumps.

(78) Variance--A deviation from a specific requirement of this chapter. A variance requires executive director approval.

(79) Wastewater--A waterborne industrial waste, recreational waste, domestic waste, or combination of these wastes.

(80) Wastewater treatment facility--All contiguous land and fixtures, structures, and appurtenances used for storing, processing, and treating wastewater. A wastewater treatment facility does not include the collection system located outside of the fenced area around a wastewater treatment facility.

(81) Wasting--The practice of removing sludge from a wastewater treatment process.

(82) Weir overflow--The flow of liquid through or over a clarifier weir or a weir used for flow measurement.

(83) Wet well--A pumping station or a portion of a pumping station that stores the fluid being pumped. A wet well may be used in conjunction with a dry well, or may contain its own submersible pumps and equipment.

§217.3. Purpose.

(a) The purpose of this chapter is to establish the minimum design criteria for the comprehensive design of domestic wastewater collection systems, collection system units, wastewater treatment facilities, and treatment units. The design criteria in this chapter is intended to promote the design of facilities in accordance with good public health and water quality engineering practices. The minimum design criteria may not be sufficient for all situations. A design must protect the public health and meet water quality standards established by the commission.

(b) It is also the purpose of this chapter that all domestic wastewater treatment facilities, treatment units, collection systems, collection system units, and associated components must be installed, operated, and maintained:

(1) to ensure the safety of the public;

(2) to ensure the safety of all individuals authorized to access a wastewater treatment facility, treatment unit, collection system, or collection system unit;

(3) in accordance with the engineering report and the associated plans and specifications approved by the executive director; and

(4) to ensure continuous compliance with all applicable statutory and regulatory requirements.

(c) This chapter establishes procedures for the review and approval of project plans and specifications. An approval granted by a municipality in accordance with §217.8 of this title (relating to Municipality Reviews) or by the Texas Water Development Board in accordance with §217.9 of this title (relating to Texas Water Development Board Reviews) is considered equivalent to approval by the executive director.

§217.4. Variances.

(a) The engineering report must include all requested variances from the requirements of this chapter.

(b) The engineering report must include a technical justification for each variance requested. The executive director may determine what level of justification is acceptable.

(c) If the executive director determines that a variance may potentially endanger public health or the environment, the executive director may deny the variance or require that compensatory measures be taken to prevent a nuisance or the potential endangerment of public health or the environment.

(d) The executive director shall not grant or approve a variance that would violate any expressed prohibition in this chapter.

(e) A variance request that has been signed, dated, and sealed by an engineer; and certified by the engineer that the requested variance does not potentially endanger public health or the environment in the summary transmittal letter required by §217.6 of this title (relating to Submittal Requirements and Review Process) is automatically approved 30 business days after receipt by the executive director unless:

(1) the executive director requests additional information in writing;

(2) the variance request conflicts with any prohibition listed in this chapter; or

(3) the variance request conflicts with a provision in this chapter that specifically requires approval from the executive director to be in writing.

§217.5. Plans and Specifications General Requirements.

(a) An owner is required to have an engineer design a collection system or wastewater treatment facility that meets the minimum requirements of this chapter. The executive director may determine that additional requirements are needed.

(b) An owner is required to construct a collection system or wastewater treatment facility according to the plans and specifications approved by the executive director or an approved review authority, as designated by §217.8 of this title (relating to Municipality Reviews) or §217.9 of this title (relating to Texas Water Development Board Reviews).

(c) The executive director's approval of plans and specifications of a wastewater treatment facility does not relieve an owner of the responsibility to obtain a wastewater permit or other authorization from the commission in accordance with Texas Water Code, Chapter 26.

(d) The commission's approval of a wastewater permit does not relieve an owner of the responsibility to obtain plans and specifications approval for a wastewater treatment facility and the associated collection system from the executive director in accordance with this chapter.

(e) An owner must ensure that its wastewater treatment facility plans and specifications meet all requirements in the associated wastewater permit.

(f) The executive director's approval of plans and specifications must be in writing, unless the project is approved through the automatic approval processes in §217.6(f) or (h) of this title (relating to Submittal Requirements and Review Process).

(g) Plans and specifications for a project that would alter an existing treatment unit or collection system unit must comply with the requirements of this chapter. The plans and specifications do not need to address existing treatment units or collection

system units that will not be altered, unless specifically required by this chapter or requested in writing by the executive director.

(h) The executive director may require more stringent design criteria of a collection system or wastewater treatment facility if the executive director determines it is necessary to protect public health or to meet water quality standards established by the commission.

§217.6. Submittal Requirements and Review Process.

(a) An owner is not required to submit collection system or wastewater treatment facility plans and specifications to the executive director for approval prior to the commission issuing the wastewater treatment facility's wastewater permit.

(b) An owner is not required to submit collection system or wastewater treatment facility plans and specifications for approval if the project only consists of maintenance, as defined in this chapter.

(c) A wastewater treatment facility's plans and specifications must be based on a design that will at least meet the requirements and effluent limits in the associated wastewater permit.

(d) An owner shall submit a summary transmittal letter to the executive director and a copy to the appropriate regional office for each collection system project and wastewater treatment facility project, except as provided by §217.8 of this title (relating to Municipality Reviews). A summary transmittal letter must include:

(1) the name and address of the design firm;

(2) the name, phone number, facsimile number, and email address of the engineer;

(3) the county or counties where the project will be located;

(4) an identifying name for the project;

(5) the collection system or wastewater treatment facility owner's name, and if applicable, the wastewater treatment facility permit number and wastewater treatment facility name;

(6) a statement certifying that the plans and specifications are in substantial compliance with all requirements of this chapter, with the exception of any variance requests, which must be listed in the letter;

(7) a statement certifying that any variances will not threaten public health or the environment, based on the best professional judgment of the engineer who prepared the engineering report and the project plans and specifications;

(8) a brief description of the project scope including:

(A) a brief engineering summary of the collection system or wastewater treatment facility;

(B) a list of every treatment unit or collection system unit that will be altered, constructed, rehabilitated, or re-rated within the project scope;

(C) a map of the collection system or wastewater treatment facility that identifies the location of every treatment unit or collection system unit that will be altered, constructed, rehabilitated, or re-rated within the project scope;

(D) a description of all variances from the requirements of this chapter, including the use of non-conforming or innovative technology; and

(E) an explanation of the reasons for all variances in accordance with §217.4 of this title (relating to Variances).

(9) the signature and seal of the engineer responsible for the design of the collection system or wastewater treatment facility.

(e) The executive director may review the plans and specifications for any collection system or wastewater treatment facility.

(f) If the executive director does not notify an owner in writing within 30 business days of the receipt of a summary transmittal letter that a review will occur, the project is approved. However, such approval is conditional, and remains subject to an executive director determination under §217.4(c) or (d) of this title. Additionally, if this provision conflicts with a requirement in this chapter that requires executive director approval in writing, then this provision does not apply.

(g) If the executive director notifies an owner in writing of the intent to review a collection system or wastewater treatment facility's design, the owner shall submit the following within 30 days from the date of the notice:

(1) a complete set of plans and specifications;

(2) a complete engineering report as defined in §217.10 of this title (relating to Final Engineering Report);

(3) all requested variances; and

(4) sufficient information to satisfy the executive director that a project is in compliance with this chapter.

(h) If the executive director does not notify an owner of any deficiencies within 30 business days of receipt of any additional information requested, the project is approved as long as the project does not violate any expressed prohibition in this chapter. However, such approval is conditional, subject to an executive director determination under §217.4(c) or (d) of this title. Additionally, if this provision conflicts with a requirement in this chapter for written approval from the executive director, then this provision does not apply.

§217.7. Types of Plans and Specifications Approvals.

(a) Approval given by the executive director or other review authority authorized under Texas Water Code, §26.034(d) and §217.8 of this title (relating to Municipality Reviews) or §217.9 of this title (relating to Texas Water Development Board Reviews) does not relieve an owner of any liability or responsibility with respect to designing, constructing, or operating a collection system or wastewater treatment facility in accordance with applicable commission rules and the associated wastewater permit.

(b) The executive director, a municipality authorized under §217.8 of this title, or the Texas Water Development Board, as authorized in §217.9 of this title, may grant the following types of approvals: standard approvals; innovative and non-conforming technology approvals; and conditional approvals.

(1) Standard approval. The executive director may grant a standard approval for plans and specifications that do not include any variance requests, do not include any innovative or non-conforming technologies, and comply with all applicable parts of this chapter.

(2) Approval of innovative and non-conforming technologies. The executive director may grant approval of innovative and non-conforming technologies in accordance with §217.4 of this title (relating to Variances).

(A) An owner who requests approval for an innovative or non-conforming technology must submit a summary transmittal letter in accordance with §217.6(d) of this title (relating to Submittal Requirements and Review Process) and must describe the technology and give the reason(s) for selecting the technology.

(B) An owner must receive written approval from the executive director before constructing, installing, or operating any innovative or non-conforming technology.

(C) The executive director may require a pilot or demonstration study for an innovative or non-conforming technology. Performance data from a similarly designed full-scale process that has operated for a reasonable period under conditions similar to those of a proposed design, as determined by the executive director, may be submitted in addition to or in lieu of a pilot or demonstration study.

(D) The executive director may require an owner to submit evidence that the owner, the manufacturer, or the supplier of the equipment for innovative or non-conforming technology has provided a performance bond that:

(i) is acceptable to the executive director;

(ii) is from a surety company listed on the United States Treasury Department's current Listing of Certified Companies; and

(iii) insures the performance of the equipment for innovative or non-conforming technology.

(E) The performance bond referenced in subparagraph (D) of this paragraph must guarantee the innovative or non-conforming technology for at least two years from the date the treatment unit or equipment is put into service, and must include:

(i) the full cost of removing equipment and closing the innovative or non-conforming technology;

(ii) the full cost of replacing the innovative or non-conforming technology with standard processes and equipment that conform to this chapter; and

(iii) all associated engineering costs necessary for the removal and replacement of any failing treatment unit or equipment.

(F) The executive director may require an owner to submit a supplement to the report on the performance of an innovative or non-conforming technology after a collection system or wastewater treatment facility is constructed and operating.

(3) Conditional approval.

(A) The executive director may grant conditional approval for a specific set of operating conditions.

(B) If a conditional approval is granted, an owner is responsible for ensuring that the conditions, stipulations, and restrictions outlined in the approval letter are met. Operating outside the conditions, stipulations, or restrictions in a conditional approval is a violation of commission rules.

§217.8. Municipality Reviews.

(a) The executive director may grant approval authority to a municipality that requests approval authority and meets the requirements in Texas Water Code, §26.034(d).

(b) The executive director may not require plans and specifications for a collection system that transports domestic wastewater to be submitted for approval from:

(1) a municipality that has been granted approval authority by the executive director under authority of Texas Water Code, §26.034(d), if the plans and specifications are prepared by a private engineering consultant and a review is conducted by an engineer who is an employee of or consultant to the municipality not affiliated with the private engineering consultant that prepared the plans and specifications under review; or

(2) an entity that is required by local ordinance to submit the plans and specifications to a municipality that has been granted approval authority by the

executive director for review and approval under authority of Texas Water Code, §26.034(d).

(c) If a municipality seeks to perform technical reviews of collection systems, the municipality must submit a map or maps to the executive director delineating the municipality's jurisdictional boundaries for the area where it is seeking approval authority at least 30 days before commencing review of plans and specifications.

(d) The municipality shall submit a revised map or maps to the executive director identifying jurisdictional boundary changes at least 30 days prior to any proposed change.

(e) If a municipality ends its review authority, the municipality shall provide written notice to the executive director at least 30 days prior to ending municipal reviews.

(f) A municipality's review and approval program must incorporate the following requirements:

(1) the municipality's review and approval process shall ensure compliance with all the applicable rules of this chapter;

(2) the municipality may only review and approve engineering reports and plans and specifications for projects that transport domestic wastewater within the jurisdictional boundaries of that municipality;

(3) the municipality shall issue a written approval document that includes the details of each project approved for construction and all variances approved; and

(4) the municipality shall maintain complete files of all review and approval activities.

(g) The executive director may perform periodic audits of a municipality's review and approval program to ensure that the review process and approved projects comply with this chapter.

(1) The executive director shall provide written notice of a pending audit to a municipality a minimum of five business days prior to beginning an audit.

(2) The municipality shall make all files relating to its review and approval activities under this chapter available to the executive director, and shall maintain files for the life of each project.

(3) The municipality shall make documentation of all agreements between private consultants and the municipality that relate to its review and approval activities under this chapter available to the executive director.

(h) If the executive director finds, through review of specific projects or through audit of a municipality's review and approval program, that a municipality's review and approval program does not provide for compliance with the minimum design and installation requirements detailed in this chapter, the municipality must achieve compliance within a time frame established by the executive director.

(i) If the municipality does not achieve the required compliance within the time frame established by the executive director, the commission may revoke the review authority of a municipality. If the commission revokes the municipality's approval authority, subsections (j), (k), (l), and (m) of this section apply.

(j) The executive director shall notify a municipality in writing of the intention to revoke the municipality's approval authority and shall include a justification for revoking the authority.

(k) If the executive director revokes the approval authority of a municipality, all new projects proposed to be constructed within that municipality's jurisdiction must be submitted to the executive director in accordance with §217.6 of this title (relating to Submittal Requirements and Review Process).

(l) If the executive director revokes the approval authority of a municipality, the municipality shall return all subsequently submitted plans and specifications in its jurisdiction and notify any applicants of the requirement to seek approval from the executive director.

(m) If the executive director revokes the approval authority of a municipality, owners of a project whose plans and specifications were already approved by the municipality are not required to seek approval from the executive director.

§217.9. Texas Water Development Board Reviews.

If the Texas Water Development Board reviews plans and specifications for a collection system or wastewater treatment facility in accordance with Texas Water Code, §17.276(d), the owner shall send a copy of the approval to the executive director.

§217.10. Final Engineering Report.

(a) An owner shall submit an engineering report within 30 days of the date of the executive director's written request.

(b) The engineering report must include the signed and dated seal of the engineer responsible for the engineering report.

(c) The engineering report must include all pertinent calculations, analyses, graphs, formulas, constants, tables, geologic information, hydraulic information, hydrological information, historical data, manufacturer's recommendations, technical assumptions, and any other information needed to demonstrate that the design of the project complies with this chapter.

(d) If a variance is requested, the engineering report must include a justification for the variance and all pertinent supporting calculations, analyses, graphs, formulas, constants, tables, geologic information, hydraulic information, hydrological information, historical data, manufacturer's recommendations, technical assumptions, and any other information needed to justify the variance request.

(e) If the executive director requests additional information for the engineering report, an owner shall submit the requested information prepared, signed, and sealed by an engineer, within 30 days after the date of a written request.

(f) The engineering report for a collection system project must include the following:

(1) a map showing the current service area, the proposed service area, and any area proposed for future expansion;

(2) the topographical features of the current, the proposed, and any future service areas;

(3) a description of how the design flow was determined;

(4) the minimum and maximum grades for each size and type of pipe;

(5) calculations of expected minimum and maximum velocities in the collection system for each size and type of pipe;

(6) the proposed project's effect on the existing collection system's capacity;

(7) the existing and anticipated inflow and infiltration, the hydraulic effect of the inflow and infiltration on the proposed and existing systems, inflow and infiltration flow rate monitoring, and inflow and infiltration abatement measures;

(8) a description of the ability of the existing and proposed trunk and interceptor collection systems and lift stations to handle the peak flow;

(9) the capability of the associated wastewater treatment facility to receive and treat the anticipated peak flow;

(10) an engineering analysis demonstrating compliance with structural design, minimization of odor-causing conditions, and pipe design requirements of this chapter;

(11) a description of the areas not initially served by the project, and the projected means of providing service to these areas, including special provisions incorporated into the present plans for future expansion;

(12) the calculations and pump curves showing the operating characteristics of all collection system lift stations at minimum, maximum, and design flows during both present and future conditions; and

(13) the safety considerations incorporated into a project design, including ventilation, entrances, working areas, explosion prevention, and methods for rerouting a portion of the collection system during repair work.

(g) The engineering report for a wastewater treatment facility project must include the quantity and characteristics of the influent, wastewater treatment facility siting information, a sludge management plan, methods to control bypassing, calculations and supporting information.

(1) Influent Characteristics. The engineering report must include quantity and characteristics of any existing wastewater influent, any proposed changes to the influent quantity and characteristics, and any anticipated changes to the influent quantity and characteristics.

If adequate records are not available, analyses must be made of the existing conditions, and the results included in the engineering report.

(2) Wastewater Treatment Facility Siting Information. The engineering report must include:

(A) a general location map for the proposed wastewater treatment facility;

(B) a description of the area surrounding the wastewater treatment facility that includes prevailing winds, water treatment facilities, water supply wells, surface water intakes, housing developments, industrial sites, highways, streets, parks, schools, recreational areas, shopping centers, and any other information required by the executive director;

(C) a map of the wastewater treatment facility site, including the site boundary, buffer zones, and the 100-year floodplain, with supporting documentation of compliance with the buffer zone criteria and the 100-year floodplain restrictions specified in §309.13 of this title (relating to Unsuitable Site Characteristics) that is clearly legible; and

(D) a map of the discharge route or land application unit that is clearly legible.

(3) Sludge Management Plan. The engineering report must include a sludge management plan that provides information regarding:

(A) the estimated quantity and quality of sludge that will be generated, including future sludge loads based on flow projections;

(B) the sludge treatment requirements for final disposal, and the sludge storage requirements for each alternative;

(C) a method of sludge transport, use, storage, and disposal; and

(D) the alternatives, contingencies, and mitigation plans that ensure reliable capacity and operational flexibility.

(4) Methods to Control Bypassing. The engineering report must include:

(A) information and data describing features to prevent bypassing such as auxiliary power, standby and duplicate units, holding tanks, stormwater clarifiers, or flow equalization basins; and

(B) operational arrangements such as the ability of pipes and valves to control flow through the treatment units and reliability of power sources to prevent unauthorized discharges of untreated or partially treated wastewater.

(5) Calculations and Supporting Information. The engineering report must include:

(A) the types of units proposed and their capacities;

(B) the detention times, surface loadings, and weir loadings pertinent to each wastewater treatment unit;

(C) a plot of the hydraulic gradient at peak flow conditions for all gravity lines;

(D) the anticipated operation mode of the wastewater treatment facility;

(E) organic and volumetric loadings pertinent to each treatment unit; and

(F) aeration demands and how those demands will be supplied.

§217.11. Construction of an Approved Project.

(a) An owner may not begin construction of a wastewater treatment facility with approved plans and specifications until the commission issues a wastewater permit for the wastewater treatment facility, unless the commission issues the owner an authorization to construct under Texas Water Code, §26.027(c).

(b) An owner must phase the construction of a wastewater treatment facility as required by the associated wastewater permit, unless a variance is granted under §217.4 of this title (relating to Variances).

(c) An owner must obtain a plans and specifications approval of a particular permitted phase before beginning to construct or operate under that permitted phase.

(d) A person is prohibited from allowing a discharge of untreated or partially treated wastewater during construction without a commission order for such discharge, such as an Emergency Order or a Temporary Order according to the requirements of Chapter 35 of this title (relating to Emergency and Temporary Orders and Permits; Temporary Suspension or Amendment of Permit Conditions).

(e) An owner that alters or constructs a treatment unit or collection system unit must comply with the requirements of this chapter that are in effect on the date the plans and specifications are submitted for approval unless granted a variance in accordance with §217.4 of this title.

(f) An owner that rehabilitates a collection system under §217.56(c) or §217.69 of this title (relating to Trenchless Pipe Installation; and Maintenance, Inspection, and Rehabilitation of the Collection System) must comply with the requirements of this chapter that are in effect on the date the plans and specifications are submitted for approval. The executive director may grant variances from specific requirements in this chapter according to §217.4 of this title for a rehabilitation project.

(g) The owner of an existing wastewater treatment facility that must apply for a new permit must comply with the requirements of this chapter that are in effect at the time the new permit application is received by the executive director.

(h) A wastewater treatment facility owner that never received a plans and specifications approval for an existing wastewater treatment facility or treatment unit must comply with the requirements of this chapter that are in effect at the time the lack of plans and specifications approval is discovered.

(i) A collection system owner that never received a plans and specifications approval for an existing collection system or collection system unit must meet the design criteria in effect at the time the lack of the plans and specifications approval is discovered.

§217.12. Substantial Design Changes.

(a) A substantial design change is a change to the approved plans and specifications or an approved variance of a process, equipment, or design that has the potential to alter the way a wastewater treatment facility or collection system functions.

(b) A substantial design change request must include the signed and dated seal of the engineer.

(c) If the executive director determines that a substantial design change may potentially endanger public health or the environment, the executive director may deny the design change or require the owner to take compensatory measures.

(d) The executive director shall not grant or approve a substantial design change that would violate any expressed prohibition in this chapter.

(e) If the executive director does not notify an owner in writing that additional information is requested or that a substantial design change is denied within 30 business days after receiving a signed, dated, and sealed substantial design change request, the substantial design change is approved as long as it does not violate any prohibition in this chapter. However, such approval is conditional subject to an executive director determination under subsection (c) or (d) of this section. Additionally, if this provision conflicts with any other rule in this chapter that requires written approval from the executive director, then this provision does not apply.

(f) A substantial design change must be approved by the executive director before it can be constructed, installed, or put into service.

§217.13. Final Construction Drawings and Specifications.

(a) If requested by the executive director, an owner shall submit final construction drawings and specifications for a constructed collection system or constructed wastewater treatment facility within 30 days from the date of the request.

(b) The signed and dated seal of an engineer must be on each sheet of the final construction drawings and on the title page of the bound final specifications.

(c) The final construction drawings and specifications must include each of the items in the following paragraphs that are applicable to the project.

(1) Construction drawings for a collection system.

(A) The drawings for a collection system must include plan and profile drawings for both gravity pipes and pressure pipes. The drawings must specify the size, grade, and type of pipe materials.

(B) The drawings must specify the location of any structural features of a collection system, including manholes, waterway crossings, bridge crossings, siphons, lift stations, and air release valves.

(C) The drawings must specify the location of all potable water distribution lines that are 9.0 feet or closer to any portion of a collection system and indicate the actual separation distances.

(D) The drawings must include dimensional section details of manholes, manhole covers, and any other collection pipe appurtenances.

(E) The drawings for a lift station must show the location of the following:

(i) all pumps, valves, pumping control equipment, safety equipment, and ventilation equipment;

(ii) points that may be accessed by operational staff, such as manholes and cleanout ports;

(iii) hatches and hoisting equipment for installing and removing equipment;

(iv) slope and location of any wet well, floor grouting, valve vaults, valve vault pipes, and gas migration prevention measures used between a wet well and a valve vault;

(v) pipe entrances and exits;

(vi) sump pumps;

(vii) elevations of level control switches; and

(viii) any other lift station-related appurtenances.

(2) Construction drawings for a wastewater treatment facility.

(A) The drawings for a wastewater treatment facility must show a vertical and horizontal scale and must include:

(i) plan drawings of all pipes;

(ii) plan and profile drawings of each treatment unit;

(iii) the dimensions of each treatment unit;

(iv) all mechanical, electrical, and construction details; and

(v) a hydraulic profile of a wastewater treatment facility at both design and peak flows.

(B) The construction drawings may include plans for future expansion of a wastewater treatment facility.

(C) The construction drawings may include a clarification of any complex details of pipe systems by including an isometric flow diagram.

(3) The specifications for an alteration of an existing collection system or wastewater treatment facility must include technical descriptions of all equipment including:

(A) the quantity and sizes of any equipment;

(B) any applicable materials specifications;

(C) testing requirements; and

(D) citations to national standards with which the project complies.

(4) If requested by the executive director in writing, an owner must submit additional information relating to the plans and specifications within 30 calendar days after the date the executive director sends a request.

§217.14. Completion Notice.

(a) Upon completion of the construction of a collection system or wastewater treatment facility, an owner shall provide a completion notice to the executive director that:

(1) is signed, sealed, and dated by an engineer;

(2) certifies that the completed work complies with this chapter, the approved plans and specifications, any approved variances, any approved substantial design changes, and the associated wastewater permit; and

(3) states that an operation and maintenance manual, as required in §217.16 of this title (relating to Wastewater Treatment Facility Operation and Maintenance Manual), has been prepared and a copy is located at the wastewater treatment facility.

(b) An owner shall disclose in a completion notice any deviation from the approved plans and specifications that is incorporated into a project after construction began or from an approved substantial design change. An owner shall retain an engineer to review design changes and to certify, based on best professional judgment, all

substantial design changes were submitted for approval, as substantial design change is defined in §217.12(a) of this title (relating to Substantial Design Changes).

§217.15. Inspection.

(a) The executive director may inspect a project at any time during any phase of the project to determine compliance with the project plans and specifications, the engineering report, any variance approval, any substantial change approval, an associated permit, or the requirements of this chapter.

(b) All documents required by this chapter must be available for review by the executive director upon request, according to the requirements in §217.18 of this title (relating to Provisions that Apply to All Sections in this Chapter).

§217.16. Wastewater Treatment Facility Operation and Maintenance Manual.

(a) An owner of a wastewater treatment facility is responsible for developing an operation and maintenance manual with the assistance of an engineer and certified wastewater operations staff. The manual must be updated when there are personnel changes, construction of treatment units, alteration of treatment units, re-rating of

treatment units, or changes in the influent quality or quantity that require permanent changes in the operation of the wastewater treatment facility.

(b) An owner must ensure that the operation and maintenance manual includes all information specific to the wastewater treatment facility that is necessary to ensure efficient and safe operation, maintenance, monitoring, and reporting. The operation and maintenance manual must include administrative and recordkeeping items, operation and maintenance information, and safety information.

(1) Administrative and recordkeeping items must include:

(A) a table of contents;

(B) a copy of the current wastewater permit;

(C) names and telephone numbers for contacts with the appropriate state and federal regulatory agencies;

(D) names or job titles and current telephone numbers of staff contacts;

(E) a copy of the final engineering report, construction drawings, and specifications for each project, as required by §217.10 and §217.13 of this title (relating to Final Engineering Report; and Final Construction Drawings and Specifications);

(F) a copy of all documents required by this chapter, including correspondence with the executive director regarding approval of plans and specifications for each project;

(G) a copy of all manufacturer's recommendations relied on in the design of each project;

(H) a sample of each type of Discharge Monitoring Report or Monthly Effluent Report an owner is required to submit for the wastewater treatment facility;

(I) a sample daily activity report for documenting internal monitoring done in association with internal process control, including flow rates from treatment units, dissolved oxygen levels, pH, solids concentrations, sludge settling, clarifier sludge blanket depths, sludge age or retention time, and disinfection residuals; and

(J) a description of the quality assurance and quality control recordkeeping requirements for all laboratory analyses performed.

(2) Operation and maintenance information must include:

(A) expected flow patterns, size, and capacity of all treatment units and processing units within the wastewater treatment facility;

(B) start-up procedures, routine operational procedures, emergency operations procedures, and shut down procedures for all treatment units and processing units;

(C) the manner and expected volumes in which solids return to aeration or waste;

(D) expected solids concentrations in each treatment unit and processing unit;

(E) expected clarifier weir overflow rates;

(F) expected disinfectant and dechlorination usage and dosage amounts during normal and emergency operating conditions;

(G) descriptions and frequencies of all routine in-situ and laboratory analyses to be performed and a list of references to standard analytical procedures;

(H) description and schedule of routine maintenance activities to be performed, including lubrication and inspection of all pumps, motors, and other equipment;

(I) the design life of each treatment unit; and

(J) a recommended spare parts inventory with source information.

(3) Safety requirements information must include:

(A) all known potential or actual safety hazards within a wastewater treatment facility;

(B) the location and method of use for all personal protective equipment in accordance with §217.324(a) of this title (relating to Chemical Handling);

(C) a schedule for servicing all personal protective equipment, respiratory equipment, and protective equipment;

(D) evacuation, shelter, and shelter-in-place plans;

(E) the names and phone numbers of entities and individuals to be contacted during emergencies;

(F) emergency operation plans for power outages, flooding, and other site specific emergency situations that may develop;

(G) annual safety training curriculum and schedule for all wastewater treatment facility staff;

(H) first aid precautions, location of first aid supplies and description of appropriate emergency medical treatment;

(I) chemical disposal methods that comply with §217.247(q) of this title (relating to Chemical Pretreatment of Sludge), if applicable;

(J) ultraviolet light precautions in accordance with §217.299 of this title (relating to Ultraviolet Light Disinfection System Safety), if applicable; and

(K) hazardous task precautions in accordance with §217.323(b) of this title (relating to Hazardous Operation and Maintenance), if applicable.

(c) An owner shall keep a copy of a current operation and maintenance manual at the wastewater treatment facility site. The operation and maintenance manual shall be immediately available for inspection by the executive director upon request.

(d) An owner shall submit a copy of the operation and maintenance manual to the executive director within 30 days of a written request from the executive director.

§217.17. Collection System Records.

An owner of a collection system shall maintain collection system records for the life of the project. An owner shall make the following records available to the executive

director in accordance with §217.18(d) of this title (relating to Provisions that Apply to All Sections in this Chapter):

(1) a copy of the final engineering report, construction drawings, and specifications for each project, as required by §217.10 and §217.13 of this title (relating to Final Engineering Report; and Final Construction Drawings and Specifications);

(2) a copy of all documents required by this chapter, including correspondence with the executive director regarding approval of plans and specifications for each project; and

(3) a copy of all manufacturer's recommendations relied on in the design of each project.

§217.18. Provisions that Apply to All Sections in this Chapter.

(a) Whenever this chapter requires a "design," such designed component of the wastewater treatment facility or collection system must also be installed, operated, and maintained to meet the design requirement.

(b) All safety and emergency equipment required in this chapter must be operational for its intended use and maintained in a readily accessible location.

(c) Copies of all written executive director approvals must be kept with all other records required to be maintained by the wastewater treatment facility.

(d) Copies of all records required to be maintained by the wastewater treatment facility:

(1) must be readily available for inspection by the executive director within 24 hours after either a written or verbal request; and

(2) must be submitted to the executive director within 15 days of a written request.

SUBCHAPTER B: WASTEWATER TREATMENT FACILITY DESIGN REQUIREMENTS

§§217.31 - 217.35, 217.36 - 217.39, 217.40

Statutory Authority

The amendments and new sections are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new sections implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.31. Applicability.

This subchapter details the design values that an owner shall use when determining the size of any wastewater treatment facility component. This subchapter applies to the treatment design for a new wastewater treatment facility, the alteration of an existing wastewater treatment facility, the re-rating of an existing wastewater treatment facility, and to an existing wastewater treatment facility that is required to apply for a new permit.

§217.32. Organic Loadings and Flows for New Wastewater Treatment Facilities.

(a) The design of a new wastewater treatment facility must be based on the flows and loadings in paragraphs (1) - (3) of this subsection, unless subsection (b) of this section applies.

(1) Design flow.

(A) If the flow is greater than or equal to 1.0 million gallons per day, as determined by multiplying the per capita flow in Table B.1. in paragraph (3) of this

subsection by the number of individuals in the service area, then the design flow is the flow calculated from the table.

(B) If the flow is less than 1.0 million gallons per day as determined by multiplying the per capita flow in Table B.1. in paragraph (3) of this subsection by the number of individuals in the service area, then the design flow is determined by multiplying the average annual flow calculated from the table by a factor of at least 1.5.

(C) The design flow must be based on the flow authorized in the wastewater treatment facility's wastewater permit.

(2) Peak flow. When site-specific data is unavailable, the peak flow must be determined by multiplying the design flow by a factor of at least 4.0. If site-specific data or projections are available, the peak flow must be based on the site-specific data.

(A) If the average daily peaking factor at a wastewater treatment facility exceeds 4.0, the actual daily peaking factor must be used to calculate the peak flow, unless flow equalization is provided.

(B) If a wastewater treatment facility experiences occasional peak events with a peaking factor that exceeds 5.0, the event-based peaking factor must be used to calculate the peak flow, unless flow equalization is provided.

(C) In a wastewater treatment facility with flow equalization, the subsequent treatment units may be designed for a lower estimated peak flow. The engineering report shall include data that supports the lower estimated peak flow.

(D) A treatment unit, pipe, weir, flume, disinfection unit, or any other treatment unit that is flow limited must be sized to transport or treat the peak flow.

(3) Design organic loading. If available, actual organic loading data must be used as the basis for the design of the wastewater treatment facility. If actual organic loading data is not available, the design organic load must be determined by using the following table. The design organic load is determined by multiplying the annual average flow from the projected uses by the corresponding influent concentrations:

Figure: 30 TAC §217.32(a)(3)

Table B.1. - Design Organic Loadings and Flows for a New Wastewater Treatment Facility

Source	Remarks	Daily Wastewater Flow (gallons/person)	Wastewater Strength (mg/l BOD_5)	Wastewater Strength (mg/l NH_3-N)
Municipality	Residential	75-100	250-400	15-75
Subdivision	Residential	75-100	250-400	15-75
Trailer Park (Transient)	2½ Individuals per Trailer	50-60	250-350	15-75
Mobile Home Park	3 Individuals per Trailer	50-75	300	15-75
School	Cafeteria & Showers Cafeteria/No Showers	20 15	300 300	15-75 15-75
Recreational Parks	Overnight User Day User	30 5	200 100	15-75 15-75
Office Building or Factory	A facility must be designed for the largest shift	20	300	15-75
Hotel/Motel	Per Bed	50-75	300	15-75
Restaurant	Per Meal	7-10	1000*	15-75
Restaurant with bar or cocktail lounge	Per Meal	9-12	1000*	15-75
Hospital	Per Bed	200	300	15-75
Nursing Home	Per Bed	75-100	300	15-75
Alternative Collection Systems (Subchapter D of this chapter)	Per Capita	75	N/A	N/A
*Based on a restaurant with a grease trap				

(b) An owner designing a new wastewater treatment facility that will serve the same service area as an existing wastewater treatment facility must use historical data from the existing wastewater treatment facility to design the new wastewater treatment facility, if there is enough historical data to meet the needs of §217.34 of this title (relating to Organic Loadings and Flows for Existing Wastewater Treatment Facilities, Re-Ratings, and Alterations). The engineering report must justify the design conclusions that are based on existing data.

§217.33. Flow Measurement.

(a) A wastewater treatment facility must include a means of effluent flow measurement with less than 10% error, or the manufacturer's error tolerance, whichever is less, throughout the expected range of flows.

(b) An effluent flow-measuring device must have an open channel to allow for easy inspection, calibration, and cleaning.

(c) Flow measurement must use a combination of primary and secondary flow measuring devices.

(1) Primary flow measuring devices.

(A) A primary flow measuring device must include a weir or a flume.

(B) A primary flow measuring device must have a non-corrosive ruler (staff gauge) that is graduated in no greater than 1/4 inch increments that are clearly visible.

(C) A primary flow measuring device must allow for manual measurement of water depth.

(2) Weirs.

(A) A channel approach section to a weir must be straight for a length at least 20 times the maximum expected head height on a weir at peak flow. An owner may use manufacturer's recommendations in lieu of this requirement if approved in writing by the executive director.

(B) The minimum distance between a channel bottom and a weir crest must be at least twice the maximum head height on the weir at peak flow, or 1.0 foot, whichever is greater.

(C) The upstream edge of a weir must not be corroded.

(D) The crest of a weir must be exactly level to ensure a uniform depth of flow.

(E) The upstream face of a weir must be smooth and perpendicular to the axis of the channel in both the horizontal and vertical directions.

(F) A secondary flow measuring device must be installed:

(i) upstream of the weir at a distance of three times the maximum head height on a weir at peak flow; or

(ii) at the location and distance recommended by the equipment manufacturer.

(3) Flumes.

(A) A flume must be located in a straight section of an open channel.

(B) A flume must be installed in accordance with the manufacturer's recommendations.

(C) A flume must distribute the approaching flow evenly across a flow channel to preclude turbulence and waves.

(4) Secondary flow measuring devices.

(A) A wastewater treatment facility must use a totalizing meter as a secondary flow measuring device, which must measure the liquid level discharging through the primary flow measuring device and convert this liquid level into a flow rate that is integrated to a totalized flow.

(B) A secondary flow measuring device must be installed in accordance with the manufacturer's recommendations and in a manner that reduces turbulence and promotes laminar flow.

(C) A secondary flow measuring device must include a display of the instantaneous flow rate and a means of reading the totalized flow.

(D) A secondary flow measuring device must be designed to allow recalibration.

(E) A secondary flow measuring device must not interfere with the accuracy of the primary flow measuring device.

§217.34. Organic Loadings and Flows for Existing Wastewater Treatment Facilities, Re-Ratings, and Alterations.

An owner who proposes to alter, or re-rate an existing wastewater treatment facility, or to obtain approval for an existing wastewater treatment facility after that wastewater treatment facility's permit has expired, is required to use the wastewater treatment facility's current operating data for flow and organic loading (biochemical oxygen demand or carbonaceous biochemical oxygen demand, total suspended solids, and ammonia nitrogen, as required by the permit) as the design basis. The compiled data must meet the criteria outlined in paragraphs (1) and (2) of this section.

(1) Flows.

(A) When an existing wastewater treatment facility is to be re-rated or altered, the wastewater treatment facility's data for the last five years must be used to

determine the annual average flow, the maximum monthly average flow, the peak flow, the ratio of maximum monthly average flow to annual average flow, and the ratio of the peak flow to the annual average flow. All flow data for these analyses must be collected by a totalizing meter. If the wastewater treatment facility is less than five years old, all existing data must be used. All calculations and assumptions must be included in the engineering report.

(B) An analysis of the peak flow must be based on a frequency distribution analysis using flow charts for each individual day.

(C) The projected peak flow must be the result of collection system monitoring or modeling based on a two-year, 24-hour storm event for the service area.

(D) For a wastewater treatment facility that will not be affected by future growth, the design flow for a re-rating or alteration must be calculated using the wastewater treatment facility's average flow plus one standard deviation.

(E) For a wastewater treatment facility that will be affected by future growth, the design flow for a re-rating or alteration must be based on future flow, calculated using anticipated changes from the existing flow. The design analysis may use

a linear regression or other appropriate statistical method for predicting the design flow when significant data exists.

(2) Organic loadings.

(A) When an existing wastewater treatment facility is to be re-rated or altered, the design organic loading must be calculated based on the average daily organic loading.

(i) The data used to determine the organic loading must be from the analyses of at least three composite samples of the influent wastewater per week, taken during days with representative flow, for a period of at least one year. If samples are collected at a frequency of less than three times per week or less than a three-part composite sample, the executive director may require an owner to collect and analyze additional samples that are representative of actual conditions at the wastewater treatment facility. The data must include samples collected during both wet and dry weather conditions.

(ii) If the samples are not 24-hour flow-weighted composite samples, the samples must be representative of the peak loading.

(iii) Sample data must include the following parameters, at a minimum, unless monitoring of the parameter is not required by the wastewater permit:

(I) five-day carbonaceous biochemical oxygen demand or five-day biochemical oxygen demand;

(II) total suspended solids; and

(III) ammonia-nitrogen.

(B) The owner must provide an engineering analysis for the minimum sampling period in the engineering report, which must include:

(i) a summary of the monthly data;

(ii) the average monthly load; and

(iii) the standard deviation of the monthly data.

(C) For a wastewater treatment facility that will not be affected by future growth, the design organic loading for a re-rating or alteration must be calculated using the wastewater treatment facility's average organic loading plus one standard deviation.

(D) For a wastewater treatment facility that will be affected by future growth, the design organic loading for a re-rating or alteration must be based on future loading calculated using anticipated changes from the existing loading. The design analysis may use a linear regression or other appropriate statistical method for predicting the design organic load when significant data exists.

(E) The design organic loading must be used to determine the required size of each treatment unit that provides treatment of organic waste.

§217.35. One Hundred-Year Flood Plain Requirements.

(a) If a 100-year flood plain is located within 1,000 feet of the site of a wastewater treatment facility, the 100-year flood plain must be shown on the site plan. A flood plain determination must be based on a superimposition of the 100-year flood elevation on the most accurate available topography and elevation data for the site.

(1) A 100-year flood plain must be based on the Federal Emergency Management Agency (FEMA) Flood Insurance Study in effect at the time the plans and specifications are submitted to the executive director. FEMA maps are prima facie evidence of flood plain locations.

(2) An appropriate flood insurance rate map or Flood Insurance Study profile, adjusted to the site's vertical data, may be used to determine flood elevations.

(3) If a site is adjacent to a FEMA 100-year flood delineation, but has no flood elevation published, a 100-year flood elevation may be determined by overlaying the effective FEMA delineation over a United States Geological Survey Quadrangle Map and interpolating a flood elevation.

(4) If FEMA flood plain information is not available, the engineering report shall include a 100-year flood elevation based on the best information available.

(b) The 100-year flood plain must be shown on the profile drawings.

(1) The FEMA 100-year water surface elevation must be marked on a hydraulic profile of a wastewater treatment facility in accordance with the vertical scale of the drawing.

(2) If a wastewater treatment facility will occupy less than 1,000 feet of shoreline along a flood plain, the profile must show a single line coincident with the elevation of the centerline of any outfall pipe.

(3) If a wastewater treatment facility will occupy 1,000 feet or more of shoreline along a flood plain, the profile must show the water surface elevation at both the upstream and downstream limits of any protective structure for the wastewater treatment facility.

(c) The executive director will not approve a design of a proposed treatment unit within a 100-year flood plain, unless the design provides protection for all open process tanks and electric units from inundation during a 100-year flood event.

§217.36. Emergency Power Requirements.

(a) A wastewater treatment facility must be designed to prevent the discharge of untreated or partially treated wastewater during electrical power outages.

(b) A wastewater treatment facility must include an audiovisual alarm system. The alarm system must transmit all alarm conditions through the use of an auto-dialer

system, a Supervisory Control and Data Acquisition (SCADA) system, or a telemetering system connected to a continuously monitored location. Audiovisual alarms are not required if the SCADA system notifies the operator about communication loss, in addition to all other alarm conditions.

(c) An alarm system must self-activate if:

(1) the power supply is interrupted;

(2) a pump fails; or

(3) a high water level alarm is triggered.

(d) An alarm system must include self-testing capability at the control panel.

(e) An owner shall determine the reliability of the existing commercial power service for a wastewater treatment facility using records from the past 60 consecutive months from the electric utility that serves the wastewater treatment facility. The entire record must be used if 60 months of records are not available. The owner must provide the power outage records and the reliability determination in the engineering report. The records must:

(1) be in writing;

(2) be on the electric utility's letterhead and bear a signature of an electric utility employee who has knowledge of data about power outages;

(3) identify the location of the wastewater treatment facility;

(4) list the total number of power outages that have occurred during the past 60 consecutive months; and

(5) indicate the date and duration of each recorded power outage.

(f) The executive director may consider documentation of commercial power system upgrades and their effects on the reliability of commercial power. Documentation of upgrades and their effects on power reliability must be submitted to the executive director in writing on the electric utility's letterhead and must bear the signature of an electric utility employee.

(g) Systems for preventing discharge of untreated or partially treated wastewater must operate for a duration at least equal to the longest power outage on record for the

past 60 consecutive months, or at least 20 minutes, whichever is longer. The design must consider the effects of peak flow, inflow, and infiltration. If the longest power outage on record for the past 60 consecutive months is greater than 48 hours and generators will be used to provide backup power, then the owner must have a contract in place that guarantees fuel supply during an emergency. The owner must also have sufficient storage capacity at the wastewater treatment facility for the fuel for the duration of the emergency.

(h) Systems for preventing discharge of untreated or partially treated wastewater at a wastewater treatment facility must either be permanent features of the wastewater treatment facility, or be temporary power systems that are capable of being made operational before an unauthorized discharge occurs during any electrical power outage. The engineer must describe how a temporary power system will be deployed and operated in the engineering report, and must address deployment during all types of weather events that might reasonably cause a power outage at the wastewater treatment facility.

(i) Systems for preventing discharge of untreated or partially treated wastewater may include any combination of alternate power sources, on-site generators, interceptor systems, on-site retention, collection system storage, portable generators, mechanical backup systems, or other similar systems.

(1) Collection system storage may not be used as a sole means of preventing the discharge of untreated or partially treated wastewater during a power outage.

(2) The main power source and an alternate power source may not be provided by the same power plant.

(3) Portable generators and pumps may only be used to guarantee service if:

(A) a tested quick-connect mechanism and a properly sized automatic transfer switch is provided where the generator will be used; and

(B) a licensed operator that is knowledgeable in operation of the portable generators and pumps will be on call 24 hours per day every day.

(j) The engineering report must include a description of emergency operation of the wastewater treatment facility. Treatment units that require continuous operation during a power outage must be identified in the engineering report. The minimum

requirements for the systems that must be operational and additional engineering report requirements are listed in paragraphs (1) - (4) of this subsection.

(1) A wastewater treatment facility must be designed to achieve primary treatment and to disinfect the wastewater to ensure compliance with the bacteria limits established in the wastewater treatment facility's wastewater permit during all power outages, including outages that are longer than outage predicted based on the power reliability determination required in subsection (e) of this section.

(2) All components of the disinfection system, including any reclaimed water used to make a chemical solution, must operate at full capacity during all power outages according to the requirements of §217.37 of the title (relating to Disinfection System Power Reliability), including outages that are longer than outage predicted based on the power reliability determination required in subsection (e) of this section.

(3) Return activated sludge pumps must be operational during any power outage.

(4) If portable generators or pumps are used to guarantee service, the engineering report must include:

(A) the storage location of each generator and pump;

(B) the amount of time that will be needed to transport each generator or pump to where it will be used;

(C) the treatment units to which each generator or pump is designated as a backup; and

(D) the routine maintenance and upkeep that will be done for each portable generator and pump to ensure that they will be operational when needed.

§217.37. Disinfection System Power Reliability.

(a) A disinfection system must include a backup power system capable of providing sufficient power to operate continuously during all power outages in accordance with the requirements of §217.36 of this title (relating to Emergency Power Requirements), including outages that are longer than outage predicted based on the power reliability determination required in §217.36(e) of this title.

(b) A backup power system must automatically restart the disinfection system during a power outage.

(c) A backup power system must meet the requirements of §217.36 of this title.

§217.38. Buffer Zones and Odor Abatement.

(a) The buffer zone requirements in §309.13 of this title (relating to Unsuitable Site Characteristics) apply to all treatment units in a wastewater treatment facility.

(b) The engineering report must include the design of any odor abatement measures intended to comply with §309.13(e) - (g) of this title.

(c) An odor abatement measure that is used in lieu of buffer zones is subject to review in accordance with §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

§217.39. Wastewater Treatment Facility Use of Reclaimed Water.

(a) A wastewater treatment facility must use reclaimed water in place of potable water in all treatment units, for wash down water, and for irrigating the grounds within the boundaries of the wastewater treatment facility.

(b) A wastewater treatment facility must include a meter to measure reclaimed water use in the wastewater treatment facility.

(c) Reclaimed water may only be used after treatment in a secondary treatment process. Untreated or partially treated wastewater may not be used as reclaimed water. A reclaimed water system must provide for screening or filtration, a backup pump with controls, and a pressure-sustaining device such as a hydro-pneumatic tank.

(d) If disinfection is part of the treatment, reclaimed water may only be used after it has been disinfected.

(e) Reclaimed water may be used within the wastewater treatment facility with no further authorization from the executive director if it is used in accordance with this section and §210.4(c) of this title (relating to Notification).

§217.40. Signs with Emergency Contact Information.

A sign must be posted at the entrance of a wastewater treatment facility to provide the wastewater treatment facility name and current 24-hour contact information. The sign must be clearly visible and legible, with block lettering that is at least 1.5 inches tall.

SUBCHAPTER B: TREATMENT FACILITY DESIGN REQUIREMENTS

[§217.36]

Statutory Authority

The repeal of this section is adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted repeal of this section implements TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.36. Emergency Power Requirements.

SUBCHAPTER C: CONVENTIONAL COLLECTION SYSTEMS

§§217.51 - 217.62, 217.63, 217.64 - 217.68, 217.69, 217.70, 217.71

Statutory Authority

The amendments and new sections are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new sections implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.51. Applicability.

This subchapter applies to the design, construction, operation, maintenance, and testing of conventional gravity collection systems, conventional wastewater lift stations, force mains for wastewater transport, and reclaimed water conveyance systems.

§217.52. Edwards Aquifer.

An owner who plans to install a collection system located over the Edwards Aquifer recharge zone, as defined in §213.3 of this title (relating to Definitions), must design and install the collection system in accordance with Chapter 213 of this title (relating to Edwards Aquifer), in addition to this subchapter.

§217.53. Pipe Design.

(a) Flow Design Basis. An owner must use the requirements of this section to design a gravity collection system.

(1) A collection system must be designed to transport the peak flow from the service area, plus infiltration and inflow. The design must minimize inflow and infiltration. Flow calculations must be included in the engineering report.

(2) The flow calculations must include the details of the average flow, the flow peaking factor, and the infiltration and inflow.

(3) The flow calculations must include the flow expected in the wastewater treatment facility immediately upon completion of construction and at the end of a 50-year period following construction.

(b) Gravity Pipe Materials.

(1) An owner must identify in the engineering report the proposed gravity collection system pipe with its appropriate American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), or American Water Works Association (AWWA) standard numbers for both quality control (dimensions, tolerances, pipe stiffness, dimensional ratio, etc.) and installation (bedding, backfill, etc.).

(2) The selection of gravity collection system pipes must be based on:

(A) the characteristics of the wastewater conveyed;

(B) the possibility of septic conditions;

(C) the ability to minimize inflow and infiltration;

(D) any external forces;

(E) any groundwater conditions;

(F) the internal pressures; and

(G) the abrasion and corrosion resistance of the pipe material.

(c) Joints for Gravity Pipes.

(1) The specifications for joints for gravity pipes must include the materials and methods used in making joints.

(2) Materials used for gravity pipe joints must prevent inflow, infiltration, and root entrance. A joint must:

(A) include rubber gaskets;

(B) include polyvinyl chloride (PVC) compression joints;

(C) include high density polyethylene compression joints;

(D) be welded; or

(E) be heat fused.

(3) The specifications must include ASTM, AWWA, ANSI, or other appropriate national reference standards for the pipe joints.

(d) Separation Distances.

(1) Collection system pipes must be installed in trenches separate from water supply trenches.

(2) Wherever possible, a collection system pipe must be located below a water supply pipe. If a collection system pipe cannot be located below a water supply pipe, the owner must justify in the engineering report why it is not possible to locate the collection system pipe below the public water supply pipe.

(3) Wherever possible, collection system pipes and manholes must be located at least nine feet from all water supply pipes. If a collection system pipe or manhole cannot be located at least nine feet away from a water supply pipe, the owner must justify in the engineering report why it is not possible to provide at least nine feet of separation. Table C.1. in Figure: 30 TAC §217.53(d)(3) provides a reference to paragraphs in this subsection that apply if a collection system pipe or manhole cannot be located at least nine feet away from a water supply pipe.

Figure: 30 TAC §217.53(d)(3)

Table C.1.

Case	Protection Requirement
Parallel pipes within nine feet, where the collection system pipe is above the water supply pipe	Encased in a casing pipe according to paragraph (4) of this subsection
Crossing pipes within nine feet, where the collection system pipe is above the water supply pipe	Encased in a casing pipe according to paragraph (5)(A) of this subsection -or- Constructed using 150 per square inch (psi) pressure class pipe according to paragraph (5)(B) of this subsection
Parallel pipes within nine feet, where the collection system pipe is below the water supply pipe	Constructed using 150 psi pressure class pipe according to paragraph (6)(A) of this subsection -or- Encased in a casing pipe according to

	paragraph (6)(B) of this subsection
Crossing pipes within nine feet, where the collection system pipe is below the water supply pipe	Constructed using 150 psi pressure class pipe according to paragraph (7)(A) of this subsection -or- Encased in cement-stabilized sand according to paragraph (7)(B) of this subsection -or- Encased in a casing pipe according to paragraph (7)(C) of this subsection
Manhole within nine feet of a water supply pipe	No measurable leakage according to paragraph (8)(A) of this subsection -or- Encased in cement-stabilized sand according to paragraph (8)(B) of this subsection

(4) If a collection system pipe is located above a water supply pipe and runs parallel to the water supply pipe, each portion of the collection system pipe within nine feet of the water supply pipe must be encased. The casing pipe must be constructed of at least 150 per square inch (psi) pressure class pipe that:

(A) encases the entire length of collection system pipe that is within nine feet of the water supply pipe;

(B) is sealed at both ends with cement grout or a manufactured seal;

(C) is at least two nominal sizes larger than the wastewater collection pipe; and

(D) is supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.

(5) If a collection system pipe crosses above a water supply pipe, each portion of the collection system pipe within nine feet of the water supply pipe must either be encased in a casing pipe according to subparagraph (A) of this paragraph, or must be constructed using at least 150 psi pressure class pipe according to subparagraph (B) of this paragraph.

(A) A casing pipe for a collection system pipe that crosses above a water supply pipe must be constructed of at least 150 psi pressure class pipe that is:

(i) sealed at both ends with cement grout or a manufactured seal;

(ii) at least two nominal sizes larger than the wastewater collection pipe; and

(iii) supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.

(B) A collection system pipe that crosses above a water supply pipe must be constructed of at least 150 psi pressure class, corrosion-resistant, non-brittle pipe and must use manufacturer-approved adapters. Gasketed joints, compression joints, and other non-bonded joints must be designed to seal at atmospheric pressure.

(6) If a collection system pipe is located below a water supply pipe and runs parallel to the water supply pipe, each portion of the collection system pipe within nine feet of the water supply pipe must either be constructed using at least 150 psi pressure class pipe according to subparagraph (A) of this paragraph, or must be encased in a casing pipe according to subparagraph (B) of this paragraph.

(A) A collection system pipe that runs parallel to and below a water supply pipe must be constructed of at least 150 psi pressure class, corrosion-resistant, non-brittle pipe that:

(i) is located at least two vertical feet below the water supply pipe;

(ii) is located at least four horizontal feet away from the water supply pipe; and

(iii) includes joints that are designed to seal at atmospheric pressure.

(B) A casing pipe for a collection system pipe that runs parallel below a water supply pipe must be constructed of at least 150 psi pressure class pipe that:

(i) is sealed at both ends with cement grout or a manufactured seal;

(ii) is at least two nominal sizes larger than the wastewater collection pipe; and

(iii) is supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.

(7) If a collection system pipe crosses below a water supply pipe, each portion of the collection system pipe within nine feet of the water supply pipe must

either be constructed using at least 150 psi pressure class pipe according to subparagraph (A) of this paragraph, or must be encased in cement-stabilized sand according to subparagraph (B) of this paragraph, or must be encased in a casing pipe according to subparagraph (C) of this paragraph.

(A) A collection system that crosses below a water supply pipe and is constructed of at least 150 psi pressure class, corrosion-resistant, non-brittle pipe must:

(i) have at least six inches of separation between the outsides of the pipes;

(ii) be centered on the crossing;

(iii) be at least 18 feet long; and

(iv) terminate at joints that are designed to seal at atmospheric pressure.

(B) A collection system pipe that crosses below a water supply pipe and is constructed of any material other than at least 150 psi pressure class, corrosion-resistant, non-brittle pipe must:

(i) have at least two feet of separation between the outsides of the pipes; and

(iii) be encased in cement-stabilized sand backfill that meets the requirements of subparagraph (D) of this paragraph.

(C) A casing pipe for a collection system pipe that crosses below a water supply pipe must be constructed of at least 150 psi pressure class pipe that is:

(i) sealed at both ends with cement grout or a manufactured seal;

(ii) at least two nominal sizes larger than the wastewater collection pipe; and

(iii) supported by spacers between the collection system pipe and the encasing pipe at a maximum of five-foot intervals.

(D) Cement-stabilized sand for encasing collection system pipes must:

(i) include at least 160 pounds of cement for every cubic yard of sand;

(ii) be installed beginning one-quarter pipe diameter below the centerline of the collection system pipe;

(iii) be installed ending one full pipe diameter above the top of the collection system pipe, or 12 inches above the top of the collection system pipe, whichever is greater.

(8) If a nine-foot separation distance between a manhole and a water supply pipe cannot be achieved, the manhole must either:

(A) have no measurable leakage during a leakage test conducted according to the requirements in §217.58 of this title (relating to Testing Requirements for Manholes); or

(B) have all portions of the manhole within nine feet of a water supply pipe encased in at least one foot of cement stabilized sand that meets the requirements of paragraph (7)(D)(i) and (ii) of this subsection.

(e) Building Laterals and Taps. Building laterals and taps must:

(1) include a manufactured fitting that prevents infiltration and root entrance;

(2) prevent service lines from protruding into the collection system pipe; and

(3) protect the mechanical and structural integrity of a collection system.

(f) Bore or Tunnel for Crossings. The spacing of supports for carrier pipe through casings must maintain the grade, slope, and structural integrity of the pipe as required by subsection (k) of this section.

(g) Corrosion Potential of Collection System Pipes.

(1) The engineering report must include calculations or other information that demonstrate the structural integrity of a pipe during the minimum 50-year design life cycle if a pipe or an integral structural component of a pipe has potential to deteriorate when subjected to corrosive internal conditions, or if a pipe or component does not have a corrosion resistant liner or protective coating installed by the pipe manufacturer.

(2) If the corrosion analysis indicates that corrosion will reduce the functional life of the pipe to less than 50 years based on the structural analysis in subsection (k) of this section, then the pipe must have a lining or protective coating that will extend the functional life to 50 years.

(h) Odor Control.

An owner shall implement odor control measures necessary to prevent a collection system from becoming a nuisance.

(i) Active Geologic Faults.

(1) An owner shall identify all active faults within the boundaries of the collection system project and minimize the number of collection system lines crossing faults.

(A) If the crossing of a collection system over an active fault is unavoidable, the engineering report must specify design features that protect the structural integrity of a collection system in the event of movement of the fault.

(B) If a collection system line crosses an active fault line, the design must specify:

(i) joints that provide maximum flexibility; and

(ii) manholes on each side of the fault that would allow a portable pump to be used to prevent unauthorized discharge of wastewater in the event of a collection system failure.

(2) An owner shall not install a collection system service connection within 50 feet of an active fault.

(j) Capacity Requirements.

(1) An owner must ensure that a collection system's capacity is sufficient to serve the estimated future population of the area served by the project, including institutional, industrial, and commercial flows.

(2) An owner must include calculations in the engineering report that demonstrate the hydraulic capacity of a collection system, accounting for the peak flow of domestic wastewater, peak flow of wastewater from industrial sites, and maximum expected infiltration rates.

(3) An owner must ensure that the collection system has capacity to prevent a surcharge.

(4) An owner must ensure that a gravity pipe is at least 6.0 inches in diameter.

(5) Any connection between a stormwater collection system and a wastewater collection system is prohibited.

(6) An owner may use the data from an existing collection system for design purposes. In the absence of existing data, a design must use data from a system with similar characteristics, including:

(A) location;

(B) inflow and infiltration characteristics;

(C) peak flows;

(D) pipe materials;

(E) customer base; and

(F) any other characteristics required by the executive director.

(7) New collection systems.

(A) The sizing of pipe for a new collection system must be based on an engineering analysis of initial and future peak flow of domestic wastewater, peak flow of waste from industrial sites, and maximum expected infiltration rates.

(B) A new collection system design must be sized for the peak flow, which is based on the estimated daily wastewater flow contribution as shown in Table B.1. in Figure: 30 TAC §217.32(a)(3) of this title (relating to Organic Loadings and Flows for New Wastewater Treatment Facilities).

(k) Structural Analysis.

(1) An owner must ensure that a collection system is designed to have a minimum structural life of 50 years.

(2) For flexible pipe used in a collection system, which is pipe that will deflect at least 2% without structural distress, the engineering report must include:

(A) live load calculations;

(B) allowable buckling pressure determinations;

(C) prism load calculations;

(D) wall crushing determinations;

(E) strain prediction calculations;

(F) calculations that quantify long-term pipe deflection;

(G) the method of determining the modulus of soil reaction for bedding material and in-situ material;

(H) pipe diameter and material with reference to appropriate standards;

(I) modulus of elasticity;

(J) tensile strength;

(K) pipe stiffness, or ring stiffness constant converted to pipe stiffness;

(L) Leonhardt's zeta factor;

(M) trench width;

(N) depth of cover;

(O) water table elevation; and

(P) unit weight of soil.

(3) For trench installations, the design must specify a minimum stiffness requirement to ensure ease of handling, transportation, and construction. Pipe stiffness must be related to the ring stiffness constant by Equation C.1. in Figure: 30 TAC §217.53(k)(3)

Figure: 30 TAC §217.53(k)(3)

Equation C.1.

$$PS = C \times RSC \times \left(\frac{8.337}{D} \right)$$

Where:
PS = Pipe stiffness in pounds per square inch (psi)
C = Conversion factor, (0.80)
RCS = Ring stiffness constant
D = Mean pipe diameter in inches

(4) The owner is not required to perform the structural calculations in paragraphs (2) and (3) of this subsection, if the pipe is installed and tested in accordance with all other requirements of this subchapter and meets all of the following:

(A) the pipe is installed using an open trench design;

(B) the pipe is flexible pipe with a pipe stiffness of 46 psi or greater;

(C) the pipe is buried 17 feet or less from the ground surface;

(D) the pipe has a diameter of 12 inches or less;

(E) the modulus of soil reaction for the in-situ soil is 200 psi or greater;

(F) there are no effects on the pipe due to live loads from vehicles driving over the pipe;

(G) the unit weight of soil used for backfill is 120 pounds per cubic foot or less; and

(H) the pipe trench width is 36 inches or greater.

(5) A design analysis for rigid pipe installations must be included in the engineering report. The design analysis must include a structural analysis and all details necessary to verify that the structural strength is sufficient to withstand the expected stresses. For rigid pipes, the minimum strength for each class of pipe material and the appropriate standard must be included.

(l) Minimum and Maximum Slopes.

(1) All collection systems must contain slopes sufficient to allow a velocity not less than 2.0 feet per second when flowing at full capacity.

(2) When site-specific data is not available, a collection system must be designed in accordance with the minimum and maximum slopes specified in this paragraph.

(A) The slopes shown in the following table are based on Manning's formula with an assumed "n factor" of 0.013 and are the minimum acceptable slopes.

Figure: 30 TAC §217.53(l)(2)(A)

Table C.2. - Minimum and Maximum Pipe Slopes

Size of Pipe *(inches)*	**Minimum Slope** *(%)*	**Maximum Slope** *(%)*
6	0.50	12.35
8	0.335	8.40
10	0.25	6.23
12	0.20	4.88
15	0.15	3.62
18	0.115	2.83
21	0.095	2.30
24	0.08	1.93
27	0.07	1.65
30	0.06	1.43
33	0.055	1.26
36	0.045	1.12
39	0.04	1.01
>39	*	*
* For pipes larger than 39 inches in diameter, the slope is determined by Manning's formula to maintain a velocity greater than 2.0 feet per second and less than 10.0 feet per second when flowing full.		

(i) The minimum acceptable "n" value for design of minimum pipe slopes is 0.013.

(ii) The "n" value must take into consideration the slime, grit, and grease layers that will affect hydraulics or hinder flow as a pipe ages.

(B) If a velocity greater than 10 feet per second will occur when a pipe flows full, based on Manning's formula, shown in Equation C.2. in Figure: 30 TAC §217.53(l)(2)(B), using the "n" value for new pipe recommended by the manufacturer, the collection system must be designed to protect against pipe and bedding displacement.

Figure: 30 TAC §217.53(l)(2)(B) (No change to the figure as it exists in TAC.)

(m) Alignment.

(1) Alignment Requirements. A gravity collection system must be laid with a uniform grade and straight alignment between manholes, if possible. All deviations from uniform grade and straight alignment must be justified in the engineering report.

(2) Prohibited Deviations.

(A) Deviation from uniform grade (e.g., grade breaks or vertical curves) without manholes is prohibited if the open cut construction method is used, except as provided in subparagraph (B) of this paragraph.

(B) For segmented pipe, a horizontal curve must not be accomplished by bending the pipe unless the pipe joints are welded or heat-fused. Horizontal curves must be accomplished using additional manholes or joint offset. Horizontal curves for non-segmented, welded, or heat-fused pipes must follow the manufacturer's recommendations.

(C) A construction method that bends a pipe joint is prohibited, unless the joints are offset less than the least of the following:

(i) five degrees of deflection;

(ii) 80% of the manufacturer's recommended maximum joint offset; or

(iii) 80% of the appropriate ASTM, AWWA, ANSI, or other nationally established standard for joint offset.

(3) Calculations and Plan Drawings. The calculations for horizontal curvature must be included in the engineering report. Details of the proposed curvature must be displayed on the plan drawings.

(4) Manhole Spacing. The maximum allowable manhole spacing for collection systems with horizontal curvature is 300 feet. A manhole must be at the point of curvature and the point of termination of a curve.

(n) Inverted Siphons and Sag Pipes.

(1) A sag pipe must include:

(A) two or more barrels;

(B) a minimum pipe diameter of 6.0 inches; and

(C) the necessary appurtenances for convenient and routine flushing and maintenance.

(2) A manhole must include adequate clearance for rodding and cleaning.

(3) Sag pipes must be sized and designed with sufficient head to achieve a velocity of at least 3.0 feet per second at initial and design flows.

(4) The arrangement of inlet and outlet details must divert the normal flow to one barrel.

(5) A portion of the collection system with the inverted siphon must allow any barrel to be temporarily taken out of service for cleaning.

(6) Provisions must be made to allow cleaning across each bend with equipment available to the entity operating the collection system.

(7) A sag pipe must prevent nuisance odors.

(8) Inverted siphons and sag pipes must be pressure tested according to the requirement of §217.57 of this title (relating to Testing Requirements for Installation of Gravity Collection System Pipes).

(o) Bridged Sections.

(1) Piping with restrained joints or monolithic pipe across a bridged section requires a manhole on each end.

(2) A bridged section must withstand the hydraulic forces, including buoyancy, applied by the occurrence of a 100-year flood event.

(3) A bridged section must be capable of withstanding impacts from debris.

(4) Bank sections must be stabilized to prevent erosion.

(5) Bridge supports must be designed to ensure that a pipe has adequate grade, slope, and structural integrity.

§217.54. Criteria for Laying Pipe.

(a) Pipe Embedment.

(1) A rigid pipe must be laid with bedding, haunching, and initial backfill that will meet the appropriate standards and will support the anticipated load. The bedding classes that are allowed are A, B, or C, as described in American Society for

Testing and Materials (ASTM) C 12, American National Standards Institute (ANSI) A 106.2, Water Environment Federation Manual of Practice No. 9, or American Society of Civil Engineers (ASCE) MOP 37.

(2) A flexible pipe must be laid with bedding, haunching, and initial backfill that will meet the appropriate standards and will support the anticipated load. The bedding classes that are allowed are IA, IB, II, or III, as described in ASTM D-2321 or ANSI K65.171.

(3) Debris, large clods, stones that are greater than six inches in diameter, organic matter, and other unstable materials are prohibited as bedding, haunching, or initial backfill.

(4) Backfill must not disturb the alignment of a collection system pipe.

(5) If a fracture, fault zone, cave, or solutional modification to the rock strata that would prevent pipe bedding is encountered during construction, an owner must halt construction until an engineer prepares a written report, which must be submitted with the final engineering report, detailing how construction will accommodate these site conditions.

(b) Compaction.

(1) Compaction of the pipe embedment must meet the manufacturer's recommendations for the collection system pipes used in a project.

(2) Compaction of the pipe embedment must provide the modulus of soil reaction for the bedding material necessary to ensure a collection system pipe's structural integrity as required by §217.53 of this title (relating to Pipe Design).

(3) The placement of the backfill above a pipe must not affect the structural integrity of a pipe.

(c) Embedment Thickness.

(1) A minimum clearance of 6.0 inches below and on each side of the bell of all pipes to the trench walls and floor is required.

(2) The embedment material used for haunching and initial backfill must be installed to a minimum depth of 12 inches above the crown of a pipe.

(d) Trench Width.

(1) The width of a trench must allow a pipe to be laid and jointed properly and must allow the backfill to be placed and compacted as needed.

(2) The maximum and minimum trench width needed for safety and a pipe's structural integrity must be included in the engineering report.

(3) The width of a trench must allow proper and safe placement and compaction of haunching materials in accordance with the standards in subsection (a) of this section.

(4) The space between a pipe and a trench wall must be wider than the compaction equipment used in the pipe zone.

Figure: 30 TAC §217.54(d)(4) (No change to the figure as it exists in TAC.)

§217.55. Manholes and Related Structures.

(a) An owner must include manholes in a collection system at:

(1) all points of change in alignment, grade, or nominal diameter;

(2) at all intersections of collection system pipes; and

(3) at the end of all pipes that may be extended at a future date.

(b) Manholes placed at the end of a collection system pipe that may be extended in the future must include pipe stub outs with plugs.

(c) A cleanout with watertight plugs may be installed in lieu of a manhole at the end of a collection system pipe if no extensions are anticipated.

(d) Cleanout installations must pass all applicable testing requirements outlined for gravity collection pipes in §217.57 of this title (relating to Testing Requirements for Installation of Gravity Collection System Pipes).

(e) A manhole must be made of monolithic, cast-in-place concrete, fiberglass, pre-cast concrete, high-density polyethylene, polymer concrete, or other material designed to withstand the anticipated live and static loads.

(f) The use of bricks to adjust a manhole cover to grade or construct a manhole is prohibited. Adjustment rings used to adjust a manhole cover to grade must be

constructed of concrete, high density polyethylene, or other material that is designed to withstand the anticipated live and static loads.

(g) Manholes may not be spaced farther apart than the distances specified in the following table for a wastewater collection system with straight alignment and uniform grades. The executive director may approve different distances, in writing, if the owner has equipment that can clean longer distances.

Figure: 30 TAC §217.55(g)

Table C.3. - Maximum Manhole Spacing

Pipe Diameter *(inches)*	**Maximum Manhole Spacing** *(feet)*
6-15	500
18-30	800
36-48	1,000
54 or larger	2,000

(h) Tunnels are exempt from manhole spacing requirements.

(i) A manhole must not be located in a stream bed or other area that prevents access to the manhole.

(j) The inside diameter of a manhole must be no less than 48 inches. A manhole diameter must be sufficient to allow personnel and equipment to enter, exit, and work in the manhole, and to allow proper joining of the collection system pipes in the manhole wall.

(k) Manholes must meet the following requirements for covers, inlets, and bases.

(1) Manhole Covers.

(A) A manhole where personnel entry is anticipated requires a clear opening with at least a 30 inch diameter.

(B) A manhole located within a 100-year flood plain must be gasketed and bolted down to prevent inflow.

(C) A manhole cover must be constructed of impervious material with no holes that could allow inflow.

(D) A manhole cover that is located in a roadway must meet or exceed the American Association of State Highways and Transportation Officials standard M-306 for load bearing.

(E) The engineering report must specify and the owner must follow an appropriate national reference standard for manhole gaskets.

(F) Manhole covers must be constructed of cast iron, steel, non-metallic composite material, fiberglass, or other material approved in writing by the executive director.

(2) Manhole Inverts.

(A) The bottom of a manhole must contain a U-shaped channel that is a smooth continuation of the inlet and outlet pipes.

(B) A manhole connected to pipes less than 15 inches in diameter must have a channel depth equal to at least half the largest pipe's diameter.

(C) A manhole connected to a pipe that is at least 15 inches in diameter but not more than 24 inches in diameter must have a channel depth equal to at least three-fourths of the largest pipe's diameter.

(D) A manhole connected to a pipe that is greater than 24 inches in diameter must have a channel depth equal to at least the largest pipe's diameter.

(E) In a manhole with pipes of different sizes, the tops of all the pipes must be at the same elevation and flow channels in the invert must be sloped evenly from pipe to pipe to prevent backpressure.

(F) A bench provided above a channel must slope at a minimum of 0.5 inch per foot.

(G) A manhole invert must be filleted to prevent solids from being deposited if a collection system pipe enters a manhole higher than 24 inches above a manhole invert.

(H) A collection system pipe entering a manhole more than 24 inches above an invert must have a drop pipe.

(l) Steps are prohibited in a manhole.

(m) Connections. A manhole-pipe connection must use watertight, size-on-size resilient connectors that allow for differential settlement and must conform to American Society for Testing and Materials C 923.

(n) Venting.

(1) An owner must ensure that the collection system is vented at least every 1,500 feet.

(2) Vents must be designed to minimize inflow and must be located above a 100-year flood event elevation.

(3) Tunnels must be vented in compliance with this subsection.

(o) Cleanouts. A cleanout diameter must be at least equal to the diameter of the pipe to which it is attached.

§217.56. Trenchless Pipe Installation.

(a) Trenchless technologies that may be used for installation of new collection system pipe include impact moling, pipe ramming, microtunneling, conventional tunneling, bore and jack, and horizontal directional drilling.

(b) Trenchless technologies that may be used for replacement of collection system pipe include pipe bursting, pipe splitting, and pipe jacking.

(c) Trenchless technologies that may be used for lining existing collection system pipes include epoxy spray lining, cured-in-place pipe, and sliplining. These technologies reduce the inside diameter of a pipe.

(d) All other trenchless methods of installing, replacing, or repairing collection system pipe are non-conforming technologies subject to the requirements of §217.7(b) of this title (relating to Types of Plans and Specifications Approvals).

(e) A collection system using a trenchless technology must be designed, installed, operated, maintained, and constructed in accordance with American Society for Testing and Materials (ASTM) or American Water Works Association (AWWA) standards with reference to materials used and construction procedures. In the absence of ASTM or

AWWA standards, the executive director review may be based upon other recognized standards used by industry engineers.

(f) The engineering report must include the following:

(1) the trenchless method;

(2) the type of pipe;

(3) the type(s) of soil;

(4) the pipe length and diameter;

(5) the pipe slope;

(6) the method for disconnecting and reconnecting lateral and service connections;

(7) the provisions for flow bypass for existing system; and

(8) the pipe standard.

(g) Collection system pipe that is installed using a trenchless technology is subject to the testing requirements in §217.57 of this title (relating to Testing Requirements for Installation of Gravity Collection System Pipes) and §217.68 of this title (relating to Force Main Testing).

§217.57. Testing Requirements for Installation of Gravity Collection System Pipes.

(a) For a collection system pipe that will transport wastewater by gravity flow, the design must specify an infiltration and exfiltration test or a low-pressure air test. The test must conform to the following requirements:

(1) Low Pressure Air Test.

(A) A low pressure air test must follow the procedures described in American Society for Testing and Materials (ASTM) C 828, ASTM C 924, or ASTM F 1417 or other procedure approved in writing by the executive director. The testing times listed in Table C.4. in Figure: 30 TAC §217.57(a)(1)(C) or Equation C.3 in Figure: 30 TAC §217.57(a)(1)(B)(ii) must be used, regardless of the testing procedure.

(B) For sections of collection system pipe with an average inside diameter less than 36 inches, the following procedure applies, unless a pipe is to be tested as required by paragraph (2) of this subsection.

(i) A pipe must be pressurized to 3.5 pounds per square inch (psi) gauge. If groundwater is present, then a pipe must be pressurized to 3.5 psi gauge greater than the pressure exerted by groundwater above the pipe.

(ii) Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 psi gauge to 2.5 psi gauge is computed from the following equation:

Figure: 30 TAC §217.57(a)(1)(B)(ii)

Equation C.3.

$$T = \frac{(0.085 \times D \times K)}{Q}$$

Where:
T = time for pressure to drop 1.0 pound per square inch gauge in seconds
K = 0.000419×D×L, but not less than 1.0
D = average inside pipe diameter in inches
L = length of pipe line, in feet
Q = rate of loss, 0.0015 cubic feet per minute per square foot internal surface

(C) Since a K value of less than 1.0 may not be used, the minimum testing time for each pipe diameter is shown in the following table:

Figure: 30 TAC §217.57(a)(1)(C)

Table C.4. - Minimum Testing Times for Low-Pressure Air Test

Pipe Diameter *(inches)*	**Minimum Time** *(seconds)*	**Maximum Length for Minimum Time** *(feet)*	**Time for Longer Length** *(seconds/foot)*
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1,020	133	7.693
21	1,190	114	10.471
24	1,360	100	13.676
27	1,530	88	17.309
30	1,700	80	21.369
33	1,870	72	25.856

(D) An owner may stop a test if no pressure loss has occurred during the first 25% of the calculated testing time.

(E) If any pressure loss or leakage has occurred during the first 25% of a testing period, then the test must continue for the entire test duration as outlined above or until failure of the test.

(F) Collection system pipes with a 27 inch or larger average inside diameter may be air tested at each joint instead of following the procedure outlined in this section.

(G) A testing procedure for a pipe with an inside diameter greater than 33 inches must be approved in writing by the executive director.

(2) Infiltration/Exfiltration Test.

(A) The total exfiltration, as determined by a hydrostatic head test, must not exceed 10 gallons per inch of diameter per mile of pipe per 24 hours at a minimum test head of 2.0 feet above the crown of a pipe at an upstream manhole, or at least two feet above the existing groundwater level, whichever is greater.

(B) An owner shall use an infiltration test in lieu of an exfiltration test when pipes are installed below the groundwater level.

(C) If the quantity of infiltration or exfiltration exceeds the maximum quantity specified, an owner shall take remedial action in order to reduce the infiltration or exfiltration to an amount within the limits specified by Equation C.3. in

Figure: 30 TAC §217.57(a)(1)(B)(ii) before putting the system into service. An owner shall retest a pipe following a remedial action according to the requirements of this chapter.

(b) If a gravity collection system pipe is composed of flexible pipe, deflection testing is also required.

(1) For a collection system pipe with an inside diameter less than 27 inches, deflection measurement requires a rigid mandrel.

(A) Mandrel Sizing.

(i) A rigid mandrel must have an outside diameter not less than 95% of the base inside diameter or average inside diameter of a pipe, as specified in the appropriate standard by the ASTM, American Water Works Association, UNI-BELL, or American National Standards Institute.

(ii) If the mandrel diameter is not specified in the standard used in clause (i) of this subparagraph, the mandrel must have an outside diameter equal to 95% of the inside diameter of a pipe. In this case, the inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, must equal

the average outside diameter minus two minimum wall thicknesses for outside diameter controlled pipe and the average inside diameter for inside diameter controlled pipe.

(iii) All mandrel dimensions must meet the standard used in clause (i) of this subparagraph.

(B) Mandrel Design.

(i) A mandrel must be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed. Adjustable or flexible mandrels are prohibited.

(ii) A mandrel must have an odd number of runners or legs.

(iii) A mandrel must have nine or more runners or legs.

(iv) The length of the mandrel's barrel section must equal at least 75% of the inside diameter of the collection system pipe.

(v) Each mandrel size must use a separate proving ring.

(C) Method Options.

(i) An owner may not use television inspection as a substitute for a deflection test.

(ii) If requested, the executive director may approve, in writing, the use of a deflectometer or a mandrel with removable legs or runners on a case-by-case basis.

(D) Trenchless Testing. The executive director may exempt pipe sections installed by trenchless technologies from mandrel testing in writing on a case-by-case basis.

(2) For a gravity collection system pipe with an inside diameter of 27 inches and greater, other test methods approved in writing by the executive director may be used to determine vertical deflection.

(3) A deflection test method must be accurate to within plus or minus 0.2% deflection.

(4) An owner shall not conduct a deflection test until at least 30 days after the final backfill.

(5) Collection system pipe deflection must not exceed 5%.

(6) If a pipe section fails a deflection test, an owner shall correct the problem immediately, and then must conduct a second test after the final backfill has been in place at least 30 days.

(7) An owner shall not use any mechanical pulling devices during deflection testing.

(8) An owner shall include a certification in the notice of completion required in §217.14 of this title (relating to Completion Notice), that the collection system passed the deflection tests.

(c) An owner of a collection system must inspect the structural integrity of the collection system under the direction of an engineer during the construction and testing phases of the project.

§217.58. Testing Requirements for Manholes.

(a) All manholes must pass a leakage test.

(b) An owner shall test each manhole, after assembly and before backfilling, for leakage using hydrostatic exfiltration testing, vacuum testing, or any other method approved in writing by the executive director. A manhole must be tested separately and independently from the collection system pipes.

(1) Hydrostatic Testing.

(A) The maximum leakage rate for hydrostatic testing or any alternative test methods is 0.025 gallons per foot diameter per foot of manhole depth per hour.

(B) To perform a hydrostatic test, an owner shall seal all wastewater pipes coming into the manhole with an internal pipe plug, fill the manhole with water, and maintain the test for at least one hour.

(C) A test for concrete manholes may use a 24-hour wetting period before testing to allow saturation of the concrete.

(2) Vacuum Testing. An owner must perform vacuum testing according to either subparagraph (A) or (B) of this paragraph. If a manhole fails the vacuum test, the owner must apply grout to the exterior of the excavated manhole before retesting the manhole.

(A) Texas Test.

(i) To perform a vacuum test, an owner shall plug all lift holes and exterior joints with a non-shrink grout and plug all pipes entering a manhole.

(ii) Grout may not be placed in horizontal joints before testing.

(iii) Stub-outs, manhole boots, and pipe plugs must be secured to prevent movement while a vacuum is drawn.

(iv) An owner shall use a minimum 60 inch/lb torque wrench to tighten the external clamps that secure a test cover to the top of a manhole.

(v) A test head must be placed at the inside of the top of a cone section, and the seal must be inflated in accordance with the manufacturer's recommendations.

(vi) There must be a vacuum of 10 inches of mercury inside a manhole to perform a valid test.

(vii) A test does not begin until after the vacuum pump is off.

(viii) A manhole passes the test if after 2.0 minutes and with all valves closed, the vacuum is at least 9.0 inches of mercury.

(B) American Society for Testing and Materials (ASTM) Test. The owner may require manhole testing that meets the requirements of ASTM D1244-11.

§217.59. Lift Station Site Requirements.

(a) Site access.

(1) A lift station must be located in a right-of-way or a permanent easement.

(2) A lift station site must be accessible by truck during all weather conditions, including a 25-year, 24-hour rainfall event.

(3) A road surface used to access a lift station must have a minimum width of 12 feet.

(b) Security.

(1) The design of a lift station, including all mechanical and electrical equipment, must restrict access by an unauthorized person.

(2) A lift station must include an intruder-resistant fence, or must be completely enclosed by an intruder-resistant enclosure approved in writing by the executive director.

(A) An intruder-resistant fence or intruder-resistant enclosure must be locked at each access point.

(B) An intruder-resistant fence must be at least 6.0 feet tall, and the bottom of the fence must be close enough to surface grade to prevent human access.

(C) An intruder-resistant fence must be constructed of wood, concrete, masonry, or metal. Other materials may be used, but only if approved in writing by the executive director.

(D) The top of an intruder-resistant fence must have at least three strands of barbed wire. A fence that is at least 8.0 feet tall does not require barbed wire. The top of an intruder-resistant fence may have outwardly-directed iron bars spaced on four-inch centers instead of barbed wire.

(3) Above-ground valves located outside of an intruder-resistant fence must be chained and locked to prevent unauthorized operation. A valve does not need to be chained if the valve is located below ground or if the valve is fully enclosed in an intruder-resistant enclosure designed to prevent unauthorized operation.

(c) Flood Protection. The design of a lift station, including all electrical and mechanical equipment, must be designed to withstand and operate during a 100-year flood event, including wave action.

(d) Odor Control. An owner shall implement odor control measures necessary to prevent a lift station from becoming a nuisance.

§217.60. Lift Station, Wet Well, and Dry Well Designs.

(a) Pump Controls.

(1) A lift station pump must operate automatically, based on the water level in a wet well. Pump controls must be designed to prevent surcharges in the collection system and must be designed to prevent adverse effects on the operation of the wastewater treatment facility.

(2) The location of a wet well water level mechanism must ensure that the mechanism is unaffected by currents, rags, grease, or other floating materials.

(3) A wet well water level mechanism must be accessible without entering the wet well.

(4) Wet wells with a bubbler system require dual air supplies and dual controls.

(5) Motor control centers must be mounted high enough above grade, but in no case less than 4.0 inches above grade, to prevent water intrusion and corrosion

from standing water in the enclosure. Motor control centers must also be protected from the entrance of corrosive gases from wet wells or piping.

(6) Electrical equipment and electrical connections in a wet well or a dry well must meet National Fire Protection Association 70 National Electrical Code® explosion prevention requirements, unless continuous ventilation is provided.

(7) Electronic wet well level control systems must also use a float switch or similar manual backup.

(8) Wet well control settings must be designed to discourage septic conditions in a lift station.

(9) Wet well control settings must be designed to prevent overloading of downstream pipes and treatment units.

(b) Wet Wells.

(1) A wet well must be enclosed by watertight and gas tight walls.

(2) A penetration through a wall of a wet well must be gas tight.

(3) A wet well must not contain equipment requiring regular or routine inspection or maintenance, unless inspection and maintenance can be done without a person entering the wet well.

(4) A gravity pipe discharging to a wet well must be located so that the invert elevation is above the liquid level of a pump's "on" setting.

(5) Gate valves and check valves are prohibited in a wet well.

(6) Gate valves and check valves may be located in a valve vault next to a wet well or in a dry well. Valve vaults shall be ventilated according to subsection (d) of this section.

(7) A pump must run continuously during the pump cycle time, which begins when the pump is activated by the pump controls. Pump cycle time, based on peak flow, must equal or exceed those in the following table:

Figure: 30 TAC §217.60(b)(7)

Table C.5. - Minimum Pump Cycle Times

Pump Horsepower	**Minimum Cycle Times** *(minutes)*
< 50	6
50-100	10
> 100	15

(8) An evaluation of minimum wet well volume requires the following formula:

Figure: 30 TAC §217.60(b)(8)

Equation C.4.

$$V = \frac{T \times Q}{4 \times 7.48}$$

Where:
V = Active volume (cubic feet)
Q = Pump capacity (gallons per minute)
T = Cycle time (minutes)
7.48 = Conversion factor (gallons/cubic foot)

(c) Dry well access.

(1) An underground dry well must be accessible for maintenance and shall be ventilated according to subsection (d) of this section.

(2) A stairway in a dry well must use non-slip steps and conform to Occupational Safety and Health Administration regulations with respect to rise and run.

(3) A ladder in a dry well must be made of non-conductive material and be rated for the load necessary for staff and equipment to descend and ascend.

(d) Lift Station Ventilation.

(1) Passive Ventilation for Wet Wells.

(A) Passive ventilation structures must include screening to prevent the entry of birds and insects to a wet well. The screening must be made of corrosion-resistant material.

(B) All mechanical and electrical equipment in a wet well with passive ventilation must be constructed in compliance with explosion requirements in the National Fire Protection Association 70 National Electrical Code®.

(C) A passive ventilation system must be sized to vent at a rate equal to the maximum pumping rate of a lift station, but not to exceed 600 feet per minute through a vent pipe.

(D) The minimum acceptable diameter for an air vent is 4.0 inches.

(E) All vent outlets must be at least 1.0 foot above a 100-year flood plain elevation.

(2) Mechanical Ventilation in Lift Stations.

(A) Dry Wells.

(i) A dry well must use mechanical ventilation.

(ii) Ventilation equipment under continuous operation must have a minimum capacity of six complete air exchanges per hour.

(iii) Ventilation equipment under intermittent operations must provide a minimum capacity of 30 complete air exchanges per hour and be connected to the lift station's lighting system.

(B) Wet Wells.

(i) Mechanical ventilation systems for wet wells must operate continuously.

(ii) The ventilation equipment must provide at least 12 complete air exchanges per hour and be constructed of corrosion-resistant material.

(iii) An owner shall implement odor control measures necessary to prevent a wet well from becoming a nuisance. An owner shall consider the source of potential odor, turbulence, residence time, and other factors that contribute odor at a lift station when selecting odor control measures.

(iv) All mechanical and electrical equipment in a wet well with mechanical ventilation must be constructed in compliance with explosion requirements in National Fire Protection Association 70 National Electrical Code®.

(e) Wet Well Slopes.

(1) A wet well floor must have a smooth finish and minimum slope of 10% to a pump intake.

(2) A wet well design must prevent deposition of solids, grease, and debris under normal operating conditions.

(3) A lift station with greater than 5.0 million gallons per day firm pumping capacity must have anti-vortex baffling.

(f) Hoisting Equipment. A lift station must have permanent hoisting equipment or be accessible to portable hoisting equipment for removal of pumps, motors, valves, pipes, and other similar equipment.

(g) Valve Vault Drains. A floor drain from a valve vault to a wet well must prevent gas from entering a valve vault by including flap valves, "P" traps, submerged outlets, or a combination of these devices.

(h) Dry Well Sump Pumps.

(1) Pumps.

(A) A dry well must use dual sump pumps, each with a minimum capacity of 1,000 gallons per hour and capable of handling the volume of liquid

necessary to prevent accumulation of water from condensation and incidental leaks during peak pumping operations.

(B) A sump pump must have a submersible motor and watertight wiring.

(C) A dry well floor must slope toward the sump. A sump must include sump pumps sized to prevent accumulation of water from condensation and incidental leaks.

(D) The minimum sump depth is 6.0 inches. The sump must prevent standing water from accumulating on a dry well floor under normal operation.

(E) A sump pump must operate automatically by use of a float switch or another level-detecting device.

(2) Pipes.

(A) A sump pump must use independent piping that is capable of discharging more than the maximum liquid level of an associated wet well at a rate that will prevent overflow of the wet well.

(B) A sump pump outlet pipe must be at least 1.5 inches in diameter and have at least two check valves in series.

§217.61. Lift Station Pumps.

(a) General Requirements. A raw wastewater pump, with the exception of a grinder pump, must:

(1) be designed to prevent clogging;

(2) be capable of passing a sphere of 2.5 inches in diameter or greater; and

(3) have greater than 3.0 inch diameter suction and discharge openings.

(b) Submersible and Non-submersible Pumps.

(1) A non-submersible pump must have inspection and cleanout plates on both the suction and discharge sides of each pumping unit that facilitate locating and removing blockage-causing materials, unless the pump design accommodates easy removal of the rotation elements.

(2) A pump support for a submersible or non-submersible pump must prevent movement and vibration during operation.

(3) A submersible pump must use a rail-type pump support system with manufacturer-approved mechanisms designed to allow personnel to readily remove and replace any single pump without entering or dewatering the wet well.

(4) Submersible pump rails and lifting chains must be constructed of a material that performs to at least the standard of Series 300 stainless steel.

(5) All lift station pumps and associated appurtenances must be designed to prevent the discharge of wastewater from the lift station and at all points in the upstream collection system.

(c) Lift Station Pumping Capacity. A lift station must have at least two pumps. The firm pumping capacity of a lift station must handle the peak flow.

(d) Pump Head Calculations.

(1) An owner must select a pump based upon analysis of the system head and pump capacity curves. The owner must determine the pumping capacities and pressure head requirements of a single pump operating alone, and with other pumps.

(2) The engineering report must include pipe head loss calculations, using the American National Standards Institute's Hydraulic Institute Standards pertaining to head losses through pipes, valves, and fittings.

(3) The engineering report must include the friction coefficient (Hazen-Williams "C" value) used in friction head loss calculations. The selected friction coefficient must be based on the pipe material.

(4) For a lift station with more than two pumps, a force main in excess of one-half mile, or a lift station with a firm pumping capacity of 100 gallons per minute or greater, the engineering report must include system curves for both the normal and peak operating conditions at friction coefficient values (C values) for the force main pipe.

(e) Flow Control.

(1) A lift station or a transfer pumping station located at or discharging directly to a wastewater treatment facility must have a peak pump capacity equal to or less than the peak flow, unless equalization is provided.

(2) Each lift station or transfer pumping station located at or discharging directly to a wastewater treatment facility with a peak flow that is greater than 300,000 gallons per day must use three or more pumps, unless duplex, automatically controlled, variable capacity pumps are used.

(3) Each lift station or transfer pumping station located at or discharging directly to a wastewater treatment facility with a peak flow that is less than or equal to 300,000 gallons per day must use at least two pumps.

(f) Self-Priming Pumps.

(1) A self-priming pump must be capable of priming without relying on a separate priming system, an internal flap valve, or any other external method for priming.

(2) A self-priming pump must use a suction pipe that produces flow with velocity of at least 3.0 feet per second but not more than 7.0 feet per second. A self-priming pump must have its own suction pipe.

(3) A self-priming pump must vent air back into the wet well during priming.

(g) Vacuum-Priming Pumps.

(1) A vacuum-primed pump must be capable of priming by using a separate positive priming system with a dedicated vacuum pump for each main wastewater pump.

(2) A vacuum-priming pump must produce a suction pipe velocity between 3.0 and 7.0 feet per second. A vacuum priming pump must have its own suction pipe.

(h) Vertical Positioning of Pumps. A raw wastewater pump must maintain positive static suction head during normal on-off cycling. A submersible pump with "no suction" pipes, a vacuum-primed pump, or a self-priming unit capable of satisfactory operation under any negative suction head anticipated for the lift station is not required to have positive static suction head during normal on-off cycling.

(i) Individual Grinder Pumps. A grinder pump is not subject to the requirements of this subchapter if:

(1) the grinder pump is not part of an alternative collection system as defined by this chapter; and

(2) the grinder pump only serves a single connection to a wastewater collection system.

(j) Pump for Low-Flow Lift Station. A pump used for a lift station with a peak flow of less than 120 gallons per minute must be submersible and include a grinder.

§217.62. Lift Station Pipes.

(a) Horizontal Pump Suctions.

(1) Each lift station pump must have a separate suction pipe that uses an eccentric reducer.

(2) Pipes in a wet well must have a turndown-type flared intake.

(b) Valves.

(1) The discharge side of each lift station pump must be followed by a full-closing isolation valve and must also have a check valve.

(A) A check valve must be a swing type valve with an external lever or external position indicator to show its open and closed positions.

(B) An isolation valve must include an external position indicator to show its open and closed positions, unless a full-closing valve is a rising-stem gate valve.

(2) A grinder pump installation may use a rubber-ball check valve or a swing-type check valve.

(3) A butterfly valve, tilting-disc check valve, or any other valve using a tilting-disc in a pipe is prohibited.

(c) Pipes.

(1) A lift station pipe must have flanged or flexible connections to allow for removal of pumps and valves without interruption of the lift station operations.

(2) Wall penetrations must allow for pipe flexure while excluding exfiltration or infiltration.

(3) Pipe suction velocities must be at least 3.0 feet per second but not more than 7.0 feet per second.

§217.63. Emergency Provisions for Lift Stations.

(a) A lift station must include a sign with the name of the wastewater treatment facility and 24-hour emergency contact information. The sign must be posted at the lift station so that it is visible and legible, with block lettering that is at least 1.5 inches tall.

(b) A lift station must be designed to prevent the discharge of wastewater from the lift station and at all points in the upstream collection system during electrical power failures.

(c) A lift station must include an audiovisual alarm system. The audiovisual alarm system must transmit alarm conditions through use of an auto-dialer system,

Supervisory Control and Data Acquisition (SCADA) system, or telemetering system connected to a continuously monitored location. At a minimum, the alarm system must automatically activate to give warnings for power outages, pump failures, and high water levels. Audiovisual alarms are not required if the SCADA system alerts the operator about communication loss, in addition to the alarm conditions.

(d) An alarm system must include self-testing capability at the control panel.

(e) An owner shall determine the reliability of the existing commercial power service for a lift station using records from the past 60 consecutive months from the electric utility that serves the lift station. The entire record must be used if 60 months of records are not available. The owner must provide the power outage records and the reliability determination in the engineering report. The records must:

(1) be in writing;

(2) be on the utility's letterhead and bear a signature of an electric utility employee who has knowledge of data about power outages;

(3) identify the location of the lift station;

(4) list the total number of outages that have occurred during the past 60 consecutive months; and

(5) indicate the date and duration of each recorded power outage.

(f) The executive director may consider documentation of commercial power system upgrades and their effects on the reliability of commercial power. Documentation of upgrades and their effects on power reliability must be submitted in writing on the electric utility's letterhead and must bear the signature of an electric utility employee who has knowledge of the system upgrades.

(g) Systems for preventing the discharge of wastewater must operate for a duration at least equal to the longest power outage on record for the past 60 months, or at least 20 minutes, whichever is longer. The design must be based on peak flows, inflow, and infiltration. If the longest power outage on record for the past 60 consecutive months is greater than 48 hours and generators will be used to provide backup power, then the owner must have a contract in place that guarantees fuel supply during an emergency. The owner must also have sufficient storage capacity at the wastewater treatment facility for the fuel for the duration of the emergency.

(h) For calculation purposes, the owner must assume that the lift station wet well is full to the pump activation level when the power outage period begins.

(i) Systems for preventing discharge of wastewater may include any combination of alternate power sources, on-site generators, portable generators, gravity relief sewers, bypass pumps, collection system storage, spill containment structures, and other systems approved in writing by the executive director. For purposes of this section, a gravity relief sewer is the part of a collection system built to manage the flow of wastewater that exceeds the capacity of the existing collection system by passively transporting the flow to a different part of the collection system or to another wastewater treatment facility.

(1) The system or combination of systems must accommodate the firm pumping capacity of the lift station.

(2) Collection system storage must not be used as a sole system for preventing unauthorized discharge of wastewater.

(3) A spill containment structure must not be used as a sole system for preventing unauthorized discharge of wastewater.

(4) Portable generators and pumps may only be used to guarantee service if:

(A) a tested quick-connect mechanism or a transfer switch properly sized to connect to a portable generator is provided where the generator will be used; and

(B) a licensed operator that is knowledgeable in operation of the portable generators and pumps will be on call 24 hours per day every day.

(5) If portable generators and pumps are used to guarantee service, the engineering report must include:

(A) the storage location of each generator and pump;

(B) the amount of time that will be needed to transport each generator or pump from the storage location to the furthest lift station that will be served by the generator or pump;

(C) how many lift stations each backup generator or pump serves; and

(D) the type of routine maintenance and upkeep that will be done for each portable generator and pump to ensure that they will be operational when needed.

(j) Systems for preventing discharge of wastewater at a lift station must be permanent features of the lift station or must be deployable during any electrical power outage. Deployable systems must be operational before any unauthorized discharge occurs. The owner must describe how a temporary power system will be deployed and operated in the engineering report, and must address deployment during all types of weather events that might reasonably cause power outage at the lift station.

(k) Spill containment structures must be able to be cleaned and must have an intruder-resistant fence that meets the requirements in §217.59(b) of this title (relating to Lift Station Site Requirements). The engineering report must include a detailed management plan for cleaning and maintaining each spill containment structure.

(l) A lift station must be fully accessible during a 25-year, 24-hour rainfall event.

(m) Lift station pump controls must prevent over-pumping and surcharge upon resumption of normal power after a power outage.

§217.64. Materials for Force Main Pipes.

(a) Force main pipe material must withstand the pressure generated by instantaneous pump stoppage due to power failure under maximum pumping conditions.

(b) The use of pipes or fittings rated at a working pressure of less than 150 pounds per square inch is prohibited.

(c) Force main pipe materials must be identified in the specifications with the appropriate specification number for both quality control and installation from the American Society for Testing and Materials, American National Standards Institute, or American Water Works Association.

(d) Pipe material specified for a force main must have an expected life equal to or longer than that of the lift station and must be non-corrosive.

§217.65. Force Main Pipe Joints.

(a) An underground force main pipe joint must include either push-on rubber gaskets or mechanical joints with a pressure rating equal to or greater than that of the force main pipe material.

(b) Exposed force main pipe joints must be flanged or flexible and adequately secured to prevent movement due to wastewater surges.

(c) American Society for Testing and Materials, American Water Works Association, or other widely accepted national reference standards for the joints must be included in the project specifications.

§217.66. Identification of Force Main Pipes.

(a) A detectable underground warning tape must be laid in the same trench as a force main pipe. The detectable underground warning tape must be located above and parallel to the force main.

(b) The detectable underground warning tape must bear the label "PRESSURIZED WASTEWATER" continuously repeated in at least 1.5 inch tall letters.

§217.67. Force Main Design.

(a) Velocities.

(1) A force main must be a minimum of 4.0 inches in diameter, unless it is used in conjunction with a grinder pump station. The executive director may approve pipes with a diameter less than 4.0 inches where grinder pumps are used, on a case-by-case basis in writing.

(2) For a lift station with two pumps, the minimum velocity is 3.0 feet per second with one pump in operation.

(3) For a lift station with three or more pumps:

(A) the minimum velocity in a force main is 2.0 feet per second with only the smallest pump operating at full speed; and

(B) a minimum flushing velocity of 5.0 feet per second or greater must occur in a force main at least twice daily.

(4) The engineering report must certify that a pipeline with a velocity greater than 6.0 feet per second can withstand high and low negative surge pressures in the event of sudden pump failure.

(b) Detention Time.

(1) Force main detention time calculations must be included in the engineering report.

(2) Force main detention time calculations must be performed using a range of flow rates that represent the flows expected to be delivered to a force main by an upstream pump station during any 24-hour period.

(c) Water Hammer. A force main design must include effective surge control measures to manage pressure due to water hammer that may exceed the working strength of a force main pipe.

(d) Connection to Gravity Main.

(1) A force main must terminate at a collection system manhole or at a manhole or preliminary treatment unit at a wastewater treatment facility.

(2) The discharge end of a force main inside a manhole must be restrained to prevent movement and must produce non-turbulent flow.

(3) A collection system receiving wastewater from a force main must be designed to accept the maximum pump discharge from the force main without surcharging.

(e) Pipe Separation. A separation distance between a force main and any water supply pipe must meet the minimum separation requirements established in §217.53(d) of this title (relating to Pipe Design).

(f) Odor Control.

(1) A force main must terminate such that the flowline of the force main entering the manhole matches the flowline of the gravity pipe leaving the manhole.

(2) A force main must be designed to abate anticipated odor. An owner shall implement odor control measures necessary to prevent a collection system from becoming a nuisance.

(g) Air Release Valves in Force Mains.

(1) Any high point along the vertical force main alignment must include an air release valve or a combination of air release and air vacuum valves.

(2) An air release valve must have an isolation valve between the air release valve and the force main.

(3) An air release valve must be inside of a vault that is at least 48 inches in diameter and has a vented access opening of at least 30 inches in diameter.

(4) An air release valve must be made of corrosion-resistant material.

(h) Valves. A force main must have valves spaced at no more than 2,000 foot intervals to facilitate initial testing and subsequent maintenance and repairs.

(i) Fatigue Life. The engineering report must include calculations that show the strength of the force main pipe at the end of the 50-year design life. The calculations must consider the fluctuations between a pressurized and depressurized operating state.

(j) Alignment Changes.

(1) Bending a segmented pipe is prohibited, unless the pipe joints are welded or heat-fused.

(2) Force main alignment changes must be accomplished using manufactured bend fittings.

(3) Force main pipe joints must include mechanical joint restraints or thrust blocks at all bends unless pipe vibration calculations justify the absence of a joint restraint or thrust block.

§217.68. Force Main Testing.

(a) The final plans and specifications must include the pressure testing procedures.

(b) A pressure test must use 50 pounds per square inch above the normal operating pressure of a force main.

(c) A temporary valve for pressure testing may be installed near the discharge point of a force main and must be removed after a test is successfully completed.

(d) A pump isolation valve may be used as an opposite termination point.

(e) A test must involve filling a force main with water.

(f) A pipe must hold the designated test pressure for a minimum of 4.0 hours.

(g) The leakage rate must not exceed 10.0 gallons per inch of diameter per mile of pipe per day. The following equation must be used to calculate the acceptable leakage rate in gallons per hour per 1,000 feet of pipe.

Figure: 30 TAC §217.68(g)

Equation C.5.

$$L = \frac{SD\sqrt{P}}{155{,}400}$$

Where:

L = Acceptable leakage rate (gallons/hour/1,000 feet of pipe, based on a leakage rate of 10.0 gallons per inch of diameter per mile of pipe per day)
S = Length of pipe (feet)
D = Nominal diameter of pipe (inches)
P = Average test pressure (ponds/square inch)

§217.69. Maintenance, Inspection, and Rehabilitation of the Collection System.

(a) The owner of a collection system shall develop a maintenance and inspection program for its collection system with the assistance of an engineer and licensed operators. The owner is responsible for ensuring that the maintenance and inspection program includes all the information pertaining to inspection, maintenance, and rehabilitation of the collection system necessary to ensure efficient, safe, and environmentally compliant operation. The owner is also responsible for ensuring that all records pertaining to maintenance, inspection, and rehabilitation activities are maintained by the licensed collection system operators. The inspection program must include, at a minimum:

(1) a schedule for inspections, cleaning, and maintenance;

(2) methods for inspecting, cleaning, and maintaining each unit within the collection system;

(3) methods for estimating the current condition and life expectancy of each unit; and

(4) a requirement to estimate the structural integrity of each collection system unit.

(b) The plans and specifications for a rehabilitation project must include, at a minimum:

(1) a surface preparation plan that includes:

(A) a cleaning plan to remove all contaminants;

(B) references for the cleaning method;

(C) dewatering or bypassing provisions; and

(D) field preparation and application logs;

(2) a plan for managing volatile chemicals and dust in confined spaces;

(3) a requirement to follow the manufacturer's installation procedures and specifications;

(4) a requirement to re-inspect the rehabilitation project, including the underlayment and coating, between six months and 11 months after installation; and

(5) a requirement to re-inspect the rehabilitation project, including the underlayment and coating, 18 months after installation.

(c) The owner must maintain records of all activities related to collection system inspection, maintenance, cleaning, and rehabilitation. The records must be made available to the executive director upon request according to the requirements of §217.18 of this title (relating to Provisions that Apply to All Sections in this Chapter).

§217.70. Reclaimed Water Facilities.

(a) In accordance with §217.6 of this title (relating to Submittal Requirements and Review Process), the design of a distribution system that will convey reclaimed water to a user must be submitted, reviewed, and approved in writing by the executive director before the distribution system may be used.

(b) A municipality may be the review authority in accordance with §217.8 of this title (relating to Municipality Reviews), and may approve a reclaimed water distribution system.

(c) A distribution system designed to transport Type II reclaimed water, as defined by §210.33(2) of this title (relating to Quality Standards for Using Reclaimed Water), must comply with this subchapter, as applicable to the project.

(d) A distribution system designed to transport Type I reclaimed water, as defined by §210.33(1) of this title must meet the requirements of subsections (e) - (j) of this section.

(e) Type I reclaimed water gravity pipes must comply with §§217.53 - 217.55, 217.58, and 217.59 of this title (relating to Pipe Design; Criteria for Laying Pipe; Manholes and Related Structures; Testing Requirements for Manholes; and Lift Station Site Requirements). Type I reclaimed water pipe design must prevent pipe and bedding displacement.

(f) Each appurtenance designed to handle reclaimed water must be identified in the plans and the engineering report.

(1) An above-ground hose bib, spigot, or other hand-operated connection is prohibited, except in a lockable, secured area that is only accessible to authorized personnel.

(2) An underground hose bib must:

(A) be located in a locked, below-grade vault, or be operated only by a special tool in a non-lockable, underground service box;

(B) be clearly labeled "NON-POTABLE WATER, DO NOT DRINK" and "NO BEBA EL AGUA;"

(C) be purple; and

(D) be designed to prevent a connection to a standard water hose.

(3) Reclaimed water storage areas, hose bibs, and spigots must include signs in both English and Spanish reading "NON-POTABLE WATER, DO NOT DRINK" and "NO BEBA EL AGUA."

(g) Cross Connection Control and Separation Distances.

(1) A Type I reclaimed water pipe must be at least 4.0 feet from a potable water pipe, as measured from the outside surface of each of the respective pipes.

(2) A physical connection between a potable water pipe and a reclaimed water pipe is prohibited.

(3) Backflow prevention must be provided for all potable water connections to prevent any possibility of reclaimed water entering a drinking water system according to the requirements of §217.330 of this title (relating to Drinking Water Supply Connections).

(4) Where a 4.0 foot separation distance cannot be achieved, a reclaimed water pipe must meet the requirements of subparagraph (A) of this paragraph if the reclaimed water pipe runs parallel to the potable water pipe or subparagraph (B) of this paragraph if the reclaimed water pipe crosses the potable water pipe.

(A) If a new Type I reclaimed water pipe is installed parallel to an existing potable water pipe, the reclaimed water pipe must:

(i) be located below the potable water pipe and maintain a horizontal separation distance of no less than 3.0 feet;

(ii) have a minimum pipe stiffness of 115 pounds per square inch (psi) with compatible joints, or a pressure rating of 150 psi for both pipe and joints; and

(iii) be embedded in cement stabilized sand that meets the requirements of subparagraph (D) of this paragraph.

(B) If a new Type I reclaimed water pipe crosses a potable water pipe, the design of the reclaimed water pipe must:

(i) include one full segment of reclaimed water pipe that is centered on the potable water pipe such that the joints of the reclaimed water pipe are equidistant from the center point of the potable water pipe;

(ii) cross the potable water pipe at a point that is equidistant between the joints of the potable water pipe; and

(iii) have a separation of at least six inches between the outsides of the pipes.

(C) A Type I reclaimed water pipe must have either a pressure rating of 150 psi for both pipe and joints or a pipe stiffness of at least 115 psi with compatible joints for a minimum distance of 4.0 feet in each direction, as measured perpendicularly from any point on the potable water pipe to the Type I reclaimed water pipe.

(D) All portions of reclaimed water pipe within 4.0 feet of a potable water pipe must be embedded in cement stabilized sand that:

(i) has a minimum content of 10% cement, based on loose dry weight volume;

(ii) is installed a minimum of 6.0 inches above and one quarter of the pipe diameter on either side and below a reclaimed water pipe.

(h) Site Selection of Type I Reclaimed Water Pump Stations. A design must comply with §217.59(a) - (c) of this title.

(i) Design of Type I Reclaimed Water Pump Stations. A design must comply with §§217.60(d) and (g); 217.61(d); and 217.62(a) and (c) of this title (relating to Lift Station,

Wet Well, and Dry Well Designs; Lift Station Pumps; and Lift Station Pipes), and paragraphs (1) - (3) of this subsection.

(1) Pump Controls.

(A) All electrical equipment must be protected from a 100-year flood event and be protected from potential flooding from a wet well.

(B) Motor control centers must be mounted at least 4.0 inches above grade to prevent water intrusion and corrosion from standing water in the enclosure.

(2) Pumps.

(A) A pump support must prevent movement or vibration during operation.

(B) A submersible pump must use a rail-type pump support incorporating manufacturer-approved mechanisms designed to allow an operator to readily remove and replace any single pump without first entering or dewatering the wet well.

(C) Submersible pump rails and lifting chains must be made of a material that is equivalent to Series 300 stainless steel at minimum.

(3) Pump Station Valves.

(A) The discharge side of each pump must include a check valve followed by a full-closing isolation valve.

(B) Check valves must be swing type with an external lever or external position indicator to show the open and closed positions.

(C) All valve types other than rising stem gate valves must include a position indicator to show the open and closed positions.

(j) Force Main Pipe for Type I Reclaimed Water. A force main pipe for Type I reclaimed water must comply with §§217.54, 217.64, 217.65, 217.67(a) - (c) and (e), and 217.68 of this title (relating to Criteria for Laying Pipe; Materials for Force Main Pipes; Force Main Pipe Joints; Force Main Design; and Force Main Testing) and the following:

(1) A valve casing for an underground isolation valve must include "REUSE" or "NPW" cast into its lid.

(2) A force main pipe must either be purple in color or be contained in an 8.0 mils thick purple polyethylene sleeve conforming to American Water Works Association C105, Class C. In-line isolation valves for reuse pipes must open clockwise to distinguish them from potable water isolation valves.

§217.71. Storage Tanks for Reclaimed Water.

Ground level storage tanks and elevated storage tanks for reclaimed water must be designed, installed, and constructed in accordance with the American Water Works Association standards with reference to materials and construction practices, except for health-based standards strictly related to potable water storage and contact practices.

SUBCHAPTER C: CONVENTIONAL COLLECTION SYSTEMS

[§§217.63, 217.69, 217.70]

Statutory Authority

The repeal of these sections is adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted repeal of these sections implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.63. Emergency Provisions for Lift Stations.

§217.69. Reclaimed Water Facilities.

§217.70. Storage Tanks for Reclaimed Water.

SUBCHAPTER D: ALTERNATIVE COLLECTION SYSTEMS

§§217.90, 217.91 - 217.93, 217.94, 217.95 - 217.100

Statutory Authority

The amendments and new sections are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new sections implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.90. Applicability.

This subchapter applies to the design, construction, operation, maintenance, and testing standards for alternative collection systems. Conventional collection systems and reclaimed water conveyance systems are covered in Subchapter C of this chapter (relating to Conventional Collection Systems). This subchapter does not apply to individual private grinder pumps or septic tank effluent pumps that discharge directly into a conventional collection system and are not part of an alternative collection system.

§217.91. Edwards Aquifer.

An owner who plans to install an alternative collection system located over the recharge zone of the Edwards Aquifer, as "recharge zone" is defined in §213.3 of this title (relating to Definitions), must design and install the alternative collection system in accordance with Chapter 213 of this title (relating to Edwards Aquifer) in addition to this subchapter.

§217.92. Component Sizing.

(a) The components of an alternative collection system must be sized based on existing flow data from a system and service area with similar characteristics, if such data is available. Similar characteristics for sizing alternative collection systems include:

(1) location;

(2) inflow and infiltration characteristics;

(3) peak flows;

(4) pipe materials;

(5) customer base, including sources of wastewater and percent contribution from the wastewater sources; and

(6) any other characteristics required by the executive director.

(b) If flow data from a similar service area with a conventional collection system is used, the engineering report must include the expected effects of inflow and infiltration on the peak flow of the conventional collection system.

(c) Design and construction of an alternative collection system must minimize excess flows from inflow and infiltration.

(d) Roof drains, street drains, or other types of drains that allow entrance of stormwater into an alternative collection system are prohibited.

(e) In the absence of existing data, the sizing of on-site components in an alternative collection system must be based on Table B.1. in Figure: 30 TAC §217.32(a)(3) of this title (relating to Organic Loadings and Flows for New Wastewater Treatment Facilities), in conjunction with the following equation:

Figure: 30 TAC §217.92(e) (No change to the figure as it exists in TAC.)

(f) Design of the off-site components must be based on the maximum flow rate expected, calculated using the following equation:

Figure: 30 TAC §217.92(f)

Equation D.2.

$$Q = (A \times N) + B$$

Where:
Q = Design flow rate (gallons per minute)
A = Design coefficient, typically 0.5
N = Number of equivalent dwelling units served by the off-site component
B = Safety factor, assumed to be 20.0

(1) An equivalent dwelling unit (EDU) is assumed to have an occupancy of 3.5 people. For EDU populations greater than 3.5, the following equation must be used:

Figure: 30 TAC §217.92(f)(1)

Equation D.3.

$$Q = (A_1 \times P) + B$$

Where:
Q = Design flow rate (gallons per minute)
A_1 = Derived from A in Equation D.2. in Figure: 30 TAC §217.92(f), typically 0.15
P = Population to be served
B = Safety factor, assumed to be 20.0

(2) The safety factor, "B,"may be adjusted if higher wastewater flows are anticipated. A discharge from commercial or institutional dischargers must be measured directly or calculated under this subsection.

§217.93. General Requirements.

(a) Except where specifically stated in this subchapter, the design of an alternative collection system must comply with the applicable requirements of Subchapter C of this chapter (relating to Conventional Collection Systems).

(b) An owner shall obtain from an engineer:

(1) an operation and maintenance manual that specifies the recommended operating procedures and maintenance practices for the alternative collection system; and

(2) as-built drawings indicating the location of all on-site components of the alternative collection system.

(c) An owner shall certify by letter to the executive director that the requirements in subsection (b) of this section have been met. The letter must include the permit number and name(s) of the owner(s) of the associated wastewater treatment facility.

(d) An intersection of three or more collection pipes must have a manhole.

(e) A manhole must not be located in the flow path of a watercourse, or in an area where surface water accumulates.

(f) An alternative collection system must discharge to a wastewater treatment facility that is permitted by the commission or to a collection system that flows to a wastewater treatment facility permitted by the commission.

§217.94. Maintenance and Inspection Program.

An alternative collection system owner shall develop and implement a maintenance and inspection program in accordance with §217.69 of this title (relating to Maintenance, Inspection, and Rehabilitation of the Collection System).

§217.95. Alternative Collection System Service Agreements.

(a) An alternative collection system service agreement must be executed between the alternative collection system owner and each real property owner served by the alternative collection system. The service agreement must authorize the collection system owner to place and maintain alternative collection system components on the real property owner's property.

(b) An alternative collection system service agreement must identify the owner of the on-site components and specify the responsible party for the construction and maintenance of the on-site components.

(c) An alternative collection system owner shall submit a copy of the alternative collection system service agreement to the executive director with the summary transmittal letter required in §217.6 of this title (relating to Submittal Requirements and Review Process), for the executive director to review.

(d) An alternative collection system service agreement must include:

(1) a requirement that the alternative collection system owner shall ensure that all existing alternative collection system components and building laterals that will

be incorporated into a new or altered alternative collection system must be cleaned, inspected, tested, maintained, altered, or replaced, as necessary, to the satisfaction of the collection system owner before connecting the alternative collection system component to the collection system;

(2) a requirement that the alternative collection system owner shall approve all materials and equipment before incorporating the materials and equipment into any construction or maintenance of an alternative collection system component;

(3) a requirement that the alternative collection system owner shall have an engineer inspect and approve the installation of all new or replacement alternative collection system components before placing the system into service;

(4) a provision that the alternative collection system owner shall have access at all reasonable times to inspect on-site alternative collection system components;

(5) a provision that the alternative collection system owner has the right to make an emergency repair and perform emergency maintenance to any alternative collection system component, including building laterals and on-site collection system components;

(6) a statement of whether the alternative collection system owner or the property owner is responsible for non-emergency maintenance of on-site components;

(7) a statement of whether the alternative collection system owner or the property owner is responsible for paying maintenance costs for on-site components, or how the costs to each party will be determined if responsibility is shared;

(8) a statement of whether the collection system owner or the property owner is responsible for paying the electrical power cost of operating an on-site component, or how the costs to each party will be determined if responsibility is shared;

(9) a payment method, including a payment schedule, for the alternative collection system owner to recover costs paid by the alternative collection system owner that the property owner is responsible for paying;

(10) a payment method, including a payment schedule, for the property owner to recover costs paid by the property owner that the alternative collection system is responsible for paying;

(11) a provision that authorizes the alternative collection system owner to inspect and approve pretreatment units before installation;

(12) a requirement that an on-site component owned by the alternative collection system owner must have an upstream isolation valve;

(13) a requirement that an on-site component must have a service isolation valve located downstream on a service pipe from an on-site component to the collection system;

(14) a provision that service isolation valves must be accessible to the alternative collection system owner at all times, through an easement or other legal agreement or contract between the property owner and the alternative collection system owner; and

(15) a provision that the alternative collection system owner shall have the ability to collect, transport, and dispose of any residual material.

§217.96. Small Diameter Effluent Sewers.

(a) Interceptor tank design. Septic tanks used as interceptor tanks must be designed and constructed according to §285.32(b)(1) of this title (relating to Criteria for Sewage Treatment Systems).

(1) An outlet of an interceptor tank must have a commercially available effluent filter designed to remove particles larger than 1/16 inch.

(2) The volume of an equivalent dwelling unit (EDU) interceptor tank must be based on the criteria in Chapter 285 of this title (relating to On-Site Sewage Facilities).

(3) The volume of a multiple equivalent dwelling unit (MEDU) interceptor tank must be calculated using the following equations:

Figure: 30 TAC §217.96(a)(3)

Equation D.4.

$$VT = VR + VN$$

Where:
VT = Total Volume

VR = Reserve Volume = 0.75 x average daily flow (ADF)
VN = Nominal Volume

Equation D.5.

$$VN = VIE + VCZ + VSO$$

Where:
VIE = Volume in gallons between elevation of a tank inlet and a tank outlet (≤0.165ADF)
VCZ = Volume in gallons of the clear zone between maximum sludge depth and scum accumulation (1.0 ADF)
VSO = Volume in gallons dedicated to scum and sludge storage (1.85 ADF)

(b) Pretreatment units.

(1) A non-residential contributor to an alternative collection system must provide a method for trapping and removing fats, oils, and grease (FOG) from the wastewater before the wastewater enters an interceptor tank.

(2) A pretreatment unit must have at least two compartments.

(3) The primary compartment volume must be at least 60% of the total tank volume.

(4) A grease trap must meet the same requirements as an interceptor tank with regard to water tightness, materials of construction, and access to contents.

(5) FOG retention capacity, in pounds, must be at least twice the pretreatment unit's flow capacity, in gallons per minute. The FOG retention capacity of a grease trap is the amount of FOG that it can hold before its efficiency drops below 90%.

(6) Plumbing for a pretreatment unit must be designed to prevent wastes, other than FOG, from entering the pretreatment unit.

(7) A pretreatment unit must be designed to allow monitoring of the sludge and FOG levels.

(c) Service pipe design.

(1) Pipe materials used for service pipe must meet or exceed the performance characteristics of American Society for Testing and Materials (ASTM) D 2241 Class 200 polyvinyl chloride (PVC) pipe.

(2) An interceptor tank must include a pumping unit if the interceptor tank's outlet elevation is below the main pipe elevation or if the hydraulic grade line is within a depressed section of a main pipe.

(3) A service pipe for an EDU or MEDU must be sized to transport the highest flow expected from the building, but must not be less than 2.0 inches in diameter.

(4) The diameter of a service pipe must be no greater than the diameter of the collection pipe it is connected to.

(5) A service pipe of an interceptor tank that is subject to periodic backflow must include a check valve that:

(A) is located immediately adjacent to the collection pipe;

(B) is made from a corrosion-resistant material;

(C) provides an unobstructed flow way; and

(D) is a swing type valve with an external position indicator to show the open and closed positions.

(d) Collection system design.

(1) Hydraulic design.

(A) A small diameter effluent sewer (SDES) system with open channel flow must use a design depth of flow of 100% of the pipe diameter.

(B) The minimum flow velocity in a collection pipe must be no less than 1.0 foot per second (fps).

(C) The maximum flow velocity in any portion of an SDES system is 8.0 fps without thrust restraint and 13.0 fps with thrust restraint.

(D) The engineering report must include velocity calculations for each pipe segment.

(E) The elevation of the hydraulic grade-line at peak flow must be lower than an outlet invert of any upstream interceptor tank, unless the interceptor tank has on-site conveyance equipment.

(F) The engineering report must include an analysis for each pipe showing the hydraulic grade line, energy grade line, and ground elevation in

relationship to the outlet elevation of each interceptor tank being served by a collection pipe.

(G) The engineering report must include an engineer's analysis of each segment of a variable grade effluent sewer.

(H) Open pipe flow design must use a Manning's "n" value of 0.013.

(I) Pressure flow design must use a Hazen-Williams "C" value of 120.

(J) No pipe in an SDES may be smaller than 2.0 inches in diameter.

(2) Vertical Alignment.

(A) The vertical alignment of an SDES may be variable; however, the overall downhill gradient must allow the pipe to transport the peak flow.

(B) Venting must be provided upstream and downstream of pipe segments that are below the hydraulic grade line.

(C) The pipes must have a uniform profile (i.e., no abrupt or sharp changes in vertical direction).

(D) A collection pipe must have a cleanout that extends to ground level and terminates in a watertight valve box at:

(i) an upstream terminus;

(ii) a minor junction;

(iii) a change in pipe diameter; and

(iv) intervals of no more than 1,000 feet.

(E) Venting at a collection pipe summit must use a wastewater service air release valve or a combination air release and vacuum valve. The valve must be constructed of corrosion-resistant material and located in a vault.

(F) Pipe material used in a collection system must meet the performance requirements of ASTM D 3034 SDR 26 PVC pipe, except for any segment

under pressure flow conditions. Under pressure flow conditions, pipe material must meet the performance requirements of ASTM D 2241 Class 200 PVC pipe.

(3) Odor Control. A collection pipe must have permanent odor control devices attached to the line and must prevent nuisance odors. Odor control devices must be accessible for maintenance.

§217.97. Pressure Sewers.

(a) Pumps. A pressure sewer system must include a grinder pump or a septic tank effluent pump (STEP).

(b) Exceptions. Except where this section specifically states otherwise, the requirements of this section apply to both grinder pumps and STEPs.

(c) Service Pipe Requirements.

(1) A pressure sewer service pipe that is buried less than 30 inches below ground must incorporate a check valve and a fully closing gate or ball valve at the junction of a collection pipe and a service pipe to allow isolation of the service pipe.

(2) A check valve must allow an unencumbered flow when fully open.

(3) A valve must be made of corrosion-resistant material and must have a position indicator to show its open and closed position.

(4) The minimum size service pipe for an equivalent dwelling unit (EDU) is 1.25 inches.

(5) The minimum size service pipe for a multiple equivalent dwelling unit (MEDU) is 1.5 inches.

(6) A junction to collection pipes must be made with a tee or service saddle and may use solvent weld fittings.

(7) The diameter of a service pipe must be no greater than the diameter of the collection pipe to which it is connected.

(8) Material used in a service pipe must have performance characteristics that are at least equivalent to American Society for Testing and Materials (ASTM) D 2241 Class 200 polyvinyl chloride (PVC) pipe.

(d) On-Site Mechanical Equipment Requirements.

(1) Pump discharge rates must allow the capacity of the pump and the volume of the wet well dedicated for flow attenuation and storage to accommodate the expected peak flow.

(2) A single pumping unit may be used for an EDU. The engineering report must include an analysis that justifies the size of the selected pump(s).

(3) An MEDU must be served by at least two pumps capable of pumping the peak flow with the largest pump out of service. The engineering report must include an analysis that justifies the size of the selected pumps.

(4) The calculations in the engineering report must show that all lift stations and pump chambers are protected against buoyancy forces.

(5) Control panels for all pumps must be at least 2.0 feet above the ground floor elevation of the structure being served by the equipment.

(6) All pipes and appurtenances within a wet well must be corrosion-resistant.

(7) A wet well must include an audiovisual alarm system.

(A) An alarm for an EDU must activate at the high water level specified in the engineering report, plans, or specifications for the project.

(B) An alarm for an MEDU must activate in the event of unit failure or a high water level.

(8) An EDU wet well must have a reserve volume of at least 100 gallons after the activation of a high water alarm.

(9) The reserve volume of an MEDU wet well must equal the volume accumulated during an average two-hour period or 100 gallons, whichever is greater.

(10) A pump located in a STEP chamber that is integrated with an interceptor tank may use the reserve volume of the interceptor tank for the required reserve volume.

(11) A housing that contains mechanical equipment or controls must be watertight if immersion of the mechanical equipment or controls would cause failure.

(12) A control panel or other electrical enclosure must:

(A) be constructed of corrosion-resistant materials;

(B) be watertight;

(C) prevent the migration and venting of odor to the panel or enclosure;

(D) prevent the migration and venting of corrosive or explosive gases to the panel or enclosure; and

(E) bear the seal of the Underwriter Laboratory, Inc. or comply with the National Fire Protection Association 70 National Electrical Code®.

(13) STEP system equipment.

(A) A pump used in a STEP system may be housed either in an interceptor tank or in a separate stand-alone unit.

(B) A pump housed in the interceptor tank of a STEP system must be located in separate chamber from the influent chamber.

(C) The water level in a STEP system pump chamber must not affect the water level in the interceptor tank, to prevent the disturbance of settleable and floatable solids in the interceptor tank.

(D) A design that allows a variable liquid elevation in an interceptor tank is prohibited.

(14) Housing for on-site mechanical equipment and any associated control mechanisms must be:

(A) lockable and tamper-resistant;

(B) constructed of corrosion-resistant material; and

(C) designed to last at least 50 years.

(15) A vault, chamber, wet well, or other structure used to contain wastewater must be:

(A) watertight;

(B) able to withstand any expected structural loading;

(C) constructed of corrosion-resistant material; and

(D) designed to last at least 50 years.

(e) Discharge Pipe Requirements.

(1) A discharge pipe and connections used to join on-site mechanical equipment to a service pipe must be pressure rated at a minimum of 2.5 times the maximum system design pressure.

(2) Pipe material and valves must be corrosion-resistant.

(3) A discharge pipe for a pressure system must include a check valve, a pipe union, and a full closing gate valve or ball valve. A check valve must precede a full closing gate valve.

(4) A ball or gate valve must have a position indicator to show its open and closed positions.

(5) A valve used at an MEDU must be located in a valve box separate from the on-site mechanical equipment.

(f) Collection System Design.

(1) The velocity of wastewater in a grinder pump pressure system main pipe must reach at least 3.0 feet per second at least once per day.

(2) The velocity of wastewater in a grinder pump pressure system main pipe must not be less than 2.0 feet per second nor exceed 8.0 feet per second.

(3) The velocity in a STEP system main pipe must reach at least 1.0 foot per second at least once per day.

(4) A collection system head loss calculation must use a Hazen-Williams "C" factor appropriate to the pipe material. The use of a "C" factor greater than 140 is prohibited.

(5) The pipe used in a pressure collection system must be at least 1.5 inches in diameter.

(6) Pipe material must have the performance characteristics at least equivalent to ASTM D 2241 Class 200 PVC pipe.

(7) A pipe equal to or greater than 3.0 inches in diameter requires elastomeric pipe joints.

(8) A pumping unit affected by less than full flow conditions must incorporate an anti-siphon device.

(9) An isolation valve must be located at:

(A) each intersection of a collection system main pipe;

(B) both sides of a stream crossing;

(C) both sides of an area of unstable soil; and

(D) maximum intervals of 2,500 feet.

(10) An isolation valve must be:

(A) a resilient seated gate valve or ball valve with a position indicator;

(B) constructed from corrosion-resistant materials; and

(C) located in a locked valve box.

(11) Each peak in elevation and each location where air may accumulate due to a difference in flow conditions requires a wastewater air release valve.

(A) A valve orifice must be at least 0.25 inches in diameter.

(B) An air release valve within 50 feet of a residence or building must control odor. An owner shall implement odor control measures necessary to prevent a collection system from becoming a nuisance.

(12) When intermediate pumping of wastewater is required, the design of a collection system lift station must meet the requirements of Subchapter C of this chapter (relating to Conventional Collection Systems).

§217.98. Vacuum Sewer Systems.

(a) A vacuum sewer system is a non-conforming technology. The executive director may review a vacuum sewer in accordance with §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals) and the criteria described in this section.

(b) On-Site Component Design.

(1) A building lateral must be constructed using pipe material that has performance characteristics at least equivalent to American Society for Testing and Materials (ASTM) D 2241 Class 160 polyvinyl chloride (PVC) pipe.

(2) A building lateral must use a screened auxiliary vent no less than 4.0 inches in diameter and located no closer than 10.0 feet to a vacuum valve.

(3) A vacuum valve control must be in a tamper-resistant, watertight, and corrosion-resistant structure.

(4) A vacuum valve pit must be watertight to prevent surface and groundwater inflow.

(5) A control mechanism that uses a pressure differential must use atmospheric air supplied by a screened breather on the lateral line.

(6) A vacuum valve must have a minimum capacity of 30 gallons per minute.

(7) A service pipe must be at least 3.0 inches in diameter.

(8) The performance characteristics of a service pipe must meet or exceed the performance characteristics of ASTM D 2241 Class 200 PVC pipe.

(9) A service pipe joint must be made using either vacuum-rated elastomeric gasket or solvent welding.

(10) A vacuum valve and a main pipe must be separated by at least 5.0 feet of service pipe.

(11) If there is a vertical profile change in a service pipe, the vacuum sewer system must have at least 5.0 feet between the vacuum valve and the first profile change, and between the last profile change and the main pipe.

(12) A service pipe must have a minimum slope of 0.2%.

(13) The connection of a service pipe to a main pipe must use a wye and a long radius elbow, oriented so that the invert of the service pipe is higher than the crown of the collection pipe, and must not be located within 6.0 feet of a collection pipe vertical profile change.

(c) Vacuum Sewer System Design.

(1) The performance characteristics of a pipe in a vacuum sewer must meet or exceed the performance characteristics of ASTM D 2241 Class 200 PVC pipe.

(2) A pipe joint must have a vacuum-rated rubber gasket or be solvent welded.

(3) A pipe in a vacuum sewer must be at least 4.0 inches in diameter. A service pipe must be at least 3.0 inches in diameter.

(A) The length of a 4.0 inch diameter vacuum pipe must not exceed 2,000 feet.

(B) The maximum length of a pipe larger than 4.0 inches in diameter must be determined by the amount of friction and lift head loss.

(4) The total available head loss from the farthest input point in a system is 18 feet, consisting of five feet to operate the vacuum valve and 13 feet available for wastewater transport.

(5) A vacuum sewer system must be laid out in a branched pattern designed to balance pressures within the system. A pipe must have a saw-tooth profile that slopes toward a vacuum station.

(6) The design of an upgrade main line transport pipe must reduce the risk of blocking a pipe with trapped sewage.

(7) A collection pipe that is depressed in order to avoid an obstruction must have at least a 20 foot segment centered on the obstruction.

(8) An intersection of collection pipes must include a division valve at both sides of a watercourse crossing, at both sides of an area of unstable soil, and at intervals of no more than 1,500 feet.

(A) A division valve must be either a plug valve or a resilient-seated gate valve capable of sustaining a vacuum of 24 inches of mercury.

(B) A gauge tap must be located downstream of each division valve.

(d) Vacuum station design. The vacuum pump capacity must be the greater of the capacities calculated using the following equations, but not less than 150 gallons per minute:

Figure: 30 TAC §217.98(d)

Equation D.6.

$$Q_{vp} = \frac{A \times Q_{max}}{7.5 g/cf} + B \times N$$

Where:
Q_{vp} = Minimum vacuum pump capacity
A = Variable based on pipe length
Q_{max} = Station peak flow (gallons per minute)
B = Bleed rate of vacuum valve controller (square feet per minute)
N_v = Number of vacuum valves in system
g/cf = gallons per cubic feet

The value of A must be as follows:

Longest Pipe Length (feet.)	**A**
0-3,000	5
3,001-5,000	6
5,001-7,000	7
7,001-10,000	8
10,001-12,000	9
12,001-15,000	11

Equation D.7.

$$Q = \frac{V}{PDT} \times \log \frac{H_1}{H_2}$$

Where:
Q = Flow rate of vacuum pump (cubic feet per second)
PDT = Time to reduce head from H_1 to H_2 (seconds)
V = Volume of closed system (cubic feet)
H_1 = Initial absolute pressure head (inches of mercury)
H_2 = Final absolute pressure head (inches of mercury)

(e) Vacuum Pumps.

(1) A vacuum pump must be capable of evacuating the system to restore the design vacuum pressure in less than 180 seconds.

(2) The vacuum system must include duplicate vacuum pumps. Each vacuum pump must be capable of delivering 100% of the required airflow and be capable of operating continuously.

(3) A vacuum pump may be either liquid-ring or sliding-vane type. Liquid-ring pumps must be sized at least 15% larger than the necessary vacuum pump capacity.

(4) The transfer pipe must have an electrically or pneumatically controlled plug valve between the collection tank and the reservoir to prevent carryover of liquid into the pump.

(f) Duplicate discharge pumps.

(1) Duplicate discharge pumps are required and must have the capacity to deliver the peak flow with one pump out of service.

(2) A discharge pump must be:

(A) designed for vacuum sewage duty;

(B) equipped with equalizing pipes;

(C) capable of passing a 3.0 inch sphere; and

(D) constructed from corrosion-resistant material.

(3) A discharge pump must use double mechanical shaft seals and have shut-off valves on both the suction and discharge pipes.

(4) The total dynamic head calculation must include the head attributed to overcoming the vacuum in the collection tank.

(5) The available net positive suction head must be greater than the required net positive suction head for the expected vacuum operating range.

(6) The pump suction pipe must be sized 2.0 inches larger than the discharge pipe to prevent wastewater from forming a vortex in the collection tank.

(7) The pump design calculations and pump curves must be included in the engineering report.

(g) Vacuum Reservoir.

(1) A vacuum system that requires a collection tank of 1,600 gallons or more must also include a vacuum reservoir tank with a capacity of at least 400 gallons.

(2) Liquid from a vacuum pump must be piped to the top of the vacuum reservoir tank.

(3) A vacuum reservoir tank must include internal access for periodic cleaning and inspection.

(4) All main pipes must connect to the collection tank.

(5) The wastewater pump suction pipe must lie at the lowest point on the collection tank and away from the main pipe inlet.

(6) The main pipe must enter at the top of the collection tank with the inlet elbows inside the tank turned at an angle away from the pump suction opening.

(7) The collection tank must include probes for liquid level sensing for operation of the discharge pumps.

(8) A vacuum pump must include automatic vacuum switch controls, which must operate based on the liquid level in the reservoir tank.

(9) The collection tank and low system vacuum must include an audiovisual alarm for high liquid level.

(h) An owner shall include a description of the alternative collection system's anti-corrosive protection in the engineering report.

§217.99. Testing Requirements.

(a) Components of an alternative collection system must be tested for water tightness by one of the methods shown in the following table:

Figure: 30 TAC §217.99(a)

Table D.1. - Testing Requirements for an Alternative Collection System

Component	**Type of Test(s)**
Interceptor Tank	Hydrostatic head test for tanks (HHT) or Vacuum test for tanks (VTT)
Buffer Tank	HHT or VTT
Vault, Pit, Wet Wells	HHT or VTT
Service Pipe (Pressure)	Pressure line test (PLT)
Service Pipe (Small Diameter Effluent Sewer (SDES))	Hydrostatic head test for pipe (HHP)
Collection Pipe (Pressure)	PLT
Collection Pipe (SDES)	Low pressure air test for pipe or HHP

(b) Hydrostatic Head Test for Pipe. The total infiltration or exfiltration, as determined by the hydrostatic head test, must not exceed 10 gallons per inch diameter per mile of pipe per 24 hours at a minimum head of 2.0 feet. If the quantity of infiltration or exfiltration exceeds the maximum quantity specified, the owner shall take remedial action to reduce the infiltration or exfiltration to an amount below the specified maximum limits.

(c) Hydrostatic Head Test for Tanks. The test consists of filling the tank to the top and holding the water for 24 hours to determine whether the tank is leaking.

(1) The hydrostatic head test must demonstrate that the tank is not leaking before the placement of backfill around a tank.

(2) The hydrostatic head test for a tank constructed from flexible or semi-rigid material is required after placement and backfilling according to the tank manufacturer's recommendations.

(d) Low-Pressure Air Test. The low-pressure air test must conform to the requirements of §217.57 of this title (relating to Testing Requirements for Installation of Gravity Collection System Pipes).

(e) Pressure Pipe Test.

(1) The test pressure must be a minimum of 25 pounds per square inch or 1.5 times the maximum pipe design pressure, whichever is larger. The maximum allowable leakage must be calculated using the following equation:

Figure: 30 TAC §217.99(e)(1)

Equation D.8.

$$L = \frac{S \times D \times \sqrt{P}}{133200}$$

Where:
L = Leakage (gallons per hour)
S = Length of pipe (feet)
D = Inside diameter of pipe (inches)
P = Pressure (pounds per square inch), gauge

(2) If the leakage exceeds the maximum amount calculated, the owner shall take remedial action to reduce the leakage to an amount within the allowable limit from paragraph (1) of this subsection.

(f) Vacuum Test for a Tank.

(1) The test may begin only after establishing an initial stable vacuum of 4.0 inches of mercury.

(2) The total vacuum loss during a vacuum test must not exceed 1.0 inch loss of mercury vacuum after five minutes.

(3) A tank constructed of flexible or semi-rigid material must not allow more than a 3% change in tank dimensions in any direction while under vacuum.

(4) If the quantity of vacuum loss or if tank deformation equals or exceeds the maximum quantity specified in paragraph (2) of this subsection, then the owner shall take remedial action to reduce the amount of vacuum loss or amount of deformation to comply with this subsection.

§217.100. Termination.

(a) An alternative collection system must terminate at a wastewater treatment facility or into a manhole that is part of a conventional collection system.

(b) Release of gases must be controlled by minimizing turbulence in the discharge into a manhole.

(c) An alternative collection system that terminates at a wastewater treatment facility must discharge below the liquid level at the headworks or the influent lift station.

SUBCHAPTER D: ALTERNATIVE COLLECTION SYSTEMS

[§217.94]

Statutory Authority

The repeal of this section is adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted repeal of this section implements TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.94. Management.

SUBCHAPTER E: PRELIMINARY TREATMENT UNITS

§§217.120 - 217.129

Statutory Authority

The amendments and new section are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new section implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.120. General Preliminary Treatment Requirements.

(a) A wastewater treatment facility must be designed with the ability to add provisions for removing fats, oils, and grease (FOG) from the wastewater.

(b) If fats, oils, or grease have caused operational failures in a treatment unit that is being altered, then FOG removal must be provided to prevent future failures.

(c) The headworks of a wastewater treatment facility must have a screening device or a grinding device.

(1) Screening devices include coarse screens and fine screens.

(2) Grinding devices include grinder pumps, and other grinding devices approved in writing by the executive director.

(d) A screening device or grinding device must not be housed in the same structure as an office or any other work area unless the area housing the screening device or grinding device is separated from the rest of the structure by an air-tight partition.

(e) Each enclosure that houses a screening device or grinding device and is accessible to individuals must have a vent fan capable of providing at least 30 complete air exchanges per hour.

(f) Each screening device or grinding device must be readily accessible for maintenance and screenings removal.

(g) Any screening device located 4.0 feet or more below ground level must include mechanical equipment capable of lifting the screenings to ground level.

(h) Screenings must be collected, managed, and disposed of in accordance with §217.123 of this title (relating to Screenings and Debris Handling) at a frequency that prevents creation of a nuisance.

§217.121. Coarse Screens.

(a) A wastewater treatment facility must use a coarse screen, unless all flow entering a wastewater treatment facility is processed through a grinder pump or grinding device.

(b) A coarse screen must include an emergency overflow sized to handle the peak flow of the wastewater treatment facility.

(c) A coarse screen must include a way to divert flow to the emergency overflow.

(d) If the primary channel uses a mechanically cleaned coarse screen, the emergency overflow must also have a coarse screen.

(e) Coarse Screen Design.

(1) For a manually cleaned coarse screen, the clear openings between the bars must be at least 0.5 inch but not more than 1.0 inch.

(2) For a mechanically cleaned coarse screen, the clear openings between the bars must be at least 0.25 inch but not more than 1.0 inch.

(3) A manually cleaned coarse screen must use a bar rack sloped at least 30 degrees but not more than 60 degrees from horizontal.

(4) A manually cleaned coarse screen must be attached to a horizontal platform that allows draining and temporary screenings storage to prevent unauthorized discharge between cleanings.

(5) A mechanically cleaned coarse screen must be designed with equipment that automatically collects and disposes of screenings.

(f) Coarse Screen Hydraulics.

(1) The velocity of wastewater through a coarse screen must be at least 1.0 foot per second, but not more than 3.0 feet per second at design flow.

(2) The inlet channel for a coarse screen must be designed to minimize the deposition of solids.

(3) The flow line of the inlet channel must not exceed 6.0 inches below the invert elevation of the influent.

(g) Corrosion Resistance. A coarse screen and related structures must be designed to resist the effects of a corrosive environment, including long-term exposure to hydrogen sulfide.

§217.122. Fine Screens.

(a) A fine screen may be used in lieu of a coarse screen.

(b) The clear openings in a fine screen must be less than 0.25 inch.

(c) Any five-day biochemical oxygen demand (BOD_5) reduction percentage claimed for a fine screen must be developed through a study conducted on actual full-scale operation of the proposed fine screen. The BOD_5 reduction percentage claimed must not exceed 35%.

(d) The engineering report must justify any reduction in the size of a treatment unit that is based on removal of BOD_5 by a fine screen.

(e) An owner who claims a BOD_5 reduction credit must include a sufficient number of fine screen units so that any BOD_5 reduction claimed will be met with the largest fine screen unit out of service.

(f) A design may include a single fine screen unit only if the design includes an emergency overflow channel with a coarse screen to accept flow when the fine screen is out of service. No BOD_5 removal credit is allowed with a single fine screen design.

(g) A coarse screen must be provided ahead of a fine screen when the manufacturer of a fine screen recommends prescreening before the fine screen.

(h) A moving or rotating fine screen must use a continuous cleaning device, such as water jets or wiper blades.

(i) A fine screen unit must automatically convey the screenings to a storage area or processing unit that complies with §217.123 of this title (relating to Screenings and Debris Handling).

(j) A fine screen must meet the manufacturer's recommendations with respect to velocity and head loss through the fine screen.

(k) A fine screen must use either a bar rack or a perforated plate.

§217.123. Screenings and Debris Handling.

(a) A screening device must have a minimum storage capacity of one day of screenings and debris.

(b) A container for screenings and debris must be fully covered with a tight-fitting cover designed to reduce vector attraction, or must use an alternative method of reducing vector attraction approved in writing by the executive director.

(c) A storage area for screenings and debris must drain to the headworks of the wastewater treatment facility or the influent lift station and must include runoff control.

(d) All screenings and debris must be collected in containers described in subsection (b) of this section and be managed and disposed of in accordance with Chapter 330 of this title (relating to Municipal Solid Waste).

§217.124. Grit Removal Systems.

(a) A wastewater treatment facility using anaerobic digestion must have a grit removal system. A grit removal system is optional for all other facilities.

(b) A grit removal system includes units and processes capable of removing inert, non-biodegradable particles.

(c) A grit removal system must include at least two units capable of operating at the peak flow of the wastewater treatment facility when grit removal is required by subsection (a) of this section.

(d) Each grit removal system must include:

(1) an emergency overflow to accept flow when a grit removal unit is off-line; and

(2) a means of diverting flow to the emergency overflow.

§217.125. Grit Chambers.

(a) Horizontal Flow Grit Chambers.

(1) Velocity through a horizontal flow grit chamber must range from 0.8 feet per second to no more than 1.3 feet per second.

(2) A horizontal flow grit chamber channel must minimize turbulence and provide uniform velocity across the channel.

(3) The channel size of a horizontal flow grit chamber must accommodate the grit removal equipment capacity and grit storage.

(b) Aerated Grit Chambers.

(1) The air diffuser and baffle arrangement in an aerated grit chamber must not interfere with the removal of particles with the design particle size and density.

(2) The aeration equipment must be capable of varying air feed rates along the length of an aerated grit chamber from 3.0 standard cubic feet per minute (scfm) per linear foot to no more than 8.0 scfm per linear foot.

(3) An aerated grit chamber must have a hydraulic detention time of at least 3.0 minutes.

(4) An aerated grit chamber must include a grit hopper located under an air diffuser.

(c) Mechanical Grit Chambers.

(1) The velocity through mechanical grit chambers must be no greater than 1.0 foot per second at design flow.

(2) Each mechanical grit chamber channel must include a grit hopper at the side of a tank contiguous to a grit removal mechanism.

(3) An inlet must include baffles to prevent short-circuiting.

(4) Grit removal must be provided by one of the following mechanisms:

(A) reciprocating rake;

(B) screw conveyor; or

(C) air lift pump.

(d) Cyclonic Degritters.

(1) A cyclonic degritter must prevent an inlet-to-outlet short circuit.

(2) A cyclonic degritter must include an adjustable apex with a quick disconnect assembly to remove any oversized object.

(3) Detention time in a cyclonic degritter must be at least 1.0 minute at the design flow.

(4) The flow velocity in a cyclonic degritter must be at least 1.0 foot per second but not more than 2.0 feet per second at the design flow.

(5) A screening unit must be installed upstream of a cyclonic degritter.

(e) Vortex Grit Chamber.

(1) An inlet channel must include a straight length in order to deliver smooth flow into the vortex grit chamber.

(2) The inlet velocity must be at least 2.0 feet per second at peak flow.

(3) A vortex system must include rotating paddles in the center of the grit chamber, and must rotate at a maximum of 21 revolutions per minute.

(4) An outlet channel must maintain a constant elevation.

(5) Grit removal from a grit storage chamber must be achieved using pumps specifically designed to handle grit.

§217.126. Grit Handling.

(a) A grit washing unit or grit storage area must be designed to return recycled water and drainage to the headworks of the wastewater treatment facility.

(b) A grit chamber located below ground level must include mechanical grit handling equipment.

(c) Grit must be stored in a container with a tight-fitting cover and must be managed and disposed of in accordance with §217.123 of this title (relating to Screenings and Debris Handling).

§217.127. Pre-aeration Units.

(a) Pre-aeration units may be used at a wastewater treatment facility to:

(1) control odor;

(2) reduce septicity;

(3) separate grease; or

(4) promote uniform distribution of solids to clarifiers.

(b) The engineering report must include the basis for the design of a pre-aeration system.

§217.128. Flow Equalization Basins.

(a) A wastewater treatment facility must be designed with a flow equalization basin if:

(1) the total daily influent flow volume or total daily influent organic loading occurs during a period less than or equal to ten hours; or

(2) the wastewater treatment facility receives an influent flow of less than 10% of its design flow or an influent organic loading less than 10% of its design organic loading during a period of time equal to or greater than 48 hours in any period of seven consecutive days.

(b) A flow equalization basin must have an upstream screening device or grinding device.

(c) A flow equalization basin must include an aeration system sized to maintain a dissolved oxygen level of at least 1.0 milligram per liter (mg/l) throughout the flow equalization basin.

(d) A flow equalization basin must include a mixing system sufficient to prevent solids from settling.

(e) The size of a flow equalization basin must be based on diurnal flow variations and the size and capacity of downstream process units. The engineering report must include the calculations justifying the size of a flow equalization basin.

(f) For pumped flow to an equalization basin, the effluent from the basin must be controlled by a flow-regulating device capable of maintaining a flow rate that allows downstream process units to operate as designed.

(g) For pumped flow from an equalization basin, a variable-speed pump or multiple pumps are required to deliver a constant flow to downstream treatment units.

§217.129. Primary Clarifiers.

(a) Inlets.

(1) A primary clarifier inlet must provide uniform flow and stilling.

(2) Vertical flow velocity through an inlet stilling well must not exceed 0.15 feet per second at peak flow.

(3) An inlet distribution channel must not have a dead-end corner and must prevent the settling of solids in the channel.

(4) An inlet structure must allow floating material to enter the clarifier.

(b) Scum removal.

(1) A primary clarifier must have scum baffles and a means of collecting and disposing of scum.

(2) A primary clarifier must discharge scum to a sludge digester, or must use an alternative method of disposal approved in writing by the executive director.

(3) The discharge of scum to any open drying area is prohibited.

(4) A primary clarifier with a design flow equal to or greater than 25,000 gallons per day must include a mechanical skimmer.

(5) A primary clarifier with a design flow less than 25,000 gallons per day must use a mechanical skimmer or hydraulic differential skimming. If hydraulic differential skimming is used, it must be capable of removing scum from the entire operating surface of the clarifier.

(6) A pump used for pumping scum must be specifically designed to pump scum.

(c) Effluent weirs.

(1) An effluent weir must not cause turbulence or a localized vertical flow velocity that would pull solids over the effluent weir in the primary clarifier.

(2) An effluent weir must be designed to prevent hydraulic short circuiting through a primary clarifier.

(3) An effluent weir must be level, and must be designed to be adjustable for re-leveling.

(4) Effluent weir loading must not exceed 20,000 gallons per day at peak flow per linear foot of weir length for a wastewater treatment facility with a design flow of 1.0 million gallons per day or less.

(5) Weir loading must not exceed 30,000 gallons per day at peak flow per linear foot of weir length for a wastewater treatment facility with a design flow greater than 1.0 million gallons per day.

(d) Primary clarifier basin sizing.

(1) The surface area of a primary clarifier must be used to determine the proper weir overflow rates.

(2) The actual primary clarifier size must be based on the larger of two surface area calculations: peak flow rate and design flow surface loading rate.

(3) Surface loading rates and detention times for a primary clarifier in subparagraphs (A) and (B) of this paragraph are based upon a minimum side water depth of 10.0 feet.

(A) Surface loading rates, excluding recirculation flow, must not exceed:

(i) 1,800 gallons per day per square foot at peak flow; and

(ii) 1,000 gallons per day per square foot at design flow.

(B) Detention Time.

(i) Detention time at peak flow must be at least 54 minutes (0.9 hour).

(ii) Detention time at design flow must be at least 108 minutes (1.8 hours).

(iii) Side water depth may be adjusted from a minimum of 10 feet to a maximum of 18 feet, as long as the detention time remains unchanged.

(iv) The detention time must be based on the effective volume and the weir overflow rate of a circular or rectangular clarifier.

(I) The effective volume includes all liquid above the sludge blanket.

(II) For a cone bottom tank, the top of the sludge blanket is considered to be at the top of the cone.

(III) The design of a flat bottom tank must include additional depth for a sludge blanket with a thickness of 3.0 feet.

(e) Side Water Depth. The minimum side water depth for primary clarifiers is 10.0 feet. For a primary clarifier, the side water depth is defined as:

(1) the water depth from the top of the cone in a cone bottom tank to the water surface; or

(2) the water depth from 3.0 feet above the bottom of a flat bottom tank to the water surface.

(f) Freeboard. The walls of a primary clarifier must extend at least 6.0 inches above the surrounding ground surface and must provide a minimum freeboard of 12.0 inches at peak flow.

(g) Drains.

(1) A primary clarifier must have the capability of draining completely without bypassing secondary treatment.

(2) A portable dewatering pump may be used for complete dewatering.

(h) Accessibility. A primary clarifier must be accessible for operation and maintenance.

(i) Five-day biochemical oxygen demand (BOD_5) Removal. The design of a primary clarifier must be based on no greater than 35% BOD_5 reduction, unless a higher efficiency is justified by a pilot study or data from a similar full-scale operation.

(j) Sludge Transfer.

(1) A primary clarifier unit must include mechanical sludge collection equipment designed to remove sludge in a manner that will minimize odor development and transfer the sludge for subsequent processing.

(2) A gravity sludge transfer pipe must be at least 8.0 inches in diameter.

SUBCHAPTER F: ACTIVATED SLUDGE SYSTEMS

§§217.151 - 217.161, 217.162, 217.163, 217.164

Statutory Authority

The amendments and new section are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new section implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.151. Requirements for an Aeration Basin.

(a) Unless designed for advanced nutrient removal, an aeration basin must be designed to maintain a minimum dissolved oxygen concentration of 2.0 milligrams per liter (mg/l) throughout the aeration basin at the maximum diurnal organic loading rate determined in §217.32(a)(3) and Figure: 30 TAC §217.32(a)(3) of this title (relating to Organic Loading and Flows for New Wastewater Treatment Facilities).

(b) The volume of aerated influent wastewater channels and aerated mixed liquor transfer channels of an activated sludge system may be used to meet aeration basin volume requirements, provided the activated sludge system uses aeration by diffused air and the diffuser depth conforms to the requirements of §217.155(b)(5)(A) of this title (relating to Aeration Equipment Sizing).

(c) The use of a contact stabilization system for nitrification is prohibited.

§217.152. Requirements for Clarifiers.

(a) Inlets.

(1) A clarifier must have an inlet valve or gate.

(2) A clarifier inlet must provide uniform flow and stilling.

(3) A transfer pipe must not trap or entrain air.

(4) Vertical flow velocity through an inlet stilling well must not exceed 0.15 feet per second at peak flow.

(5) An inlet distribution channel must be designed to prevent the settling of solids in the channel.

(b) Pumped Inflow.

(1) For a wastewater treatment facility with pumped inflow, a clarifier must be able to accommodate all flow without overloading or overtopping the clarifier effluent weir.

(2) A clarifier must hydraulically accommodate peak flows without adversely affecting treatment in the clarifier or in subsequent treatment units.

(c) Scum removal.

(1) A clarifier must include scum baffles and a means for scum collection and disposal.

(A) A clarifier at a wastewater treatment facility with a design flow equal to or greater than 10,000 gallons per day must use a mechanical skimmer.

(B) A clarifier at a wastewater treatment facility with a design flow less than 10,000 gallons per day may use either mechanical skimming or hydraulic differential skimming. Hydraulic differential skimming may only be used if the scum pickup is capable of removing scum from the entire operating surface of the clarifier.

(2) Scum collected from a clarifier in a wastewater treatment facility using an activated sludge process or an aerated lagoon must be:

(A) discharged to an aeration basin or digester; or

(B) disposed of using any method that complies with Chapter 312 of this title (relating to Sludge Use, Disposal, and Transportation).

(3) If scum contains debris or foreign materials that were not removed by preliminary treatment, debris and foreign materials must be removed from the scum before the scum is discharged to a digester or applied to the land. Otherwise, scum containing debris or other foreign materials must be sent to a landfill or a sludge-only monofill.

(4) Scum collected from a clarifier in a wastewater treatment facility not using an activated sludge process and not using an aerated lagoon must be discharged to a sludge digester or must be disposed of using any disposal method that complies with Chapter 312 of this title.

(5) Discharge of scum to a drying area that is open to the atmosphere is prohibited.

(6) Storage or holding of scum in a containment vessel that is open to the atmosphere is prohibited. Scum must be contained in a vessel that is not open to the atmosphere or must be routed to a treatment unit in the wastewater treatment facility for further processing.

(7) A pump used for pumping scum must be specifically designed to pump scum.

(d) Clarifier Effluent Weirs.

(1) A clarifier effluent weir must prevent turbulence or localized high vertical flow velocity in a clarifier.

(2) A clarifier effluent weir must be located a minimum of 6.0 inches from an outer wall or baffle, except for a clarifier effluent weir and launder that is attached to a wall. A clarifier effluent weir must prevent the short-circuiting of flow throughout the clarifier.

(3) A clarifier effluent weir must be level, and must be adjustable to allow re-leveling of the weir and to provide for minor changes to the water surface elevation in the clarifier.

(4) For a wastewater treatment facility with a design flow of less than 1.0 million gallons per day, the clarifier effluent weir loading must not exceed 20,000 gallons per day at the peak flow per linear foot of weir length.

(5) For a wastewater treatment facility with a design flow equal to or greater than 1.0 million gallons per day, the clarifier effluent weir loading must not exceed 30,000 gallons per day at the peak flow per linear foot of weir length.

(6) A center-feed circular clarifier must have effluent weirs around the entire perimeter of the clarifier.

(e) Sludge Pipes.

(1) The transfer of sludge from a clarifier to a treatment or processing unit must not negatively affect treatment efficiency of the unit that receives the sludge.

(2) A sludge pipe must be a minimum of 4.0 inches in diameter.

(3) The flow velocity in a sludge pipe must be greater than 2.0 feet per second for a wastewater treatment facility with a design flow greater than 150,000 gallons per day. For a wastewater treatment facility with a design flow of 150,000 gallons per day or less, the flow velocity in the sludge pipe must be greater than 0.5 feet per second. The executive director may consider approving lower velocities in writing for a wastewater treatment facility that uses a biological nutrient removal process, on a case-by-case basis.

(4) A sludge pipe must be accessible for cleaning.

(5) A means to remove a blockage from all sludge pipes must be provided at the wastewater treatment facility.

(f) Sludge Collection Equipment.

(1) A clarifier that is part of a wastewater treatment facility with a design flow of 10,000 gallons per day or greater must include mechanical sludge collecting equipment.

(2) A clarifier that is part of a wastewater treatment facility with a design flow of less than 10,000 gallons per day must include manual equipment designed to move settled sludge to the sludge collection pipe, unless mechanical sludge collecting equipment is provided.

(g) Side Water Depth.

(1) For a secondary clarifier, the side water depth is defined as:

(A) the water depth from the top of the cone in a cone bottom tank to the water surface; or

(B) the water depth from 2.0 feet above the bottom of a flat bottom tank to the water surface.

(2) The minimum side water depth for a clarifier with a mechanical sludge collector is:

(A) 10.0 feet if the surface area is equal to or greater than 300 square feet; and

(B) 8.0 feet if the surface area is less than 300 square feet.

(3) A clarifier with a hopper bottom must have a minimum side water depth of 8.0 feet, not including the hopper and sump. The corresponding surface area and surface loading relationships in Figure: 30 TAC §217.152(g)(3) must be used.

Figure: 30 TAC §217.152(g)(3)

Equation F.1.

$$SLR = Q_{peak}/SA$$

Where:
SLR = surface loading rate (gallons per square foot per day)
Q_{peak} = peak flow (gallons per day)
SA = surface area (square feet)

(4) The hopper portion of a hopper bottom clarifier must have a vertical depth of at least 4.0 feet.

(h) Restrictions on Hopper Bottom Clarifiers.

(1) A hopper bottom clarifier is prohibited for use in a wastewater treatment facility with a design flow equal to or greater than 10,000 gallons per day.

(2) Each hopper cell of a hopper bottom clarifier must have individually controlled sludge removal equipment.

(3) A hopper bottom clarifier must have a smooth wall finish.

(4) A hopper bottom clarifier must have an upper hopper slope of not less than 60 degrees from horizontal.

(i) Restrictions on Short Circuiting. The influent stilling baffle and effluent clarifier weir must prevent hydraulic short circuiting.

(j) Return Sludge Pumping Capacity.

(1) The capacity of a return sludge pumping system must be calculated based on the area of the activated sludge clarifier or clarifiers, including the stilling well area.

(2) The return sludge pumping capacity must be equal to or greater than the clarifier underflow rate in gallons per day per square foot (gpd/sf) with the largest pump out of service.

(3) A return sludge pumping system must be capable of pumping at least 200 gpd/sf but not more than 400 gpd/sf.

(4) The return sludge pumping capacity must be controlled via throttling, variable speed drives, or multiple pump operation.

§217.153. Requirements for Both Aeration Basins and Clarifiers.

(a) Construction. Construction material for aeration basins and clarifiers must be resistant to the effects of a corrosive wastewater environment.

(1) Aeration basins and clarifiers must not be buoyant when empty.

(2) Structures using a common wall must be designed to accommodate the stresses generated when one basin is full and an adjacent basin is empty.

(3) Aeration basin and clarifier walls must be watertight.

(b) Freeboard.

(1) An aeration basin must have a minimum freeboard of 18 inches at the peak flow.

(2) A clarifier must have a minimum freeboard of 12 inches at the peak flow.

(c) Redundancy and Flow Control.

(1) A wastewater treatment facility with a design flow equal to or greater than 0.4 million gallons per day must have a minimum of two aeration basins and two

clarifiers. Aeration basins are exempt from this requirement if the aeration equipment, including the diffusers, is removable without taking the aeration basin out of service.

(2) Internal and interconnecting pipes must be capable of hydraulically handling the peak flow without overflow while either the largest clarifier or the largest aeration basin is out of service.

(3) Each aeration basin and clarifier must have gates or valves to allow it to be hydraulically isolated.

(4) Each aeration basin and clarifier must have a dedicated means for draining.

§217.154. Aeration Basin and Clarifier Sizing--Traditional Design.

(a) This section applies to the traditional approach for sizing an aeration basin and clarifier, and is based on empirically-derived design values that have been used historically as standard engineering practice.

(b) Aeration Basin Sizing.

(1) An aeration system must be designed to maintain a minimum dissolved oxygen concentration of 2.0 milligrams per liter (mg/l) throughout the aeration basin at the maximum diurnal organic loading rate determined in §217.32(a)(3) and Figure: 30 TAC §217.32(a)(3) of this title (relating to Organic Loading and Flows for New Wastewater Treatment Facilities). The executive director may consider alternative dissolved oxygen specifications for designs that include biological nutrient removal or tapered aeration for energy conservation, which must be approved in writing.

(2) Based on the calculated organic load, the aeration basin volume must be designed to ensure that the organic loading on the aeration basin does not exceed the organic loading rates in the following table:

Figure: 30 TAC §217.154(b)(2)

Table F.1. - Design Organic Loading Rates for Sizing Aeration Basins Based on Traditional Design Methods

Process	**Applicable Permit Effluent Sets** *Concentration milligrams per liter (mg/l)*			**Maximum Organic Loading Rate** *Pounds BOD_5/day/1,000 cubic feet (lbs/day/1,000cf)*
	Five-day Biochemical Oxygen Demand (BOD_5)	**Total Suspended Solids (TSS)**	**Ammonia Nitrogen**	
Conventional activated sludge	10	15	NA	45
	20	20	NA	

process without nitrification				
Conventional activated sludge process with nitrification when reactor temperatures exceed 15° C	10	15	3, 2, or 1	35
Conventional activated sludge process with nitrification when reactor temperatures are 13° to 15° C	10	15	3, 2, or 1	25
Conventional activated sludge process with nitrification when reactor temperatures are 10° to 12° C	10	15	3, 2, or 1	20
Extended aeration basins including oxidation ditches (mean cell residence time over 20 days)	10	15	3, 2, or 1	15

(3) When identifying the aeration basin temperature for the process design in Table F.1. in Figure: 30 TAC §217.154(b)(2), the owner must use the average of the

lowest consecutive seven-day mean aeration basin temperature from a wastewater treatment facility with similar characteristics. For purposes of this subsection, a similar wastewater treatment facility:

(A) is located within 50 miles of the wastewater treatment facility where the planned aeration basin or system will be installed;

(B) uses the same placement of the aeration basin (in-ground or above-ground); and

(C) has any other characteristics required by the executive director in writing.

(c) Clarifier Sizing.

(1) The following table establishes the maximum surface loading rates and the minimum detention times that must be used to determine the size of a clarifier:

Figure: 30 TAC §217.154(c)(1)

Table F.2. - Maximum Clarifier Weir Overflow Rates Based Upon Traditional Design Methods

Applicable Permit Effluent Sets *concentration milligrams per liter (mg/l)*			**Aeration Basin Organic Loading** *(five-day biochemical oxygen demand,* from Table F.1.	**Process - Treatment Level**	**Maximum Surface Loading Rate at Two-Hour Peak Flow** *(gallons/day/ square foot)*	**Minimum Detention Time at Two-Hour Peak Flow** *(hours)*
BOD_5	**TSS**	**NH_3-N**				
20	20		45	Fixed film - secondary or enhanced secondary	1,200	1.8
10	15					
20	20		45, 35, 25 or 20	Activated sludge - secondary, enhanced secondary, or secondary with nitrification	1,200	1.8
10	15					
10	15	3				
20	20		15	Extended air - secondary	900	2.0
10	15	3	15	Extended aeration - enhanced secondary	800	2.2

(2) A clarifier must meet both the detention time and weir overflow rate criteria in Table F.2. in Figure: 30 TAC §217.154(c)(1).

(A) When calculating weir overflow rates for a clarifier, return activated sludge flow must not be used in the calculation of the maximum weir overflow rate, in compliance with Table F.2. in Figure: 30 TAC §217.154(c)(1).

(B) When calculating the weir overflow rate for a clarifier, the surface area of the stilling well may be included as part of the clarifier surface area.

§217.155. Aeration Equipment Sizing.

(a) Oxygen Requirements (O_2R) of Wastewater.

(1) An aeration system must be designed to provide a minimum dissolved oxygen concentration in the aeration basin of 2.0 milligrams per liter (mg/l).

(2) Mechanical and diffused aeration systems must supply the O_2R calculated by Equation F.2. in Figure: 30 TAC §217.155(a)(3), or use the recommended values presented in Table F.3. in Figure: 30 TAC §217.155(a)(3), whichever is greater.

(3) The O_2R values in Table F.3. in Figure: 30 TAC §217.155(a)(3) use concentrations of 200 mg/l five-day biochemical oxygen demand (BOD_5) and 45 mg/l ammonia-nitrogen (NH3-N) in Equation F.2. in Figure: 30 TAC §217.155(a)(3):

Figure: 30 TAC §217.155(a)(3)

Equation F.2.

$$O_2R = \frac{1.2(BOD_5) + 4.3(NH_3 - N)}{BOD_5}$$

Where:
O_2R = Oxygen requirement, pound (lb) O_2/lb five-day biochemical oxygen demand (BOD_5)
BOD_5 = BOD_5 concentration, milligrams per liter (mg/L)
NH_3-N = Ammonia nitrogen, mg/L

Table F.3. - Minimum O_2R for Lower BOD_5 Loadings

Process	O_2R, pounds (lbs) O_2/lb BOD_5
Conventional Activated Sludge Systems that are not Intended to Nitrify	1.2
Conventional Activated Sludge Systems that are Intended to Nitrify and Extended Aeration Systems (including all Oxidation Ditch Treatment Systems)	2.2

(b) Diffused Aeration System. An airflow design must be based on either paragraph (1) or (2) of this subsection.

(1) Design Airflow Requirements - Default Values. A diffused aeration system may use Table F.4. in Figure: 30 TAC §217.155(b)(1) to determine the airflow for sizing aeration system components:

Figure: 30 TAC §217.155(b)(1)

Table F.4. - Minimum Airflow Requirements for Diffused Air

Process	**Airflow/Five-day biochemical oxygen demand (BOD_5) load** *standard cubic feet/day/pound*
Conventional activated sludge systems that are not intended to nitrify	1,800*
Extended aeration systems and all other activated sludge systems that are intended to nitrify, including all oxidation ditch treatment systems	3,200*
*These values were calculated using Equation F.3. in Figure: 30 TAC §217.155(b)(2)(A)(iv) with the following assumptions: a transfer efficiency of 4.0% in wastewater for all diffused air activated sludge processes; a diffuser submergence of 12 feet; a wastewater temperature of 20°C; and the oxygen requirements in Figure: 30 TAC §217.155(a)(3), Table F.3.	

(2) Design Airflow Requirements - Equipment and Site Specific Values. A diffused aeration system may be based on calculations of the airflow requirements for the diffused aeration equipment in accordance with subparagraphs (A) - (D) of this paragraph.

(A) Determine Clean Water Oxygen Transfer Efficiency.

(i) A diffused aeration system design may be based on a clean water oxygen transfer efficiency greater than 4%, only if the clean water oxygen transfer efficiency is supported by full scale diffuser performance data. Full scale performance data must be developed by an accredited testing laboratory or a licensed professional engineer. Data developed by a professional engineer must be sealed by the engineer.

(ii) A testing laboratory or licensed engineer shall use the oxygen transfer testing methodology described in the most current version of the American Society of Civil Engineers (ASCE) publication, *A Standard for the Measurement of Oxygen Transfer in Clean Water*.

(iii) A diffused aeration system with a clean water transfer efficiency greater than 18% for a coarse bubble system or greater than 26% for a fine bubble system is considered an innovative technology and is subject to §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(iv) A design for clean water transfer efficiencies obtained at temperatures other than 20 degrees Celsius must be adjusted for a diffused aeration

system to reflect the approximate transfer efficiencies and air requirements under field conditions by using the following equation:

Figure: 30 TAC §217.155(b)(2)(A)(iv) (No change to the figure as it exists in TAC.)

(B) Determining Wastewater Oxygen Transfer Efficiency (WOTE).

(i) The WOTE must be determined from clean water test data by multiplying the clean water transfer efficiency by 0.65 for a coarse bubble diffuser or by multiplying the clean water transfer efficiency by 0.45 for a fine bubble diffuser.

(ii) The executive director may require additional testing and data to justify actual WOTE for a wastewater treatment facility treating wastewater containing greater than 10% industrial wastes.

(C) Determining Required Airflow (RAF). The RAF must be calculated using the following equation to determine the size needed for a diffuser submergence of 12.0 feet. If the diffuser submergence is other than 12.0 feet, a diffused aeration system must correct the RAF, as detailed in subparagraph (D) of this paragraph.

Figure: 30 TAC §217.155(b)(2)(C)

Equation F.4.

$$RAF = \frac{(PPD\ BOD_5) \times (O_2/lb\ BOD_5)}{WOTE \times 0.23 \times 0.075 \times 1440}$$

Where:
RAF = Required Airflow Rate (standard cubic feet per minute (SCFM))
PPD BOD_5 = Influent Organic Load in Pounds per Day of five-day biochemical oxygen demand
0.23 = lb 0_2/lb air @ 20° C
1440 = minutes/day
0.075 = lb air/cubic foot (cf)
WOTE = Wastewater Oxygen Transfer Efficiency (decimal)
If the design inlet temperature is above 24° C, the specific weight of air must be adjusted to the specific weight at the intake temperature.

(D) Corrections to RAF based on varying diffuser submergence depths. The engineer shall provide the manufacturer's laboratory testing data if the diffuser submergence depth in the design is the same as the diffuser submergence depth in the manufacturer's testing. The engineer shall apply a correction factor from Table F.5. in Figure: 30 TAC §217.155(b)(2)(D) to the required airflow rate calculated using Equation F.4. in Figure: 30 TAC §217.155(b)(2)(C) if the manufacturer's laboratory testing data is not available for the design diffuser submergence depth. Linear interpolation is allowed for diffuser submergence depths not shown in Table F.5. in Figure: 30 TAC §217.155(b)(2)(D).

Figure: 30 TAC §217.155(b)(2)(D) (No change to the figure as it exists in TAC.)

(3) Mixing Requirements for Diffused Air. The air requirements for mixing must be calculated using an airflow rate:

(A) from *Design of Municipal Wastewater Treatment Plants, Fifth Edition*, Chapter 11, a joint publication of the ASCE and the Water Environment Federation, for mixing requirements; or

(B) greater than or equal to 20 standard cubic feet per minute (scfm) per 1,000 cubic feet for a coarse bubble diffuser and greater than or equal to 0.12 scfm per square foot for a fine bubble diffuser.

(4) Blowers and Air Compressors.

(A) A blower and an air compressor system must provide the required design airflow rate for biological treatment and mixing, based on paragraphs (1) - (3) of this subsection, and the air requirements of all other supplemental units where air must be supplied.

(B) The engineering report must include blower and air compressor calculations that show the maximum air requirements for the temperature range where the wastewater treatment facility is located, including both summer and winter conditions, and the impact of elevation on the air supply.

(C) A diffused aeration system must have multiple compressors arranged to provide an adjustable air supply to meet the variable organic load on the wastewater treatment facility.

(D) The air compressors must be capable of handling the maximum design air requirements with the largest single air compressor out of service.

(E) A blower unit and a compressor unit must restart automatically after a power outage, or have a telemetry system or an auto-dialer with battery backup to notify an operator of any outage.

(F) The design of a blower and air compressor system must specify blowers and air compressors with sufficient capacity to handle air intake temperatures that may exceed 100 degrees Fahrenheit (38 degrees Celsius), and pressures that may be less than standard (14.7 pounds per square inch absolute).

(G) The design of a blower and air compressor system must specify the capacity of the motor drive necessary to handle air intake temperatures that may be 20 degrees Fahrenheit (-7 degrees Celsius) or less.

(H) A blower must include a governor or other means to regulate airflow.

(5) Diffuser Systems - Additional Requirements.

(A) Diffuser Submergence.

(i) For a new wastewater treatment facility, the submergence depth for any diffuser must meet the minimum depths in the following table:

Figure: 30 TAC §217.155(b)(5)(A)(i) (No change to the figure as it exists in TAC.)

(ii) For an alteration or expansion of an existing wastewater treatment facility, the diffuser submergence depth may vary from the values in Table F.6. in Figure:30 TAC §217.155(b)(5)(A)(i) to match existing air pressure, delivery rate, and hydraulic requirements.

(iii) The submerged depth for a diffuser must be at least 7.0 feet . A wastewater treatment facility with a design flow of less than 5,000 gallons per day may have a diffuser submergence depth of less than 7.0 feet, but only if justified by the engineer and approved in writing by the executive director.

(B) Grit Removal. A wastewater treatment facility that uses diffusers and has wastewater with concentrations of grit that would interfere with the operation of a diffuser must either include a grit removal unit upstream of an aeration process, or include multiple aeration basins so that one basin may be taken out of service to allow for grit removal.

(C) Aeration System Pipes.

(i) Each diffuser header must include an open/close or throttling type control valve that can withstand the heat of compressed air.

(ii) A diffuser header must be able to withstand temperatures up to 250 degrees Fahrenheit.

(iii) The capacity of an air diffuser system, including pipes and diffusers, must equal 150% of design air requirements.

(iv) The design of an aeration system must minimize head loss. The engineering report must include a hydraulic analysis of the entire air pipe system that quantifies head loss through the pipe system and details the distribution of air from the blowers to the diffusers.

(v) An aeration system may use non-metallic pipes only in the aeration basin, but the pipes must be a minimum of 4.0 feet below the average water surface elevation in the aeration basin.

(c) Mechanical Aeration Systems.

(1) Required Airflow - Equipment and Site Specific Values. The airflow requirements for a mechanical aeration system must be calculated in accordance with subparagraphs (A) and (B) of this paragraph.

(A) Clean Water Oxygen Transfer Efficiency.

(i) The engineering report must include the clean water oxygen transfer efficiency rate for the mechanical equipment.

(ii) The clean water oxygen transfer efficiency must not exceed 2.0 pounds of oxygen per horsepower-hour unless justified by full scale performance data. Full scale performance data must be developed by an accredited testing laboratory or a licensed professional engineer. Data developed by a professional engineer must be sealed by the engineer. Full scale performance tests must follow the oxygen transfer testing methodology described in the most current version of the ASCE publication, *A Standard for the Measurement of Oxygen Transfer in Clean Water*.

(iii) A technology with a proposed clean water oxygen transfer efficiency in excess of 2.0 pounds of oxygen per horsepower-hour is innovative technology and subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(B) Wastewater Oxygen Transfer Efficiency.

(i) The engineering report must include the actual wastewater oxygen transfer efficiency and data to justify the actual wastewater oxygen transfer efficiency.

(ii) If a wastewater treatment facility will receive more than 10% industrial wastewater by volume, all mechanical aeration equipment must be sized

based on a wastewater oxygen transfer efficiency of no more than 0.65 times the clean water oxygen transfer efficiency.

(2) Mixing Requirements.

(A) A mechanical aeration device must provide mixing to prevent mixed liquor suspended solids (MLSS) deposits under any flow condition.

(B) A mechanical aeration device must be capable of re-suspending the MLSS after a shutdown period.

(C) Mechanical aeration devices with a channel or basin layout must have a minimum of 100 horsepower per million gallons of aeration basin volume or 0.75 horsepower per thousand cubic feet of aeration basin volume.

(3) Mechanical Components.

(A) Process Reliability.

(i) Each aeration basin must include a minimum of two mechanical aeration devices.

(ii) A mechanical aeration device must meet the maximum design requirements for oxygen transfer with the largest single unit out of service.

(iii) A mechanical aeration device must either automatically restart after a power outage, or have a telemetry system or an auto-dialer with battery backup to notify an operator of any outage.

(B) Operation and maintenance.

(i) A mechanical aeration device must have two-speed or variable-speed drive units, unless another means of varying the output is provided.

(ii) To vary the output, a mechanical aeration device may use single-speed drive units with timer-controlled operation if the device also includes an independent means of mixing.

(iii) A wastewater treatment facility must be designed such that an operator is able to perform routine maintenance on the aeration equipment without coming into contact with wastewater.

(iv) Each bearing, drive motor, or gear reducer must be accessible to an operator for maintenance and must be equipped with a splash prevention device. A splash prevention device must be designed to protect the operator from contact with wastewater and to prevent wastewater from escaping the basin.

(v) Each gear reducer must have a drainage system to prevent operator contact with mixed liquor.

§217.156. Sequencing Batch Reactors.

(a) System Sizing and Reliability.

(1) A sequencing batch reactor (SBR) must meet the reliability requirements in §217.155(b) and (c)(3) of this title (relating to Aeration Equipment Sizing), and power source reliability requirements in §217.36 of this title (relating to Emergency Power Requirements).

(2) An SBR must have a minimum decantable volume that is sufficient to pass the design flow, and must be capable of meeting permitted effluent limits, with the largest basin out of service.

(3) A two-basin wastewater treatment facility without removable aeration devices is required to have aerated storage of mixed liquor separate from the SBR tank(s).

(4) An SBR with a fixed level decanter must have more than two basins and additional decantable storage volume.

(5) An equalization basin is required if an SBR has fixed decant equipment and decant volumes that do not accommodate the peak flow.

(6) Organic loadings must conform to the values in Table F.1. in Figure: 30 TAC §217.154(b)(2) of this title (relating to Aeration Basin and Clarifier Sizing--Traditional Design). Organic loadings must be below 35 pounds of five-day biochemical oxygen demand per 1,000 cubic feet of tank volume.

(7) The reactor mixed liquor suspended solids (MLSS) level at the normal operating level must range from at least 3,000 milligrams per liter (mg/l) to not more than 5,000 mg/l.

(8) The minimum depth of the MLSS during a react phase is 9.0 feet.

(9) The minimum side water depth of an SBR tank is 12 feet.

(10) An SBR must include sludge digestion pursuant to the requirements in Subchapter J of this chapter (relating to Sludge Processing).

(b) Decanter Design.

(1) A decanter must control the velocity at an inlet port or at the edge of submerged weirs to prevent vortexing, disturbance of the settled sludge, and entry of floating materials.

(2) The entrance velocity to a decanter must not exceed 1.0 foot per second.

(3) A decanter must draw effluent from below the water surface and include a device that excludes scum.

(4) A decanter must maintain a zone of separation between the settled sludge and the decanter of no less than 12 inches.

(5) A decanter must prevent solids from entering the decanter during a react cycle by using one the following methods:

(A) recycling treated effluent to wash out solids trapped in a decanter;

(B) mechanically closing a decanter when it is not in use; or

(C) filling a decanter with air except during a decant period.

(6) The performance of a decanter and related pipes and valves must not be affected by ambient temperatures below 32 degrees Fahrenheit.

(7) A fixed decanter is prohibited in a basin where simultaneous fill and decant may occur.

(8) For any system of tanks that is fed sequentially, the size of the decant system must accommodate the design flow with a constant cycle time with the largest tank out of service.

(9) An SBR system utilizing more than two basins must allow the decanting of at least two tanks simultaneously.

(10) If units downstream of an SBR are not capable of accepting the peak flow rate of the decanting cycle, flow equalization must be provided between the decanter and the downstream units.

(c) SBR Tank Details.

(1) An SBR requires multiple tanks.

(2) An SBR with two tanks or an SBR system operating with a continuous feed during settling and decanting phases must include influent baffling and physical separation from the decanter.

(3) An elongated tank must be used for an SBR system if influent baffling is required.

(4) An SBR tank must have a minimum freeboard of 18 inches at the maximum liquid level.

(5) An SBR tank must not be buoyant when empty.

(6) Structures using a common wall must be designed to accommodate the stresses generated when one basin is full and an adjacent basin is empty.

(7) Each SBR wall must be watertight.

(8) A sump must be provided in any basin with a flat bottom.

(9) An SBR system must have a dedicated means of transferring sludge between aeration basins.

(10) An SBR system must include a means of scum removal in each aeration basin.

(11) Each SBR tank must include a dewatering system and an emergency overflow to another aeration tank or a storage tank.

(12) At a wastewater treatment facility that is not staffed 24-hours per day, a manually operated SBR tank must include a high-level alarm that notifies wastewater

treatment facility staff in accordance with §217.161 of this title (relating to Electrical and Instrumentation Systems).

(13) A design must specify the means and frequency for removal of grit and other debris from the SBR tanks.

(14) All equipment must be accessible for inspection, maintenance, and operation. Walkways shall be provided to allow inspection, maintenance, and process control sampling and to allow access to instrumentation, mechanical equipment, and electrical equipment.

(15) An SBR may use fine screens pursuant to §217.122 of this title (relating to Fine Screens).

(16) An SBR preceded by a primary clarifier may use a comminutor.

(17) An SBR must have a sufficient number of tanks to operate at design flow with the largest tank out of service.

(d) Aeration and Mixing Equipment.

(1) In addition to the requirements of §217.155 of this title, aeration equipment must handle the cyclical operation in an SBR.

(2) The aeration and mixing equipment must not interfere with settling.

(3) A dissolved oxygen concentration of 2.0 mg/l must be maintained in a tank during the fill cycle.

(4) The design must specify the blower discharge pressure at the maximum water depth.

(5) An SBR used for biological nutrient removal or reduction must meet the design requirements of §217.163 of this title (relating to Advanced Nutrient Removal).

(6) The design of an SBR must allow for the removal of air diffusers or mechanical aeration devices without dewatering the tank.

(e) Control Systems.

(1) The motor control center must include programmable logic controllers (PLC) that are able to operate with limited operator adjustment and be programmed to meet the effluent limitations in the wastewater permit at the design loadings. An SBR must have the ability to run in full manual mode.

(2) A hard-wired backup means of operating the SBR is required.

(3) The PLC must include battery backup. A duplicate set of all circuit boards must be kept at the wastewater treatment facility.

(4) Adequate controls for the separate operation of each tank must be provided.

(5) A tank level system must include floats or pressure transducers.

(A) A float system must be protected from prevailing winds and freezing.

(B) A bubbler system in a tank level system is prohibited.

(6) The control panel switches must include the following switches:

(A) pumps - hand/off/automatic;

(B) valves - open/closed/automatic;

(C) blowers or aerators - hand/off/automatic; and

(D) selector switch for tank(s) - in operation/standby.

(7) The control panel visual displays must include:

(A) a mimic diagram of the process that shows the status and position of all pumps, valves, blowers, aerators, and mixers;

(B) process cycle and time remaining;

(C) instantaneous and totalized influent flow to the wastewater treatment facility and effluent flow of the final discharge;

(D) tank level gauges or levels;

(E) sludge pumping rate and duration; and

(F) airflow rate and totalizer.

(8) The annunciator panel must include the following alarm condition indicators:

(A) high and low water levels in each tank;

(B) failure of all automatically operated valves;

(C) decanter failure;

(D) blowers, if used - low pressure, high temperature, and failure;

(E) mechanical aerator, if used - high temperature and failure;

(F) pump - high pressure and failure; and

(G) mixers, if used - failure.

§217.157. Membrane Bioreactor Systems.

(a) Applicability.

(1) This section contains criteria for low-pressure, vacuum, and gravity ultrafiltration or microfiltration membrane bioreactors (MBRs).

(2) Other types of MBRs are considered innovative technology and are subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(b) Definitions.

(1) Flat plate system--A membrane bioreactor that arranges membranes into rectangular cartridges with a porous backing material that provides structural support between two membranes.

(2) Gross flux rate--The volume of water that passes through a membrane, measured in gallons per day per square-foot of membrane area at a standard temperature of 20 degrees Centigrade.

(3) Hollow fiber system--A membrane bioreactor composed of bundles of very fine membrane fibers, approximately 0.5 - 2.0 millimeters in diameter, held in place at the ends with hardened plastic potting material, and supported on stainless steel frames or rack assemblies. The outer surface of each fiber is exposed to the mixed liquor with filtrate flow from outside to inside through membrane pores.

(4) Net flux rate--The gross flux rate adjusted for production lost during backwash, cleaning, and relaxation.

(5) Transmembrane pressure--The difference between the average pressure on the feed side of a membrane and the average pressure on the permeate side of a membrane.

(6) Tubular system--A system in which sludge is pumped from an aeration basin to a pressure driven membrane system outside of a bioreactor where the suspended solids are retained and recycled back into the bioreactor while the effluent passes through a membrane.

(c) Performance Standards.

(1) MBR performance standards for conventional pollutants and nutrients are shown in the following table:

Figure: 30 TAC §217.157(c)(1)

Table F.7. Performance Standards for Conventional Pollutants and Nutrients

Parameter	Units	Expected Value
Five-day Biochemical Oxygen Demand	*milligrams per liter (mg/l)*	5
TSS	*mg/l*	1
Ammonia	*mg/l as N*	1
Total Nitrogen (with only preanoxic zone)	*mg/l*	10
Total Nitrogen (with preanoxic and postanoxic zones)	*mg/l*	3
Total Phosphorous (with chemical addition)	*mg/l*	0.2
Total Phosphorous (with bio-P removal)	*mg/l*	0.5
Turbidity	*nephelometric turbidity units*	0.2
Bacteria	*log removal*	≤ 6 log (99.9999%)
Viruses	*log removal*	≤ 3 log (99.9%)

(2) The executive director may require an owner to submit a pilot study report or data from a similar wastewater treatment facility if a wastewater treatment facility is designed to achieve higher quality effluent than the performance standards listed in Table F.7. in Figure: 30 TAC §217.157(c)(1). A similar wastewater treatment facility must have similar characteristics including:

(A) climate region;

(B) peak flows;

(C) customer base, including sources and percent contribution; and

(D) other characteristics required by the executive director.

(d) Wastewater Treatment Facility Design.

(1) Pretreatment.

(A) Each MBR system must have fine screening to prevent damage from abrasive particles or fibrous, stringy material.

(i) Fine screens must be rotary drum or traveling band screens with either perforated plates or wire mesh.

(ii) Fine screens for hollow fiber or tubular systems must have an opening size of 0.5 - 2.0 millimeter (mm).

(iii) Fine screens for flat plate systems must have an opening size of 2.0 - 3.0 mm.

(iv) Bypass of a fine screen must be prevented by use of a duplicate fine screen, emergency overflow to a wet well, or an alternative method that has been approved in writing by the executive director.

(v) A fine screen must be designed to prevent bypass at the peak flow.

(vi) Coarse screens may be used ahead of fine screens to reduce the complications of fine screening.

(B) The economic feasibility of primary sedimentation must be evaluated for facilities designed for an average daily flow of 5.0 million gallons per day or more. The economic feasibility evaluation must be included in the engineering report.

(C) Fat, oil, and grease removal is required if the levels of fat, oil, and grease in the influent may cause damage to the membranes. The specific detrimental concentration must be determined by the equipment manufacturer. Influent concentrations of fat, oil, and grease equal to or more than 100 milligrams per liter (mg/l) must have fat, oil, and grease removal.

(D) The necessity of grit removal must be evaluated for a wastewater treatment facility that has a collection system with excessive inflow and infiltration. Excessive grit accumulation is characterized by grit accumulation in any treatment unit following the headworks. An evaluation must be included in the engineering report.

(2) Biological Treatment.

(A) The reactor volume must be determined using rate equations for substrate utilization and biomass growth according to §217.154 of this title (relating

to Aeration Basin and Clarifier Sizing--Traditional Design), or another method approved by the executive director in writing.

(B) The design sludge retention time (SRT) for an MBR must be at least 10 days, but not more than 25 days.

(C) The design operational range of mixed liquor suspended solids (MLSS) concentration must be:

(i) at least 4,000 mg/l but not more than 10,000 mg/l in the bioreactor; and

(ii) at least 4,000 mg/l but not more than 14,000 mg/l in the membrane tank.

(D) An MBR system designed for an SRT or MLSS outside the ranges in subparagraph (C) of this paragraph requires a pilot study in compliance with paragraph (8) of this subsection or data from a similar wastewater treatment facility that demonstrates that the design parameters are sustainable and can achieve the expected performance to the executive director's satisfaction.

(3) Aeration.

(A) An aeration system in an MBR must be capable of maintaining dissolved oxygen levels as listed in subparagraph (C) of this paragraph.

(B) An aeration system in an MBR must compensate for low oxygen transfer efficiency associated with the maximum MLSS concentrations established in paragraph (2)(C) of this subsection. The alpha value used to determine design oxygen transfer efficiency must be 0.5 or lower.

(C) The oxygen concentration range used for sizing aeration systems for treatment zones must be:

(i) not more than 0.5 mg/l for anoxic basins;

(ii) at least 1.5 mg/l but not more than 3.0 mg/l for aerobic basins; and

(iii) at least 2.0 mg/l but not more than 8.0 mg/l for membrane basins.

(D) An MBR must include dissolved oxygen monitoring and an alarm to notify an operator if dissolved oxygen levels are outside of the design operating range, or if there is a rapid decrease in dissolved oxygen. Alarm systems must comply with §217.161 of this title (relating to Electrical and Instrumentation Systems).

(4) Recycle Rates. Facilities without advanced nutrient removal must be designed with recycle rates sufficient to sustain the design mixed liquor concentrations (typically from 200% to 400% of the wastewater treatment facility's influent flow).

(5) Nutrient Removal.

(A) A system designed for advanced nutrient removal must include an isolated tank or baffled zone to separate anoxic, anaerobic, and aerobic treatment zones.

(B) The engineer shall submit calculations to support the sizing of the reactor volumes.

(C) If recycled activated sludge is returned to an anoxic or anaerobic basin, a wastewater treatment facility designed for total nitrogen or advanced nutrient removal must contain a deoxygenation basin, a larger anoxic basin, or another

method of decreasing dissolved oxygen concentration approved in writing by the executive director.

(D) An advanced nutrient removal system must be designed with recycle rates sufficient to sustain the designed mixed liquor concentrations in both the aeration, anoxic, and anaerobic basins (sufficient recycle rates are typically 600% or more of the influent flow).

(6) Use of Membranes.

(A) Use of a membrane system other than a hollow fiber system, tubular system, or a flat plate system is considered an innovative technology and is subject to §217.7(b)(2) of this title.

(B) The engineering report must provide justification for the use of a membrane material other than one of the following:

(i) polyethersulfone (PES);

(ii) polyvinylidene fluoride (PVDF);

(iii) polypropylene (PP);

(iv) polyethylene (PE);

(v) polyvinylpyrrolidone (PVP); or

(vi) chlorinated polyethylene (CPE).

(C) The nominal pore size used in an MBR for microfiltration membranes must be at least 0.10 micrometers (microns) but not more than 0.4 microns.

(D) The nominal pore size used in an MBR for ultrafiltration must be at least 0.02 microns but not more than 0.10 microns.

(E) Any chemical used for cleaning must not adversely affect the membrane material.

(7) Membrane Design Parameters.

(A) MBRs must be designed for:

(i) an average daily net flux rate equal to or less than 15 gallons per day per square-foot of membrane area;

(ii) a peak daily net flux rate equal to or less than 1.25 times the average daily net flux rate; and

(iii) a two-hour peak net flux rate equal to or less than 1.5 times the average daily net flux rate.

(B) The executive director may approve larger net flux rates if the rates are substantiated to the executive director's satisfaction with a pilot study or data from a similar wastewater treatment facility.

(C) An MBR system with a peak flow rate that is greater than 2.5 times the average daily flow must use an equalization basin, off-line storage, or reserve membrane capacity to accommodate the higher peak flow.

(D) Hollow Fiber Transmembrane Pressure (TMP).

(i) The operational TMP of a hollow fiber MBR system must be at least 2.0 pounds per square inch (psi) but not more than 10.0 psi.

(ii) The TMP of a hollow fiber MBR system must not exceed 12.0 psi.

(E) Flat Plate TMP.

(i) The operational TMP of a flat plate MBR system must be at least 0.3 psi but not more than 3.0 psi.

(ii) The TMP of a flat plate MBR system must never exceed 4.5 psi.

(F) Tubular, Out of Basin TMP.

(i) The operational TMP of a tubular, out of basin MBR system must be at least 0.5 psi but not more than 5.0 psi.

(ii) The TMP of a tubular, out of basin MBR system must never exceed 10.0 psi.

(8) Supporting Data. An owner must provide pilot study reports or data from a similar wastewater treatment facility for a wastewater treatment facility that is either:

(A) required to meet stricter standards than in Table F.7. in Figure: 30 TAC §217.157(c)(1); or

(B) designed to operate outside normal operating parameters defined within this section.

(i) A pilot study must be conducted for at least 30 days after the initial start-up and acclimation period.

(ii) A pilot study must be designed to evaluate the membrane performance under actual operational conditions, including flow variations and influent wastewater characteristics.

(iii) The treatment and pretreatment processes evaluated in a pilot study or similar wastewater treatment facility must be equivalent to the processes that will be used in the wastewater treatment facility.

(iv) The results of the pilot study must include the following recommendations:

(I) net flux rates for design flow and peak flow;

(II) average and maximum transmembrane pressure;

(III) cleaning and backwash intervals;

(IV) expected percent chemical recovery after chemical cleaning;

(V) dissolved oxygen concentrations for reactors and membrane basins;

(VI) MLSS concentrations for reactors and membrane basins;

(VII) SRTs for reactors and membrane basins; and

(VIII) expected effluent concentrations of conventional pollutants and nutrients, including the pollutants and nutrients that will be limited or monitored in the wastewater treatment facility's wastewater permit.

(9) Redundancy.

(A) A wastewater treatment facility must be able to operate at normal operating parameters and conditions for design flow with the largest MBR unit or train out of service.

(B) Acceptable methods of providing redundancy are additional treatment trains, additional treatment units, or storage. The engineering report must include calculations that demonstrate adequate redundancy within the wastewater treatment facility.

(10) Other Components.

(A) Mixers.

(i) Unaerated (deoxygenation, pre/post anoxic, and anaerobic) zones must have a submersible mixing system, or an alternative mixing system that has been approved in writing by the executive director.

(ii) Coarse bubble air diffusers may be used for mixing in a pre-anoxic tank.

(B) Scum and Foam Handling. An MBR must control scum and foam so that scum or foam does not interfere with treatment, and must prevent unauthorized discharge of scum or foam from a treatment unit.

(C) Cranes and Hoists. A crane, hoist, or other process or mechanism approved in writing by the executive director must be provided for periodic cleaning and maintenance of the membranes.

(11) Disinfection.

(A) An owner may request and the executive director may approve, in writing, decreased ultraviolet light or chlorine dosing requirements for MBR effluent.

(B) the design for ultraviolet light disinfection for MBR effluent that is based on greater than 75% transmissivity must be justified in the engineering report.

(e) MBR operation.

(1) Membrane cleaning. The following methods may be used to clean membranes:

(A) air scouring of at least 0.01 standard cubic feet per minute of air per square foot of membrane area, but not more than 0.04 standard cubic feet per minute of air per square foot of membrane area;

(B) a mixture of air scouring as described in subparagraph (A) of this paragraph and mixed liquor jet feed;

(C) back-flushing;

(D) relaxation; or

(E) chemical cleaning.

(2) Operational Control Parameters.

(A) In-line continuous turbidity monitoring of filtrate from each membrane train or cassette must be provided for operational control and indirect membrane integrity monitoring. An alarm must be provided to notify the wastewater treatment facility operator of turbidity greater than or equal to 1.0 nephelometric turbidity units (NTU).

(B) An owner must follow the manufacturer's recommended frequency for MBR component inspection, testing, and maintenance. The manufacturer's recommended inspection, testing, and maintenance procedures and frequencies must be included in the wastewater treatment facility's operation and maintenance manual.

(C) An owner must provide a wastewater treatment facility operator access to any specialized tool necessary for the operation or maintenance of an MBR system. A description of all specialized tools and instructions for their use must be included in the operation and maintenance manual for the wastewater treatment facility.

(3) Control instrumentation. A wastewater treatment facility must have the ability to operate in full manual mode.

(f) Chemical Use and Disposal.

(1) The chemicals used in treatment and maintenance must not harm the MBR system or interfere with treatment.

(2) The chemicals used in treatment and maintenance, including concentrations of the chemicals and chemical disposal methods, must be identified in the engineering report.

(g) Training.

(1) The individuals trained to operate an MBR system must be familiar with the sequencing and set points of all operations and actions typically controlled by automated systems and be able to identify and respond to irregularities.

(2) The operation and maintenance manual must include instructions on how to operate the MBR in manual mode.

(h) Warranty and Bonds.

(1) All membranes must have a warranty of at least five years.

(2) The executive director may require a performance bond that meets the requirements of §217.7(b)(2)(E) of this title.

§217.158. Solids Management.

(a) Solids Recycling and Monitoring.

(1) A return sludge system must operate as designed in all flow conditions.

(2) A monitoring and control system must provide a means to control return and waste sludge flows from each clarifier, to control return sludge flows into each aeration basin, to meter return sludge flows, and to measure waste sludge flows.

(b) Solids Wasting. The solids management system must be able to store and process the waste activated sludge under all flow conditions.

(c) Return Activated Sludge (RAS) Pump Design.

(1) A centrifugal sludge pump must have a positive suction head, unless the pump is self-priming.

(2) An airlift pump must comply with requirements of §217.162 of this title (relating to Air Lift Pump Design).

(3) An RAS system must have sufficient pumping units to maintain the maximum design return pumping rate with the largest single pumping unit out of service.

(d) Waste Activated Sludge Pump Design. A waste activated sludge pumping system requires at least two pumping units and must be sized to prevent excessive solids accumulation in the clarifiers.

(e) Sludge Piping System.

(1) The design of a sludge piping system must accommodate cleaning and flushing.

(2) The design of a sludge piping system must accommodate a minimum velocity of 2.0 feet per second at the maximum wasting rate to prevent solids from settling. The velocity in a sludge piping system must prevent scouring.

(3) A sludge pipe must have a minimum diameter of 4.0 inches.

§217.159. Process Control.

(a) Solids Retention Time Control.

(1) A wastewater treatment facility design must include equipment for a wastewater treatment facility operator to control the solids retention time (SRT) in the aeration tanks by wasting a measured volume of surplus activated sludge.

(2) The engineering report and the operation and maintenance manual must provide the formulas used for determining the SRT.

(3) The SRT required for nitrification applies to the aerobic portion of the wastewater treatment facility.

(b) Aeration System Control. Aeration system control must regulate the total amount of air supplied and how air is distributed to the aeration tanks.

(1) In order to conserve energy, a wastewater treatment facility design may provide the operator with the ability to adjust the airflow in proportion to the oxygen demand of the wastewater.

(2) If an adjustable type of airflow control is installed, the aeration equipment must be manually adjustable over the entire range of oxygen demands and must maintain solids in suspension.

(c) A wastewater treatment facility with a design flow greater than 0.4 million gallons per day must provide for totalized flow measurement of the return sludge and waste sludge discharges for process control.

§217.160. Operability and Maintenance Requirements.

(a) All equipment must either be able to operate at the temperature extremes of the wastewater treatment facility location, or must be located in a temperature controlled enclosure.

(b) All equipment must be accessible for inspection, maintenance, and operation.

(c) An enclosure that houses equipment must have sufficient clearance and working room to safely remove and reinstall equipment. The enclosure must be accessible to portable lifting devices or must be equipped with overhead lifting eyes, hoists, trolleys, or cranes to facilitate the safe removal of equipment.

§217.161. Electrical and Instrumentation Systems.

(a) All three-phase motors must have phase failure protection.

(b) Instrumentation and monitoring equipment must have power surge protection.

(c) A wastewater treatment facility must conduct fault monitoring to notify the operator of high wet well level, power interruption, disinfection failure, blower failure, clarifier failure, return sludge pumping failure, and any other conditions that the executive director may require an owner to monitor as a condition for project approval.

(d) For a wastewater treatment facility not staffed 24 hours per day, a telemetry with battery back-up or supervisory control and data acquisition system with battery

backup must be able to notify an operator of a malfunction identified in subsection (c) of this section within one minute of the malfunction.

§217.162. Air Lift Pump Design.

(a) Required Calculations.

(1) The engineering report must include calculations to determine static and dynamic pressure head necessary for operation of each air lift pump. Static and dynamic pressure head requirements for the suction line must be considered in the calculations.

(2) Air lift pump systems must be designed to meet the range of required flow rates.

(3) The engineering report must include the number of air lift pumps required and the minimum and maximum:

(A) design airflow rate for each air lift pump;

(B) design flow rate for each air lift pump; and

(C) design flow rate for the system.

(b) Design.

(1) Air lift pumps may not be used to pump sludge from a primary clarifier.

(2) Air lift pumps must be at least three inches in diameter.

(3) The design air flow rates must be based on the actual submergence of an air lift pump.

(4) Blowers for an air lift pump system must be sized to provide the maximum design airflow rate required by the system.

(5) The discharge end of an air lift pump must prevent splashing.

(6) Air lift pumps located inside of a basin must allow for cleaning without removal from the basin.

(7) An air lift pump must provide a way to release trapped air.

(8) Air lift pump systems for return activated sludge, waste activated sludge, internal recycle, and other systems that affect overall process performance must have a minimum dynamic submergence of 60%.

(9) Air lift pump systems for scum removal, grit removal, or for transfers that do not affect overall process performance must have a minimum dynamic submergence of 50%.

(10) Air lift pump systems for return activated sludge, waste activated sludge, internal recycle, and other systems that affect overall process performance must provide a method for flow measurement using:

(A) an external box with a weir; or

(B) a rotameter, or other flow measurement device approved in writing by the executive director on the air line to each pump. When flow is measured on the air line, the engineering report must include a graph correlating the air flow rate in the air line to the liquid flow rate of the air lift pump.

(c) Redundancy.

(1) A backup pump or other means of transfer must be provided for each air lift pump system.

(2) Air lift systems for return activated sludge, waste activated sludge, and internal recycle must be able to operate at full capacity with the largest pumping unit out of service.

§217.163. Advanced Nutrient Removal.

(a) For a wastewater treatment facility designed to provide advanced nutrient removal, the engineering report must specify the process units needed to achieve the effluent limits established in the wastewater treatment facility's wastewater permit.

(b) Biological nutrient removal using an activated sludge process, membrane filtration, sand filtration, or a combination of these processes may be used for advanced nutrient removal without applying for the executive director's approval under the innovative or non-conforming technology criteria in §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals). A biological nutrient removal process that involves fixed-film treatment is subject to the executive director's determination under §217.7(b)(2) of this title.

(c) If a biological nutrient removal unit is proposed, the engineering report must include the:

(1) anticipated food to microorganism ratio in both the anoxic and anaerobic zones;

(2) volatile fatty acid recycle ratio; and

(3) design of a foaming control system.

(d) If a chemical addition unit is proposed, it must comply with the chemical containment requirements in Subchapter K of this chapter (relating to Chemical Disinfection). Chemical addition may only be used if approved in writing by the executive director.

§217.164. Aeration Basin and Clarifier Sizing--Volume-Flux Design Method.

(a) A volume-flux design must size an aeration basin and clarifier on the relationship between the volume-flux of solids in the secondary clarifier, the sludge volume index (SVI), and the sludge blanket depth. The following design approach may

be used as an alternative to the traditional design approach. If the volume-flux design approach is used, it must be used consistently throughout the design. No other design method may be used in combination with the volume-flux design method.

(1) A design may base the aeration tank volume and the clarifier volume on a mixed liquor suspended solids (MLSS) and floc volume (at SVI of 100) for the required minimum solids retention time.

(2) Larger values of MLSS require less aeration tank volume and greater clarifier volume.

(3) By examining a range of values of the MLSS and the floc volume, the most favorable arrangement for a wastewater treatment facility may be selected.

(4) When using the volume-flux design method, the size of an aeration basin and a clarifier must be in accordance with the requirements of this section.

(b) Design approach.

(1) Determine the solids retention time (SRT) needed to meet the permit requirement for five-day biochemical oxygen demand (BOD_5) and ammonia-nitrogen (NH_3-N) effluent limitations.

(2) Select a trial value mixed liquor floc volume (for example, MLSS at an SVI of 100).

(3) Using the design organic loading rate, the required SRT and yield, and the trial MLSS, determine the aeration tank volume.

(4) Using the trial value of mixed liquor flow volume, determine the clarifier area.

(5) For clarifiers overloaded in thickening at the peak flow, determine the final MLSS during storm flow and the resulting sludge blanket depth.

(6) Observing effluent limitations, determine the side water depth (SWD) and volume of the clarifier.

(7) Repeat the steps in paragraphs (2) - (6) of this subsection at different mixed liquor floc volumes and select the most favorable conditions for the wastewater treatment facility design.

(c) Aeration Basin Sizing.

(1) For a wastewater treatment facility that does not require nitrification, the minimum SRT is as follows:

(A) for a wastewater treatment facility with an effluent BOD_5 monthly average limitation of 20 milligrams per liter (mg/l), the minimum SRT is three days;

(B) for an extended aeration wastewater treatment facility with an effluent BOD_5 monthly average limitation of 20 mg/l, the minimum SRT is 22 days;

(C) for a wastewater treatment facility with an effluent BOD_5 monthly average limitation less than 20 mg/l, the minimum SRT is 4.5 days; and

(D) for an extended aeration wastewater treatment facility with an effluent BOD_5 monthly average limitation of less than 20 mg/l, the minimum SRT is 25 days.

(2) For a wastewater treatment facility that requires nitrification, the minimum SRT is based on the winter reactor temperature as set forth in §217.154(b) of this title (relating to Aeration Basin and Clarifier Sizing--Traditional Design) and the values of SRT and net solids production (Y), as listed in Table F.8. in Figure: 30 TAC §217.164(c)(3). The maximum BOD_5 loading limitation for a single-step aeration process is 50 pounds (lb) BOD_5 per 1,000 cubic feet (cf) and for the first step of multi-step aeration process facilities is 100 lb BOD_5/1,000 cf.

(3) An above-ground steel or fiberglass tank requires 2 degrees Celsius lower minimum operating temperature than a wastewater treatment facility utilizing a reinforced concrete tank. A wastewater treatment facility must be designed for an MLSS concentration of at least 2,000 mg/l but no more than 5,000 mg/l. The net solids production, (Y), in the following table includes both coefficients for yield and endogenous respiration:

Figure: 30 TAC §217.164(c)(3) (No change to the figure as it exists in TAC.)

(4) To calculate the SRT, divide the safety factor by the maximum growth rate as shown in the following equation. The safety factor includes the design factor for the ratio of average to maximum diurnal ammonia loading. A value of 3.0, as recommended in the United States Environmental Protection Agency manual *Nitrogen Control*, is used in calculating the values in Table F.8. in Figure: 30 TAC §217.164(c)(3).

Figure: 30 TAC §217.164(c)(4) (No change to the figure as it exists in TAC.)

(5) To determine the aeration basin volume, select a trial value of MLSS. The aeration basin volume is calculated as the maximum value from the following equations:

Figure: 30 TAC §217.164(c)(5)

Equation F.6.

$$\boldsymbol{V_a = \frac{1,000,000(BODL)(Y)(SRT)}{62.4MLSS}}$$

Where:
V_a = Volume of aeration basin, cubic feet
BODL = Design biochemical oxygen demand (BOD) load per day, pounds
Y = yield of solids per unit BOD removed
SRT = required solids retention time, days
MLSS = mixed liquor suspended solids, milligrams per liter

Equation F.7.

$$\boldsymbol{V_a = \frac{1{,}000\ (BODL)}{max\ allowable\ lb\ BOD/kcf}}$$

Where:
V_a = Volume of aeration basin, cubic feet
BODL = Design BOD load per day, pounds
max allowable lb BOD/kcf = Maximum pounds BOD load/1,000 cubic feet

(d) Clarifier Sizing.

(1) A clarifier basin size is based on volume-flux from the floc volume of solids entering the clarifier.

(2) Biological solids may occupy different volumes for the same mass of solids as indicated by the SVI.

(3) For purposes of determining weir overflow rates for clarifier sizing, the design flow and the peak flow must include any return flows from units downstream of the clarifier, including flow from skimmers, thickeners, and filter backwash.

(4) A clarifier must be sized to prevent overloading under any design condition.

(5) The settling velocity of the mixed liquor solids must equal or exceed the two-hour peak weir overflow rate.

(6) A clarifier must be sized to prevent overloading in the thickening process at the design flow.

(7) The wastewater treatment facility's operation and maintenance manual must state the design maximum mixed liquor floc volume.

(e) Determine Weir Overflow Rate and Area. The values in Table F.9 in Figure 1: 30 TAC §217.164(e)(2)(I) determine the maximum surface loading rates. The MLSS concentration must include the same concentration used for sizing the aeration basin. The design must be based on the underflow rate. The design must include calculations for maximum weir overflow rate for the clarifier at the peak flow (Table F.9. in Figure 1: 30 TAC §217.164(e)(2)(I)), the aeration basin MLSS concentration, and a selected underflow rate. The area of the clarifier is determined by the following equation:

Figure: 30 TAC §217.164(e)

Equation F.8.

$$A_c = \frac{1{,}000{,}000\, Q_p}{OR_p}$$

Where:
A_c = area of the clarifier(s), square feet
Q_p = peak flow, million gallons per day
OR_p = weir overflow rate (gallons per day per square foot) from Table F.9. in Figure 1: 30 TAC §217.164(e)(2)(I)

(1) Determine Volume of a Clarifier. The volume of a clarifier must exceed the values determined from the minimum side wall depth (SWD) in Equation F.9. in Figure: 30 TAC §217.164(e)(1) or the minimum detention time in Equation F.10. in Figure: 30 TAC §217.164(e)(1):

Figure: 30 TAC §217.164(e)(1)

Equation F.9. Clarifier Volume Based on SWD

$$V_c = A_c\,(minSWD)$$

Where:
V_c, = volume of the clarifier(s), cubic feet, based on minSWD
A_c = Area of the clarifier(s), square feet
minSWD = 10 feet, except as allowed in §217.152(g) of this title (relating to Requirements for Clarifiers)

Equation F.10. Clarifier Volume Based On Minimum Detention Time

$$V_c = \frac{(Q_p / 24)(minDT)}{(7.48)}$$

Where:
V_c, = volume of the clarifier(s), cubic feet, based on minDT
Q_p = peak flow, gallons per day
minDT = minimum detention time (hours) from Table F.2. in Figure: 30 TAC §217.154(c)(1) of this title (relating to Aeration Basin and Clarifier Sizing--Traditional Design)

(2) Dimensions for Clarifiers Designed for Solids Storage Capabilities. The design of a clarifier that may be overloaded in thickening at the design flow must include the ability to store solids during peak flow events. The design must be based on the values in Table F.9. in Figure 1: 30 TAC §217.164(e)(2)(I), Table F.10. in Figure 2: 30 TAC §217.164(e)(2)(I), and Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I). The process for designing a clarifier based on this concept must be completed as follows:

(A) Determine the area of a clarifier. The area calculations must be based on the trial MLSS value selected for the sizing of the aeration basin in paragraph (1) of this subsection. The area of a clarifier must exceed the greater of the areas determined by Equation F.11. or Equation F.12. in Figure: 30 TAC §217.164(e)(2)(A):

Figure: 30 TAC §217.164(e)(2)(A)

Equation F.11. Clarifier Area Based on Design Flow

$$A_c = \frac{Q_d}{OR_{T9}}$$

Where:
A_c = clarifier area (square feet(sf)) based on max 30 day flow
Q_d = design flow (gallons per day)
OR_{T9} = weir overflow rate for selected underflow rate and mixed liquor suspended solids (MLSS) (gallons per day per square foot (gpd/sf)) from Table F.9. in Figure 1: 30 TAC §217.164(e)(2)(I)

Equation F.12. Clarifier Area Based on Peak Flow

$$A_c = \frac{Q_p}{OR_{T10}}$$

Where:
$A_{c,}$ = clarifier area (sf), based on peak flow
Q_p = peak flow, million gallons per day
OR_{T10} = weir overflow rate for selected MLSS (gpd/sf) from Table F.10. in Figure 2: 30 TAC §217.164(e)(2)(I)

(B) The final MLSS value must be the result of the transfer of solids from an aeration tank to a clarifier at the peak flow. A clarifier design must allow for rates of flow that will transfer solids from an aeration tank to a clarifier if the clarifier becomes overloaded in thickening until the mixed liquor solids are reduced to the concentration that no longer causes the overload.

(C) Using Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I) and the selected underflow rate, the MLSS concentration at peak flow is determined using the following equation:

Figure: 30 TAC §217.164(e)(2)(C)

Equation F.13.

$$MLSS_{pf} = \frac{UR_{T11} * RSSS_{T11}}{OR_{pf} + UR_{T11}}$$

Where:
UR_{T11} = Underflow rate (UR) (gallons per day per square foot (gpd/sf)) from Table F.11 in Figure 3: 30 TAC §217.164(e)(2)(I)
OR_{pf} = Weir overflow rate at peak flow (gpd/sf)
$MLSS_{pf}$ = Diluted mixed liquor suspended solids during peak flow (milligrams per liter (mg/l))
$RSSS_{T11}$ = Maximum return sludge concentration for the selected UR (mg/l) from Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I)

(D) Determine depth of sludge blanket at peak flow. The depth of a sludge blanket is determined by the aeration basin volume, the change in MLSS, the area of the clarifier, and the concentration of the blanket solids at the selected underflow rate as shown in the following equation:

Figure: 30 TAC §217.164(e)(2)(D)

Equation F.14.

$$SBD = \frac{V_a(MLSS_{av} - MLSS_{pf})}{(A_c BKSS)} + 1.0$$

Where:
SBD = Sludge Blanket Depth (feet)
V_a = Volume of aeration basins (cubic feet)
A_c = Area of clarifier (square feet)
$MLSS_{pf}$ = Diluted MLSS during peak flow (milligrams per liter (mg/l))
$MLSS_{av}$ = Diluted MLSS during average flow (mg/l)
BKSS = Blanket concentration at the selected underflow rate (mg/l) from Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I)
1.0 = Assumed sludge blanket depth during design flow conditions (feet)

(E) Determine the SWD. The SWD of a clarifier is the maximum value resulting from the following conditions:

(i) 10 ft, unless a lower depth is allowed by §217.152(g) of this title (relating to Requirements for Clarifiers);

(ii) 3.0 times the sludge blanket depth; and

(iii) minimum detention time per the following equation:

Figure: 30 TAC §217.164(e)(2)(E)(iii)

Equation F.15.

$$SWD_{DT} = \frac{OR_p(DT)}{180}$$

Where:
OR_p = Weir overflow rate at peak flow (gallons per day per square foot)
DT = Detention time, hours
SWD_{DT} = Side water depth based on detention time, feet

(F) Determine clarifier volume. The volume of a clarifier is the surface area multiplied by the SWD determined in subparagraph (E) of this paragraph.

Figure: 30 TAC §217.164(e)(2)(F)

Equation F.16.

$$V_c = A_c(SWD)$$

Where:
V_c = Volume of Clarifier, (cubic feet)
A_c = Area of the Clarifier, (square feet)
SWD = Side Water Depth determined in subparagraph (E) of this paragraph, (feet)

(G) The formulas for Equation F.17. in Figure: 30 TAC §217.164(e)(2)(G)(i); Equation F.18. in Figure: 30 TAC §217.164(e)(2)(G)(ii); and Table F.10. in Figure 2: 30 TAC §217.164(e)(2)(I); calculate the rates that are equal to the settling velocity of activated sludge at various floc volume concentrations. For values less than 30%, the floc volume is the 30-minute settled volume in an unstirred one-liter

graduated cylinder. For values greater than 30%, the sample is diluted so that the settled volume is at least 15% but not more than 30%, and the result multiplied by the dilution factor.

(i) For floc volume less than 40%, use the following equation; or

Figure: 30 TAC §217.164(e)(2)(G)(i)

Equation F.17.

$$OR_{T10} = 5053.8(1 - fv/100)^{3.83}\ gpd/sf$$

Where:
OR_{T10} = Settling velocity (gallons per day per square foot) of Table F.10. in Figure 2: 30 TAC §217.164(e)(2)(I)
fv = Floc Volume (percent) = SVI(MLSS)/10,000 SVI (ml/g), MLSS (mg/l)

(ii) For floc volume greater than 40%, use the following equation:

Figure: 30 TAC §217.164(e)(2)(G)(ii)

Equation F.18.

$$OR_{T10} = 9003610(fv^{-2.56})gpd/sf$$

Where:
OR_{T10} = Settling velocity (gallons per day per square foot) of Table F.10. in Figure 2: 30 TAC §217.164(e)(2)(I)
fv = Floc Volume (percent) = SVI(MLSS)/10,000 SVI (ml/g), MLSS (mg/l)

(H) Table F.9. in Figure 1: 30 TAC §217.164(e)(2)(I) and Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I) are based on an analysis of the floc volume-flux, i.e. floc volume times settling velocity, calculated from Equation F.17. in Figure: 30 TAC §217.164(e)(2)(G)(i) and Equation F.18. in Figure: 30 TAC §217.164(e)(2)(G)(ii). Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I) is a tabulation of the maximum concentration of the underflow at different underflow rates. Equation F.19. is for Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I).

Figure: 30 TAC §217.164(e)(2)(H)

Equation F.19.

$$RSSS_m = \frac{10170000(UR^{-0.391})}{SVI}$$

Where:
$RSSS_m$ = Return Sludge Suspended Solids (milligrams per liter)
UR = Underflow Rate (gallons per day per square foot)

SVI = Sludge Volume Index (ml/g)

(I) Table F.9. in Figure 1: 30 TAC §217.164(e)(2)(I) determines the weir overflow rate that, along with the underflow rate and MLSS, determines the same floc volume-flux as shown in Table F.11. in Figure 3: 30 TAC §217.164(e)(2)(I).

Figure 1: 30 TAC §217.164(e)(2)(I)

Table F.9. - Clarifier Loading Rates

Allowable surface loading rates for given underflow rates with no provisions for sludge storage in the clarifier **OR** The maximum surface loading rate at the design flow for clarifiers designed to store solids during peak events					
MLSS	**Underflow Rate (gpd/sf)**				
mg/l	***200***	***250***	***300***	***350***	***400***
2,000	1,081	1,218	1,340	1,452	1,554
2,100	1,020	1,148	1,262	1,366	1,461
2,200	965	1,084	1,191	1,288	1,377
2,300	914	1,026	1,126	1,217	1,299
2,400	868	973	1,067	1,151	1,229
2,500	825	924	1,012	1,091	1,163
2,600	786	879	962	1,036	1,103
2,700	749	837	915	985	1,048
2,800	715	798	872	937	996
2,900	684	762	831	893	948
3,000	654	729	793	851	903

3,100	627	697	758	812	861
3,200	601	667	725	776	821
3,300	577	640	694	742	784
3,400	554	613	665	710	750
3,500	532	589	637	680	717
3,750	483	533	575	611	642
4,000	441	484	520	551	577
4,250	403	441	472	498	520
4,500	369	402	429	451	469
4,750	340	368	391	409	423
5,000	313	337	356	371	382

Figure 2: 30 TAC §217.164(e)(2)(I)

Table F.10. - Settling Velocities

Maximum allowable clarifier weir overflow rate allowed for clarifiers that are designed to store solids SVI=100 *(minimum allowable SVI)*	
MLSS	**Surface Loading Rates**
(mg/l)	**(gpd/sf)**
2,000	2,000
2,150	2,000
2,200	1,952
2,300	1,858

2,400	1,767
2,500	1,680
2,600	1,596
2,700	1,514
2,800	1,437
2,900	1,362
3,000	1,290
3,100	1,220
3,200	1,154
3,300	1,090
3,400	1,029
3,500	971
3,750	836
4,000	715
4,250	611
4,500	528
4,750	459
5,000	403

Figure 3: 30 TAC §217.164(e)(2)(I)

Table F.11. - Values for Use in Determining Sludge Storage Requirements					
Underflow (gpd/sf)	200	250	300	350	400
RSSS maximum (mg/l)	12,813	11,743	10,935	10,295	9,771
Blanket concentration (mg/l)	7,816	7,163	6,670	6,280	5,961
Blanket (lb/cf)	0.488	0.447	0.416	0.392	0.372

SUBCHAPTER F: ACTIVATED SLUDGE SYSTEMS

[§217.162]

Statutory Authority

The repeal of this section is adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted repeal of this section implements TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.162. Internal Process Flow Measurement.

SUBCHAPTER G: FIXED FILM AND FILTRATION UNITS

§§217.182 - 217.193, 217.194

Statutory Authority

The amendments and new sections are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments and new sections implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.182. Trickling Filters--General Requirements.

(a) Trickling filters are classified according to applied hydraulic loading, including recirculation, in million gallons per day per acre of filter media surface area and influent organic loadings in pounds of five-day biochemical oxygen demand (BOD_5) per day per 1,000 cubic feet of filter media. The following factors must be used as the basis for the selection of the design hydraulic and influent organic loadings:

(1) BOD_5 concentration of the influent wastewater;

(2) effectiveness of pretreatment;

(3) type of filter media; and

(4) treatment efficiency required.

(b) A trickling filter may be classified as:

(1) a roughing filter, which provides at least 50%, but not more than 75% removal of soluble BOD_5;

(2) a secondary treatment filter, which provides the removal of pollutants required to meet the effluent limits for BOD_5 and total suspended solids (TSS) of effluent set 1 or 2 in §309.4 of this title (relating to Table 1, Effluent Limitations for Domestic Wastewater Plants);

(3) a combined BOD_5 and nitrifying filter, which provides the removal of pollutants required to meet the effluent limits for BOD_5, ammonia-nitrogen (NH_3-N), and TSS of effluent set 2N or 2N1 in §309.4 of this title; or

(4) a tertiary nitrifying filter, which provides removal of NH_3-N, if the influent to the trickling filter is a clarified secondary effluent.

(c) The following table lists the hydraulic and organic loadings for different classes of trickling filters.

Figure: 30 TAC §217.182(c) (No change to the figure as it exists in TAC.)

(d) Pretreatment.

(1) A trickling filter must have upstream preliminary treatment units that:

(A) remove grit, debris, suspended solids, oil, and grease;

(B) remove particles with a diameter greater than three millimeters; and

(C) control the release of hydrogen sulfide.

(2) A primary clarifier equipped with scum and grease removal devices must precede a rock media trickling filter.

(e) Rock Filter Media.

(1) Materials.

(A) Rock filter media composed of crushed rock, slag, or similar material is prohibited if more than 5% of the media, by weight, consists of pieces with their longest dimension measuring more than three times greater than their shortest dimension.

(B) Rock filter media must conform to the following size distribution and grading. Mechanical grading over a vibrating screen with square openings must meet the following:

(i) passing 5.0 inch sieve - 100% by weight;

(ii) retained on 3.0 inch sieve - 95 to 100% by weight;

(iii) passing 2.0 inch sieve - 0.2% by weight;

(iv) passing 1.0 inch sieve - 0.1% by weight; and

(v) the loss of weight by the 20-cycle test, as described in American Society of Civil Engineers' *Manual of Engineering and Engineering Practice No. 13*, must be less than 10%.

(2) Placement.

(A) Rock filter media must be at least 4.0 feet deep at the shallowest point.

(B) Dumping rock filter media directly on a trickling filter is prohibited. Rock media must be placed by hand to a depth of 12 inches above the underdrains. The remainder of the rock filter media may be placed by belt conveyor or an equivalent mechanical method.

(C) Crushed rock, slag, and other similar media must be washed and screened or forked to remove clay, organic material, and other fine particles prior to placement.

(D) The placement of any material must not damage the underdrains.

(E) Vehicles and equipment are prohibited from driving over the rock filter media.

(f) Synthetic (Manufactured or Prefabricated) Media Materials.

(1) Any synthetic media material must be used in accordance with all of the manufacturer's recommendations.

(2) Synthetic media material may be considered innovative or non-conforming technology and may be subject to §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals), and requires executive director approval in writing.

(A) Suitability. The suitability of synthetic media material must be evaluated based on performance data from a wastewater treatment facility with similar media operating under similar hydraulic and organic loading conditions. The engineering report must include a relevant case history involving the use of the synthetic media.

(B) Durability. A synthetic media must be insoluble in wastewater and resistant to flaking, spalling, ultraviolet degradation, disintegration, erosion, aging, common acids and alkalis, organic compounds, and biological attack.

(C) Structural Integrity.

(i) The structural design of synthetic filter media must support the synthetic media, water flowing through or trapped in voids, and the maximum anticipated thickness of the wetted biofilm.

(ii) The synthetic filter media must support the weight of an individual, unless a separate provision is made for maintenance access to the entire top of the trickling filter media and to the distributor.

(D) Placing of Synthetic Filter Media. Modular synthetic filter media must be installed with the edges of the modules matched as closely as possible to provide consistent hydraulic conditions within the trickling filter.

(g) Trickling Filter Dosing.

(1) Dosing rates to a trickling filter must be within the design dosing rate range, even if the trickling filter receives flow from a siphon, pump, or gravity discharge from a preceding treatment unit.

(2) A trickling filter must be designed to control instantaneous dosing rates under both normal operating conditions and filter-flushing conditions.

(3) The distributor speed and the recirculation rate of a trickling filter must be adjusted for the dosing intensity as a compensatory measure under low-flow conditions. The following table provides design ranges of dosing intensity for both normal usage periods and for flushing periods:

Figure: 30 TAC §217.182(g)(3) (No change to the figure as it exists in TAC.)

(4) A design may be based on instantaneous dosing intensity for rotary distributors using Equation G.1. in Figure: 30 TAC §217.182(g)(4).

Figure: 30 TAC §217.182(g)(4)

Equation G.1.

$$SK = \frac{(q + r) \times (1000mm/m)}{(a) \times (n) \times (60)}$$

Where:
SK = dosing intensity, millimeter (mm)/pass of an arm
q = influent flow/filter top surface area, in cubic meters (m^3)/square meter (m^2)/hour
r = recycle flow/filter top surface area, m^3/m^2/hour
a = number of arms
n = revolutions per minute

(h) Distribution Equipment.

(1) The design of a trickling filter must include a rotary, horizontal, or traveling wastewater distribution system that distributes wastewater uniformly over the entire surface of a filter at the design and flushing dosing intensities.

(2) A design must include filter distributors that operate properly at all anticipated flow rates.

(3) A design must not deviate from the design dosing intensity by more than 10%.

(4) A new trickling filter or an upgrade of an existing trickling filter must include an electrically driven, variable speed filter distributor to allow operation at optimum dosing intensity independent of recirculation pumping.

(5) If an existing rectangular trickling filter is retrofitted with rotary distributors, any filter media that will not be fully wetted must not be considered part of the required effective treatment area.

(6) The center column of a rotary trickling filter distributor must have emergency overflow ports that are sized to prevent water from reaching the bearings in the center column.

(7) A filter distributor must include cleanout gates on the ends of the distributor arms and an end spray nozzle to wet the edges of the trickling filter media.

(8) The trickling filter walls must extend at least 12.0 inches above the top of the ends of the distributor arms.

(9) The use of a mercury seal in a distributor of a trickling filter is prohibited in a new wastewater treatment facility. If an existing wastewater treatment facility is materially altered, any mercury seal in a trickling filter must be replaced with an oil or mechanical seal.

(10) The minimum clearance between the top of the trickling filter media and the distributing nozzles is 6.0 inches.

(11) Rotary distributors must be capable of operating at speeds as low as one revolution per 30 minutes.

(12) A trickling filter with a height or diameter that does not allow distributors to be removed and replaced by a crane must provide jacking columns and pads at the distributor column.

(i) Recirculation.

(1) Low Flow Conditions.

(A) The design of a trickling filter must include a mechanism to maintain minimum recirculation during periods of low flow to ensure that the biological growth on the filter media remains active at all times.

(B) For all trickling filters with continuous recirculation, the design must include the minimum recirculation rate in the evaluation of the efficiency of the filter.

(C) Minimum flow to the filters must be equal to or greater than 1.0 million gallons per day per acre of filter aerial surface and must ensure the proper operation of the distribution nozzles.

(D) The minimum flow rate for a trickling filter design using hydraulically driven distributors must keep rotary distributors turning at the minimum design rotational velocity.

(E) For a wastewater treatment facility designed with a design flow equal to or greater than 0.4 million gallons per day and recirculation for BOD_5 removal, the recirculation system must include variable speed pumps and a method of conveniently measuring the recycle flow rate.

(2) Compensatory Recirculation.

(A) The design of a trickling filter must provide compensatory recirculation to supplement influent flow if design and flushing dosing intensities are not achieved solely by the control of distributor operation.

(B) Controls for the distributor speed and recycle pumping rate must provide optimum dosing intensity under all anticipated influent flow conditions.

(3) Process Calculations. The engineering report must:

(A) provide design details about removal of the remaining organic matter by recirculation;

(B) identify the effect of dilution of the influent on the rate of diffusion of dissolved organic substrates into the biofilm; and

(C) identify the effect of reduced influent concentrations on reaction rates in each section of a filter having first order kinetics.

(4) Recirculation Rate. A recirculation rate may exceed four times the design flow if calculations to justify the higher rate are included in the engineering report.

(5) Configuration.

(A) In a wastewater treatment facility with influent that has constant organic loadings, direct recirculation of unsettled trickling filter effluent must be used.

(B) A design must ensure that the distributor nozzles can handle the recirculated sloughed biofilm.

(C) In a wastewater treatment facility with variable influent organic loadings, effluent must recirculate from a final clarifier to either a primary clarifier or a trickling filter to equalize organic loading.

(j) Average Hydraulic Surface Loading.

(1) The engineering report must include calculations of the maximum, design, and minimum surface loadings on the trickling filters in terms of million gallons per acre of filter area per day for the flow expected in the initial year and at full capacity.

(2) The average hydraulic surface loadings of a trickling filter with crushed rock, slag, or similar media:

(A) must not exceed 40 million gallons per day per acre based on design flow, except in roughing applications;

(B) must not be less than 1.0 million gallons per day per acre; and

(C) must be within the ranges specified by the manufacturer.

(k) Underdrain System Design.

(1) A trickling filter must include an underdrain with semicircular inverts that cover the entire floor of the trickling filter.

(2) An underdrain must be constructed of vitrified clay or pre-cast reinforced concrete.

(3) An underdrain constructed of half tile is prohibited.

(4) Underdrain inlet openings must have a gross cross-sectional area greater than 15% of a trickling filter's surface area.

(5) A modular synthetic media design must be supported above a trickling filter floor by beams and grating with support and clearances in accordance with the trickling filter media manufacturer's recommendations. The manufacturer's recommendations must be included in the engineering report.

(l) Underdrain Slopes.

(1) An underdrain and trickling filter effluent channel floor must have a minimum slope of 1%.

(2) An effluent channel must produce a minimum velocity of 2.0 feet per second at the design flow rate to a trickling filter.

(3) The floor of a new trickling filter using stackable modular or synthetic media must slope toward a drainage channel at a slope of at least 1% and not more than 5%, based on filter size and hydraulic loading.

(m) Passive Ventilation.

(1) The effluent channels and effluent pipes of an underdrain system or a synthetic media support structure must permit free passage of air.

(2) Any drain, channel, or effluent pipe must have a cross-sectional area with not more than 50% of the area submerged at peak flow plus recirculation.

(3) The effluent channels must accommodate the specified flushing hydraulic dosing intensity and allow the possibility of increased hydraulic loading.

(4) A passive ventilation system may include an extension of an underdrain through a trickling filter sidewall, a ventilation opening through a sidewall, or an effluent discharge conduit designed as a partially full flow pipe or an open channel.

(5) A vent opening through a trickling filter wall must include hydraulic closure to allow flooding of a trickling filter for nuisance organism control.

(6) A passive ventilation design must provide at least 2.5 square feet of ventilating area per 1,000 pounds of primary effluent BOD_5 per day.

(7) An underdrain system for a rock media filter must provide at least 1.0 square foot of ventilating area for every 250 square feet of the trickling filter basin surface area.

(8) The minimum required ventilating area for a synthetic media underdrain is the area recommended by the manufacturer. The manufacturer's recommendations must be included in the engineering report.

(9) The ventilating area must be equal to the greater of 1.0 square foot per 175 square feet of synthetic media area or 2.6 square feet per 1,000 cubic feet of media volume.

(n) Forced Ventilation.

(1) Forced ventilation is required for a trickling filter designed for:

(A) nitrification;

(B) a trickling filter design with a media depth in excess of 6.0 feet; and

(C) a location where seasonal or diurnal temperatures do not provide sufficient difference between the ambient air and wastewater temperatures to sustain passive ventilation of one cubic foot of air per square foot of trickling filter area per minute.

(2) A design must specify the minimum airflow for forced ventilation and optimized process performance, and the engineering report must include all calculations associated with this determination.

(3) The design of a down-flow forced ventilation system must include a provision for:

(A) the removal of entrained droplets; or

(B) the return of air containing entrained moisture to the top of a trickling filter; and

(C) a reversible fan or other mechanism to reverse the airflow when a wide temperature difference between the ambient air and wastewater creates strong updrafts.

(4) A ventilation fan and the associated controls must withstand flooding of a trickling filter without sustaining damage.

(5) The following equation and the values in Table G.3. in Figure: 30 TAC §217.182(n)(5) determine the minimum airflow rate for forced ventilation.

Figure: 30 TAC §217.182(n)(5)

Equation G.2.

$$MAFR = \frac{(R_A) \times (L) \times (P_F)}{1440 \text{min}/day}$$

Where:
MAFR = Minimum airflow rate, scfm
R_A = Aeration rate, scf/lb, Table G.3.
L = Loading rate, lb/day, Table G.3.
P_F = Loading peaking factor

Table G.3. - Aeration Rate and Loading Rate Factors		
Filter Application	**R_A (scf/lb BOD_5)**	**L (lb BOD_5/1000 cf/day) Loading on the filter**

Roughing Filter at 75-200 lb BOD_5/1000 cf/day	1080	BOD_5
Secondary Treatment Filter at 25-50 lb BOD_5/1000 cf/day	1200	BOD_5
Combined or Tertiary Filter	2400	1.25 * BOD_5 + 4.6 * total Kjeldahl nitrogen (TKN)

(o) Maintenance.

(1) Cleaning and Sloughing.

(A) A flow distribution device, an underdrain, a channel, and a pipe must allow for maintenance, flushing, and drainage.

(B) A trickling filter system must hydraulically accommodate the specified flushing hydraulic dosing intensity and must facilitate cleaning and rodding of the distributor arms.

(C) A trickling filter system must prevent recirculation of sloughed biomass in pieces larger than the distributor nozzle openings or the filter media voids.

(2) Nuisance Organism Control. A trickling filter system must control nuisance organisms by operation of trickling filters at proper design dosing intensities, with periodic flushing at higher dosing intensities.

(A) Filter Flies.

(i) The structural and hydraulic design of a trickling filter must enable flooding of the trickling filter for fly control.

(ii) The executive director may approve an alternate method of fly control for a trickling filter that exceeds 6.0 feet in height if the effectiveness of the alternate method is verified at a full-scale installation and documented in the engineering report.

(B) Snails. A trickling filter system must be designed to prevent sludge accumulation that attracts snails. A trickling filter system must include a low-velocity, open channel between a trickling filter and final clarifier for manual removal of snails.

(3) Corrosion Protection. A trickling filter must be designed to prevent corrosion. Corrosion-resistant materials must be used for all equipment and for construction of a trickling filter, including ventilation equipment and covers.

(p) Flow Measurements. A trickling filter system must include a means to measure the flow to each trickling filter and the recirculation flow of each trickling filter.

(q) Odor Control. A trickling filter system must use ventilation and periodic flushing at a higher dosing intensity to minimize potential odor.

(1) Covers.

(A) The executive director may require an owner of a wastewater treatment facility with prior odor complaints to install a cover over a new or altered trickling filter.

(B) A cover must allow access to the entire top of the trickling filter media and to the distributor for maintenance and removal.

(C) A covered trickling filter must have a forced ventilation system with a scrubber or an adsorption column for odor control.

(2) Stripping. A trickling filter with an influent organic strength of BOD_5 greater than 200 milligrams per liter must have forced ventilation in a down-flow mode to minimize odor. Odorous off-gases may be:

(A) recycled through a trickling filter;

(B) used to ventilate a tertiary nitrifying trickling filter in an up-flow mode;

(C) diffused into an aeration basin; or

(D) treated separately for odor control using a scrubber or an adsorption column.

(r) Final Clarifiers. The size of the final clarifiers for a wastewater treatment facility with a trickling filter must ensure the required effluent total suspended solids removal at the peak flow with all recirculation pumps in operation.

(s) Report Requirements.

(1) The engineering report must specify the trickling filter efficiency formula used in the design calculations.

(2) The engineering report must include the operating data from any existing trickling filter of similar construction and operation to justify the projected treatment efficiency, kinetic coefficients, and other design parameters as required in this subchapter.

(3) The engineering report may include more than one set of applicable design equations to allow crosschecking of predicted treatment efficiency.

§217.183. Nitrifying Trickling Filters--Additional Requirements.

(a) Ventilation. A nitrifying trickling filter must include forced ventilation to distribute airflow throughout the underdrain area. The minimum design airflow rate must be the greater of:

(1) 50 pounds of oxygen provided per pound of oxygen required at average organic loading, based on stoichiometry; or

(2) 30 pounds of oxygen provided per pound of oxygen required at peak organic loading, based on stoichiometry.

(b) Temperature. The engineering report must justify the temperature used in the design equations. A design may include deep towers or other means to minimize recirculation while providing a design hydraulic dosing intensity that lessens the effects of temperature on removal efficiency.

(c) pH. The engineering report must document that the design recirculation rates are appropriate for dealing with the effects of pH.

(d) Predation. A nitrifying trickling filter must include a means for control of biomass predators, such as snails.

(e) Hydraulic Application Rates. A nitrifying trickling filter must operate at a design dosing intensity of at least 1.47 gallons per minute per square foot and provide operational control of dosing intensity.

(f) Media. Cross-flow synthetic media is required for a new tertiary nitrification filter or for the nitrifying section of a new combined nitrification filter.

(g) Tertiary Nitrification Filters. A trickling filter treating influent that has a five-day biochemical oxygen demand (BOD_5) to total Kjeldahl nitrogen (TKN) ratio of equal to or greater than 1.0 and soluble BOD_5 of less than or equal to 12 milligrams per liter (mg/l) is a tertiary nitrification filter.

(1) Design Justification. The engineering report must include process design calculations and selection criteria of kinetic coefficients for a tertiary nitrification trickling filter. The design calculations and selection criteria must be justified by operating data from an existing trickling filter of similar construction and operation.

(2) Media biotowers. A tertiary nitrification trickling filter design must minimize pH depression due to recirculation. A tertiary nitrification trickling filter must use either:

(A) a single tower at least 20 feet tall; or

(B) a series of towers less than 20 feet tall. The design must include provisions to readily switch the operating sequence of the trickling filters if multiple towers are operated in series.

(h) Combined BOD_5 and Nitrification Filters. A trickling filter intended to perform nitrification and treating influent having a BOD_5 to TKN ratio of less than 1.0 or soluble BOD_5 of less than 12 mg/l is a combined BOD_5 and nitrification filter.

(1) Design Justification. The engineering report must justify the projected treatment efficiency and other design parameters of a combined BOD_5 and nitrification trickling filter by including operating data from any existing trickling filter of similar construction and operation.

(2) BOD_5 Removal Requirements. A combined BOD_5 and nitrification filter must achieve effluent total BOD_5 of less than 15 mg/l.

(3) Recirculation. A combined BOD_5 and nitrification filter design must enable a high recirculation rate with turndown capability.

§217.184. Dual Treatment Using Trickling Filters.

(a) Classification. A trickling filter or other attached-growth treatment unit in series with a suspended-growth process is considered a dual treatment process that is classified as an Activated Biological Filter (ABF) System, a Trickling Filter/Solids Contact (TF/SC) System, a Roughing Filter/Activated Sludge (RF/AS) System, an

Activated Biological Filter/Activated Sludge (ABF/AS) System, or a Trickling Filter/Activated Sludge (TF/AS) System.

(1) ABF System. An ABF system consists of a tricking filter and a final clarifier. An ABF system recirculates settled solids from the final clarifier through the trickling filter with no separate aeration basin or solids contact basin.

(2) TF/SC System. A TF/SC system consists of a trickling filter sized to remove the majority of the soluble five-day biochemical oxygen demand (BOD_5), followed by an aerated solids contact basin sized to provide polishing and improved sludge settleability, followed by a final clarifier. A TF/SC system recirculates activated sludge to a solids contact basin. The design of a TF/SC system may include a sludge re-aeration basin.

(3) RF/AS System. An RF/AS system consists of a trickling filter sized to perform primary treatment, followed by an aeration basin sized to remove the majority of the soluble BOD_5, followed by a final clarifier. An RF/AS system circulates activated sludge to the aeration basin.

(4) ABF/AS System. An ABF/AS system consists of a trickling filter sized to perform primary treatment, followed by an aeration basin sized to remove the

majority of the soluble BOD_5, followed by a final clarifier. An ABF/AS system recirculates activated sludge to the trickling filter.

(5) TF/AS System. A TF/AS system consists of a trickling filter sized to perform roughing and concentration dampening, followed by an intermediate clarifier, followed by an aeration basin sized to remove the majority of the soluble BOD_5, followed by a final clarifier. A TF/AS system circulates activated sludge to the aeration basin.

(b) Process Design.

(1) Attached and suspended growth sub-processes in a dual treatment system must be designed through an integrated process that includes the effluent quality from the first stage in determining the design basis of the second stage.

(2) The design of a dual treatment system must include an estimate of the performance of the second stage of a dual system using data from existing similar installations or applicable pilot studies.

(3) For a dual treatment system design in which activated sludge is recycled to first-stage trickling filters, the design must not include the reduction of

oxygen demand to the second-stage aeration basin because of sludge recirculation to the trickling filters.

(4) The design of a dual treatment system may include estimates of the applicable design equations and methodology used for a single stage process.

(c) Treatment Unit Design. The design of a suspended and attached growth system must include all of the features and operational capabilities required for the same treatment unit used for single-process treatment. The design of a suspended and attached growth system must also include the design for pretreatment, snail control, return sludge, aeration, sludge age, hydraulic residence time, and nitrification design.

(1) Pretreatment. Pretreatment for a dual treatment system must conform to the requirements for a first-stage process.

(2) Snail Control. A dual treatment system must include a low-velocity channel between the first-stage and second-stage treatment units for control of snails.

(3) Return sludge.

(A) A dual treatment system that includes recirculation of activated sludge or sloughing to trickling filters must prevent recirculation of pieces too large to pass through the distributor nozzles or the trickling filter media voids.

(B) The trickling filters in a dual treatment system that recirculates sludge to the trickling filters must be of a high-rate, vertical flow design that uses fully corrugated media.

(C) Sludge must be incorporated into the influent prior to application to trickling filters, and must be incorporated into the effluent from first-stage processes prior to being introduced into second-stage aeration basins.

(4) Aeration. An aeration system for second-stage treatment units in a dual system not designed for nitrification must transfer at least 1.2 pounds of oxygen per pound of first stage effluent BOD_5 per day. An aeration system for second-stage treatment units in systems designed for nitrification must transfer sufficient oxygen to meet stoichiometric requirements for:

(A) biomass growth;

(B) respiration for both carbonaceous material oxidation and nitrification; and

(C) oxygen demand due to biomass sloughing events from the first-stage.

(5) Sludge Age.

(A) A second-stage suspended growth process must operate in a way that varies the age of the sludge.

(B) The mean cell residence time must be:

(i) at least 1.5 days for the suspended growth process for TF/SC systems; or

(ii) at least 3.0 days if the second process is an activated sludge aeration basin.

(C) A nitrifying dual treatment system must maintain a total combined mean cell residence time in the attached and suspended growth systems of at

least 10.0 days with capability to provide at least 6.0 days mean cell residence time in the suspended growth process alone.

(6) Hydraulic Residence Time. A design of second-stage processes must have a minimum hydraulic residence time of:

(A) 0.5 hour if the second process is an aerated solids contact basin; or

(B) 3.0 hours if the second process is an activated sludge aeration basin.

(7) Nitrification Design. A wastewater treatment facility designed for nitrification using a dual treatment system must include:

(A) a sludge re-aeration basin if the second process is an aerated solids contact basin; or

(B) an intermediate clarifier if the second process is an activated sludge aeration basin.

§217.185. Rotating Biological Contactors.

(a) Pretreatment.

(1) Pretreatment to remove grit, debris, and excess oil and grease must precede a rotating biological contactor (RBC). Grit, debris, and excess oil and grease must be handled and disposed of in accordance with §217.123 and §217.126 of this title (relating to Screenings and Debris Handling; and Grit Handling).

(2) The executive director may require primary clarifiers, fine screens, or grit removal chambers prior to an RBC to control high levels of grease, oil, grit, or other debris in the influent waste stream.

(3) Hydrogen sulfide concentration must be considered to determine whether an RBC system requires pre-aeration.

(b) Enclosures and Ventilation.

(1) An RBC must be covered and must provide at least six complete air exchanges per hour.

(2) A cover must have working clearance of at least 30 inches above an RBC, unless the cover can be removed with on-site equipment.

(3) Enclosures must be constructed of a corrosion-resistant material.

(4) An RBC must include:

(A) access doors on each end; and

(B) observation ports with covers at 3.0 foot intervals along the RBC.

(c) Media Design.

(1) An RBC must provide self-cleaning action for the media.

(2) RBC media must be compatible with the wastewater to be treated.

(3) An RBC design using multiple stages must use low-density media material for the first stage.

(d) Design Flexibility. If included in the design of an RBC, the engineering report must include descriptions of the following:

(1) controlled flow to multiple first stages;

(2) alternate flow and staging arrangements;

(3) removable baffles between stages; and

(4) provisions for step feed and supplemental aeration.

(e) Tank Configuration. The design of an RBC must ensure that each RBC tank:

(1) minimizes the zones in which solids will settle out; and

(2) includes tank drains to facilitate removal of any accumulated solids.

(f) Control of Unwanted Growth in the Initial Stages. Chlorine may be added upstream of an RBC system to control the growth of filamentous bacteria that oxidize sulfur compounds (e.g., *Beggiatoa* species).

(g) Maintenance Provisions.

(1) An RBC system with a design flow of 1.0 million gallons per day or greater must have two or more process trains, each consisting of three or more stages in series.

(2) An RBC system must be able to treat the design flow with the largest process train out of service for maintenance or cleaning.

(h) Bearing Maintenance. The bearings in each RBC must be easily accessible for inspection, lubrication, and replacement.

(i) Organic Loading Design Requirements.

(1) The design of an RBC must be based on the organic loading rate.

(2) The maximum loading rate must not exceed 8.0 pounds of five-day biochemical oxygen demand (BOD_5) per day per 1,000 square feet (sf) of media in any stage.

(3) The RBC media area must be adjusted to compensate for the effects of the ratio of soluble BOD_5 to total BOD_5.

(4) Allowable organic loading for the entire RBC system must not exceed:

(A) 3.0 lbs of BOD_5 per day per 1,000 sf of media area for wastewater treatment facilities required to meet secondary treatment; or

(B) 2.0 lbs of BOD_5 per day per 1,000 sf of media for a wastewater treatment facility required to meet advanced secondary treatment.

(j) Hydraulic Loading Design Requirements. A wastewater treatment facility using an RBC system must include flow equalization when the peak flow is more than 2.5 times the design flow to prevent loss of fixed growth from the media.

(k) Stages.

(1) An RBC system designed for BOD_5 removal must have at least three stages in series, unless the engineering report justifies that equivalent treatment will be achieved with less than three stages. Justification must use operational data from either

a full-scale operating wastewater treatment facility or pilot unit with an appropriate scale-up factor.

(2) The first stage of an RBC system must include a means of spreading the influent flow evenly across the media.

(l) Drive Systems. An RBC drive system must be able to handle the maximum anticipated media load and may be a variable speed system. An RBC may be mechanically driven or air driven.

(1) Mechanical Drive Systems.

(A) A mechanical drive system must have a motor and speed control unit capable of maintaining the required revolutions per minute.

(B) A fully assembled spare mechanical drive unit must be kept on-site for each size of mechanical drive unit used in the RBC.

(2) Air Drive System.

(A) Each RBC using an air drive system must have air diffusers mounted below the media and off-center from the vertical axis of the RBC and must have air cups mounted on the outside of the media to collect the air.

(B) The blowers must provide the capacity to supply:

(i) the airflow rate necessary for each RBC;

(ii) double the airflow rate to any one RBC while the others are running normally; and

(iii) the required airflow with the largest blower out of service.

(C) The air diffuser pipe to each RBC must:

(i) be mounted so that the air diffuser pipe may be removed without draining the tank or without moving the RBC media; and

(ii) include an air control valve to each RBC.

(m) Dissolved Oxygen.

(1) An RBC system must maintain a minimum dissolved oxygen concentration of 1.0 milligram per liter in all stages under the maximum organic loading rate.

(2) The executive director may require supplemental aeration.

§217.186. Nitrifying Rotating Biological Contactors.

(a) A rotating biological contactor (RBC) system designed for five-day biochemical oxygen demand (BOD_5) removal and nitrification of domestic wastewater in a single system must include four stages and have a maximum overall organic loading rate of 1.6 pounds of BOD_5 per day per 1,000 square feet of media.

(b) A nitrifying RBC must be designed to allow chemical addition if the influent pH is below 7.0 standard units.

(c) The engineering report must justify the nitrification rate of a system using calculations.

(d) A nitrifying RBC system may be subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

§217.187. Dual Treatment Utilizing Rotating Biological Contactors.

(a) A rotating biological contactor (RBC) may be used in conjunction with other treatment as a dual treatment system.

(b) An RBC may be used as aroughing unit, as described in §217.182(b)(1) of this title (relating to Trickling Filters--General Requirements, regarding trickling filter classifications), in series with an activated sludge system.

(c) The engineering report must include supporting data, calculations, process descriptions, and vendor information to describe how a proposed RBC system will meet the permitted effluent limitations.

(d) Combined systems may be subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

§217.188. Submerged Biological Contactor.

(a) A submerged biological contactor (SBC) must be air driven and does not require a cover. An SBC is any biological contactor where more than 60% of the surface is below the water level at design flow.

(b) An SBC system requires the same pretreatment as a rotating biological contactor system and must meet the criteria in §217.185 of this title (relating to Rotating Biological Contactors), except as described in paragraphs (1) and (2) of this subsection.

(1) Each SBC unit must include two air headers - one to provide rotation of the unit, and one to provide dissolved oxygen for biological activity.

(2) Submerged bearings must be sealed to prevent intrusion of wastewater.

(c) If an SBC has any moving parts that require lubrication, an SBC must have lubrication access above the water level.

§217.189. Dual Treatment Systems Using Submerged Biological Contactor.

(a) A submerged biological contactor (SBC) may be used in conjunction with other treatment systems.

(b) An SBC may be used as a roughing unit, as described in §217.182(b)(1) of this title (relating to Trickling Filters--General Requirements), in series with activated sludge.

(c) SBC units may be installed in existing activated sludge basins to create a combination of fixed and suspended growth processes.

(d) If a dual treatment system employs an SBC, the engineering report must include supporting data, calculations, process descriptions, and vendor information to describe how the proposed dual treatment system will provide the required treatment levels.

(e) These designs may be subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

§217.190. Filtration.

(a) Reasons for Use.

(1) Permit Requirements. A wastewater treatment facility that requires tertiary effluent limitations must use filtration as a unit of operation to supplement suspended solids removal. Tertiary effluent limits are any limits less than or equal to five milligrams per liter for five-day biochemical oxygen demand or total suspended solids.

(2) Specific Water Quality Requirements. A wastewater treatment facility designed for secondary or advanced secondary treatment effluent limitations may use filtration as a unit of operation to supplement suspended biological floc removal. Filters may be designed for intermittent operation if filters are not necessary to meet permitted effluent limitations.

(b) Redundancy.

(1) A wastewater treatment facility using filtration to provide tertiary treatment to comply with a permit requirement must have a minimum of two independent, fully functional filter basins with independent, fully functional equipment.

(2) The design of a filtration system must specify the submerged filter surface area required to treat the peak flow with the largest filter unit out of service.

(3) If a filter is provided solely to polish wastewater in situations where permit compliance does not depend on the use of a filter, such as in some cases of reclaimed water use, one filter is allowed.

(c) Source of Backwash Water. A filtration system must use filtered effluent as the source of backwash water.

(d) Disposition of Backwash Water. A filtration system must return backwash water containing material cleaned from a filter to the headworks of the wastewater treatment facility or to the influent lift station for processing.

(e) Sequence of Treatment Units.

(1) A final clarifier must precede a filter.

(2) A filter system may be used in conjunction with a disinfection tank to provide additional detention time, provided the filter is backwashed to the headworks of the wastewater treatment facility or to the influent lift station.

(f) Overload Conditions. A design must prevent effluent or partially treated effluent from overflowing from any filtration unit.

(g) Control of Slime Growth. A filtration system must provide periodic disinfectant in the influent stream to control slime growth in the filter and backwash storage tank.

§217.191. Additional Requirements for Deep Bed, Intermittently Backwashed, Granular Media Filters.

(a) Application Rates. With one unit out of service, the peak application rate to any deep bed, intermittently backwashed, granular media (deep bed) filtration unit must not exceed twice the design application rate.

(1) Single Media (Sand).

(A) The design filtration rate for single media (sand) filters must not exceed three gallons per minute per square foot (gpm/sf) of media surface.

(B) The maximum filtration run time between backwash periods is 6.0 hours.

(2) Dual Media (Stratified Anthracite and Sand). The design filtration rate for a dual media (anthracite and sand) filter must not exceed 4.0 gpm/sf of media surface.

(3) Mixed Media (Non-stratified Anthracite, Sand, Garnet, or Other Materials). The design filtration rate for mixed media (non-stratified anthracite, sand, garnet, or other materials) must not exceed 5.0 gpm/sf of media surface.

(b) Media Design.

(1) A deep bed filter underdrain system must include a graded gravel layer with a minimum depth of 15 inches. Filter support media other than gravel may be used if justified in the engineering report.

(2) The uniformity coefficient of media used in a deep bed filter must be 1.7 or less.

(3) A dual or mixed deep bed filter must be designed to maintain stratification of media during backwash, based on the particle size distribution.

(4) Media material depths for the various deep bed filter types must conform to the values in the following table, unless other media depths are justified in the engineering report with an analysis of the backwash rates:

Figure: 30 TAC §217.191(b)(4)

Table G.4. - Minimum Filter Depths for Deep Bed, Intermittently Backwashed Filters

Filter Type	Type of Media	Effective Particle Size (millimeters)	Minimum Depth (inches)
Single Media	Sand	1.0-4.0	24
Dual Media	Anthracite & Sand *Anthracite* *Sand*	1.0-4.0 *1.0-2.0* *0.5-1.0*	16 total *10* *6*
Mixed Media	Anthracite, Sand & Other *Anthracite* *Sand* *Garnet or Similar Material*	1.0-4.0 *1.0-2.0* *0.6-0.8* *0.3-0.6*	16 total *10* *4* *2*

(c) Backwash Systems.

(1) Flowrate and Media Expansion.

(A) A backwash system must allow a fluidized media expansion of at least 20% by volume.

(B) A single media deep bed filter must provide a minimum backwash flowrate of 6.0 gpm/sf of media area.

(C) Dual and mixed media deep bed filters must provide a minimum backwash rate of 15 gpm/sf of media area.

(D) Backwash times must be at least 10 minutes but not more than 15 minutes, unless the engineering report justifies a different time.

(2) Surge Control.

(A) A wastewater treatment facility that does not have flow equalization or other means of surge control must have a backwash tank.

(B) A surge control device must prevent increases in flow greater than 15% of the design flow of the upstream treatment units if backwash is taken directly to the headworks of the wastewater treatment facility or the influent lift station.

(C) The design of a surge control device must be based on calculations that demonstrate the slug effects of backwash water and that demonstrate treatment capabilities are not diminished with the return of backwash water to the headworks of the wastewater treatment facility or the influent lift station.

(D) An enclosed backwash tank must be vented.

(3) Pumps.

(A) Pumps for backwashing deep bed filters units must deliver the required flow rate for backwash operations according to paragraph (1) of this subsection with the largest pump out of service.

(B) A backup pump must be available on-site.

(C) A valve arrangement for isolating a deep bed filter unit for backwashing must be accessible for maintenance.

(D) A backwash system employing automatic controls must include a manual override system.

(4) Supplemental Systems.

(A) A single deep bed media filter system must include either an air scour system or a combination air and water scour system in addition to an up-flow backwash water system.

(B) A dual or mixed deep bed media filter system must include either a surface air or water scour system that meets one of the following requirements for air or water scouring.

(i) Air scour system flowrates must be at least 3.0 standard cubic feet per minute per square foot (scfm/sf) of media surface area but not more than 5.0 scfm/sf of media surface area.

(ii) Water scour system flowrates must be at least 0.5 gpm/sf of media area but not more than 2.0 gpm/sf of media area.

(d) Underdrain System. An underdrain system must provide a uniform distribution for filter backwash without plugging or exceeding the manufacturer's recommendation for maximum head loss. The manufacturer's recommendation for maximum head loss must be included in the engineering report.

(e) Tank Design.

(1) The bottom of a wash water collection trough must be a minimum of 6.0 inches above the maximum elevation of the expanded media during backwash.

(2) A wash water collection trough must have a minimum freeboard of 3.0 inches during the maximum backwash flowrate.

(f) Controls.

(1) The deep bed filter operation controls may be manual or automatic.

(2) Control indicators must be visible to a wastewater treatment facility operator while adjusting the controls.

(3) An automatically controlled system must include a manual override system.

(4) Each deep bed filter unit must have a head loss indicator.

§217.192. Additional Design Requirements for Multi-Compartmented, Low Head, Automatically Backwashed Filters.

(a) Application Rates.

(1) With one unit out of service, the peak application rate to any multi-compartmented, low head, automatically backwashed (multi-compartmented) filter unit must not exceed twice the design application rate.

(2) The engineering report must include manufacturer's recommended filtration and application rates with test data.

(3) Single Media. A single media multi-compartmented filter must have a maximum design filtration rate of 3.0 gallons per minute per square foot of media surface.

(4) Dual Media. A dual media multi-compartmented filter must have a maximum design filtration rate of 4.0 gallons per minute per square foot of media surface.

(b) Media Design. Media sizes and depths must correspond to the values in Table G.5. in Figure: 30 TAC §217.192(b), unless an engineer uses calculations to justify different media sizes, depths, or both in the engineering report.

Figure: 30 TAC §217.192(b) (No change to the figure as it exists in TAC.)

(c) Backwash System.

(1) A backwash system must provide a minimum backwash rate of 20 gallons per minute per square foot of media.

(2) The backwash duration must last at least 20 seconds for each compartment and must allow a fluidized media expansion of at least 20% by volume, unless the engineering report includes the manufacturer's recommended backwash rates with test data that supports a shorter backwash duration or less expansion of the fluidized media.

(3) The surge control and pumping system requirements must be the same as those detailed in §217.191(c)(2) and (3) of this title (relating to Additional Requirements for Deep Bed, Intermittently Backwashed, Granular Media Filters).

(d) Traveling Bridge. A traveling bridge mechanism must:

(1) provide support and access to the backwash pumps and equipment;

(2) be constructed of corrosion-resistant materials;

(3) have provisions for consistent tracking of the bridge and safe support of the power cords; and

(4) initiate a backwash cycle automatically when a preset head loss through the filter media occurs.

(e) Floating Material Control. A multi-compartmented filter system must provide for automatic removal of any floating material from the surface of the multi-compartmented filter and return the floating material to the headworks of the wastewater treatment facility for further processing.

§217.193. Cloth or Disk Filter Systems.

(a) Cloth or disk filter systems must meet the requirements in §217.190 of this title (relating to Filtration).

(b) Media Design.

(1) The average pore size of cloth or disk filter media must not exceed 30 microns.

(2) The media thickness must be based on the manufacturer's recommendations, considering frequent pressure changes. The manufacturer's recommendations must be included in the engineering report.

(3) The media must be disinfectant-resistant if the filter will be exposed to disinfectants.

(4) The media must be chlorine-resistant if the filter will be exposed to chlorine.

(c) Filtration Rates and Hydraulic Requirements.

(1) The design filtration rate must be based on the effective submerged surface area of the media. If the submerged surface area of the media varies based on the operational mode, the design filtration rate must account for the variability.

(2) The maximum design filtration rate for peak flow must not exceed 6.5 gallons per minute per square foot of submerged media.

(3) The filtration system must be able to treat the design flow rate with one filter unit in backwash mode.

(4) The backwash flux rate must be at least 6.0 gallons per minute per square foot of media, based on the portion of the filter surface that is being actively backwashed.

(d) Disposal of Backwashed Material.

(1) Liquid filter backwash must be re-filtered or must be returned to the headworks of the wastewater treatment facility or to the influent lift station.

(2) Solid filter backwash material must be pumped to the influent lift station, the headworks, the digester, or to another location approved in writing by the executive director for processing at least once per day.

(e) Monitoring and Controls.

(1) Cloth or disk filters must use an automatic control system.

(2) An automatic control system must include manual override capability.

(3) Each filter unit must monitor head loss across the unit and must have a head loss gauge or readout.

(4) Each filter unit must monitor effluent turbidity and have a turbidity gauge or readout.

(5) Gauges and readouts must be readable from the control panel.

(f) Weather Resistance. Cloth or disk filter systems must be protected from the environment. The engineering report must describe how the system will be protected from freezing conditions, ultraviolet light, and similar environmental concerns.

§217.194. Alternative Designs for Effluent Polishing.

The executive director shall review alternative processes for tertiary suspended solids removal, other than filters, as non-conforming technologies subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

SUBCHAPTER G: FIXED FILM AND FILTRATION UNITS

[§217.193]

Statutory Authority

The repeal of this section is adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The repeal of this section implements TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.193. Alternative Designs for Effluent Polishing.

SUBCHAPTER H: NATURAL TREATMENT UNITS

§§217.201 - 217.213

Statutory Authority

The amendments are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.201. Applicability.

This subchapter establishes the minimum requirements for Imhoff tanks, constructed wetlands, and all lagoons used to store treated, untreated, or partially treated domestic wastewater, including facultative lagoons, aerated and partially aerated lagoons, stabilization lagoons, raw influent storage lagoons, treated effluent storage lagoons, evaporative lagoon systems, and overland flow processes, except that lagoons used for reclaimed water under Chapter 210 of this title (relating to Use of Reclaimed Water) must comply with the requirements of that chapter.

§217.202. Primary and Secondary Treatment Units.

(a) A primary treatment unit may be an aerated lagoon, a partially aerated lagoon, a facultative lagoon, an evaporative lagoon, or an Imhoff tank.

(b) A secondary treatment unit may be a stabilization lagoon, a constructed wetland, an evaporative lagoon, or an overland flow process. A secondary treatment unit may be used for polishing and tertiary treatment.

(c) A treated effluent storage lagoon downstream of the sampling location in the wastewater treatment facility permit is not considered a treatment unit for the purposes of this chapter.

(d) A secondary treatment unit must be preceded by a primary treatment unit.

§217.203. Design Criteria for Natural Treatment Units.

(a) This section applies to all earthen lagoons and earthen treatment units in a wastewater treatment facility, including constructed wetlands, facultative lagoons, aerated lagoons, partially aerated lagoons, stabilization lagoons, evaporative lagoons, and storage lagoons. Storage lagoons are considered treatment units for the purposes of this chapter if they hold wastewater that is not final treated effluent, such as raw influent or wastewater that has received intermediate treatment.

(b) Flow Distribution. The shape and size of a treatment unit must ensure uniform distribution of the wastewater flow.

(c) Windbreaks and Screening.

(1) A windbreak or vegetative screening must be used if operation of the treatment system could cause spray to drift off of the property.

(2) The use, type, and extent of windbreaks or vegetative screening must be approved in writing by the executive director.

(d) Maximum Liner Permeability.

(1) Except as provided in paragraph (3) of this subsection, constructed wetlands, facultative lagoons, aerated lagoons, partially aerated lagoons, stabilization lagoons, evaporative lagoons, and storage lagoons must be constructed with a liner material that has a coefficient of permeability less than 1×10^{-7} centimeters per second for a thickness of:

(A) 2.0 feet for water depths less than or equal to 8.0 feet; and

(B) 3.0 feet for water depths greater than 8.0 feet.

(2) A liner must extend from the lowest elevation in a lagoon or constructed wetland, up to an elevation of 2.0 feet above normal water elevation in the lagoon or constructed wetland.

(3) If a lagoon is constructed to store treated wastewater authorized as reclaimed water under Chapter 210 of this title (relating to Use of Reclaimed Water), the lagoon liner must comply with §210.23 of this title (relating to Storage Requirements for Reclaimed Water).

(e) Compliance with the Liner Permeability Requirements. A lagoon must be lined and tested according to the requirements of this subsection. The engineering report must include the results of all tests required by this subsection.

(1) Sampling Requirements for Soil Liners.

(A) Sample Analysis. Soil liner material must be sampled and analyzed before construction. All samples of the liner material must meet the following requirements:

(i) the coefficient of permeability must be less than 1×10^{-7} centimeters per second;

(ii) at least 30% of the liner material must pass through a 200 mesh sieve;

(iii) the liner material must have a liquid limit greater than 30%; and

(iv) the liner material must have a plasticity index of 15 or greater.

(B) Preconstruction Sampling for Unamended In-Situ Liners. Permeability testing for an unamended in-situ soil liner requires undisturbed core samples of the liner material. At least one undisturbed core sample must be analyzed for every 0.25 acre of liner surface area on the bottom of each lagoon or constructed wetland. At least one additional undisturbed core sample must be analyzed for every 0.25 acre of liner surface area from each side of each lagoon or constructed wetland. All undisturbed core samples must have a coefficient of permeability less than 1×10^{-7} centimeters per second. The engineering report must demonstrate that the in-situ soil liner meets the minimum thickness requirements in subsection (d)(1) of this section.

(C) Preconstruction Sampling for Imported Soil Liners and Amended In-Situ Soil Liners. Four samples must be tested for every 0.25 acres of liner surface area in each lift according to subparagraph (A)(ii) - (iv) of this paragraph. . At least one out of every four samples must be tested for permeability according to

subparagraph (A)(ii) of this paragraph. If samples are collected before compaction, molded samples of the liner material mixture may be tested instead of undisturbed core samples for imported soil liners and amended in-situ soil liners.

(D) Post-construction Sampling. A minimum of one undisturbed core sample must be analyzed after the liner is complete for each 0.25 acre of liner surface area on the bottom of each lagoon or constructed wetland. At least one additional undisturbed core sample must be analyzed for every 0.25 acre of liner surface area from each side of each lagoon or constructed wetland. The coefficient of permeability must be less than 1×10^{-7} for each sample. An unamended in-situ liner does not require post-construction sampling if it meets the pre-construction requirements in subparagraphs (A) and (B) of this paragraph and the construction requirements in paragraph (2)(B) of this subsection.

(2) Soil Liner Construction.

(A) Amended In-situ or Imported Soil Liner Construction. All amended in-situ or imported soil liners must comply with the following requirements:

(i) liner material must be placed in loose lifts that are each no more than 8.0 inches in thickness;

(ii) each lift must be compacted to at least 95% standard proctor density at -1% to +3% optimum moisture according to American Standards for Testing and Materials (ASTM) D 698;

(iii) each lift must be no more than 6.0 inches thick after compaction and the completed liner must meet the minimum thickness requirements in subsection (d)(1) of this section; and

(iv) the in-situ subgrade must be scarified before placement of the lowest lift.

(B) Unamended In-situ Soil Liner Construction. All unamended in-situ soil liners must comply with the following requirements.

(i) The liner must include at least one 8.0 inch loose lift of excavated in-situ material that is compacted to no more than 6.0 inches at 95% standard proctor density at -1% to +3% optimum moisture according to ASTM D 698.

(ii) The in-situ subgrade must be scarified before placement of the lowest lift.

(3) Synthetic Membrane Liner Construction. All synthetic membrane liners must comply with the following requirements.

(A) A synthetic membrane liner must have a minimum thickness of 40 mils.

(B) A synthetic membrane liner must include an underdrain with a leachate detection and collection system.

(C) Synthetic membrane liner material must be able to withstand constant sunlight without degrading.

(D) Soil compaction beneath a synthetic liner must meet the liner manufacturer's requirements.

(f) Embankment Design and Construction.

(1) The top of an embankment must be at least 10.0 feet wide.

(2) The engineering report must justify all inner and outer embankment slopes steeper than 1.0 foot vertical to 4.0 feet horizontal from the top of the embankment.

(3) Inner and outer embankment slopes steeper than 1.0 foot vertical to 3.0 feet horizontal are prohibited.

(4) All embankments must be protected against erosion by establishing grass, paving, riprapping, or any other method approved in writing by the executive director.

(5) All vegetated embankments must have a minimum cover of 6.0 inches of topsoil.

(g) Disinfection. Unless otherwise specified in the wastewater treatment facility's wastewater permit, chemical or ultraviolet disinfection is not required if a detention time of at least 21 days is provided in the plant-free water surface with full sun exposure in accordance with §309.3(g) of this title (relating to Application of Effluent Sets).

(h) Sampling Point Significance. The size or design of a treatment unit upstream of the permitted sampling point must not be based on the design of any storage lagoon or other structure downstream of the permitted sampling point.

(i) Stormwater Drainage. A natural treatment system must be designed and constructed to prevent stormwater from draining into the system.

(j) Piping. A natural system must have piping that allows water in each lagoon or wetland cell to be re-routed to a different lagoon or wetland cell for maintenance.

(k) Freeboard.

(1) A lagoon must have a minimum of 2.0 feet of freeboard above the normal operating level if the lagoon's normal water surface area is less than 20 acres.

(2) A lagoon must have a minimum of 3.0 feet of freeboard above the normal operating level if the lagoon's normal water surface area is 20 acres or more.

(3) A constructed wetland cell must have at least 2.0 feet of freeboard above the normal operating level, or the freeboard required to manage the selected wetland plant population, whichever is greater.

(l) Prohibition of Synthetic Liners for Constructed Wetlands. The use of a synthetic membrane liner for a free water surface constructed wetland is prohibited.

§217.204. Imhoff Tanks.

(a) Settling Compartment.

(1) The minimum length-to-width ratio of a settling compartment is 2.0 to 1.0.

(2) A tank inlet must provide uniform flow distribution across the width of a settling compartment.

(3) The septum walls must slope to the center of a compartment at an angle of at least 50 degrees but not more than 60 degrees from horizontal. The septum walls must create an overlap with a continuous slot that is at least 8.0 inches wide between the walls to allow solids to be dispersed into the digestion compartment. To prevent gases from escaping through the slot, one of the septum walls must continue past the slot to create a slot overhang of at least 8.0 inches.

(4) The depth between the water level at design flow and the plane of a slot must not be more than 9.0 feet.

(5) At least 18 inches of freeboard must be provided above the normal water level.

(b) Surface Loading.

(1) The settling compartment surface loading rate must not exceed 800 gallons per day per square foot of settling compartment area under design flow conditions.

(2) The longitudinal velocity of wastewater through a settling compartment must not exceed 1.0 foot per second under peak flow conditions.

(c) Scum Baffles. An inlet and an outlet of an Imhoff tank must include scum baffles with a height that meets the water levels at all flows from minimum flow to peak flow.

(d) Gas Vents.

(1) An Imhoff tank must include gas vents with a total area not less than 20% of the total Imhoff tank surface area. The total Imhoff tank surface area must be included in the engineering report.

(2) At least one vent opening must be large enough to allow equipment into the digestion compartment for maintenance.

(e) Digestion Compartment Loading. The digestion compartment minimum volume must be 3.5 cubic feet per capita or 20.5 cubic feet per pound of influent five-day biochemical oxygen demand (BOD_5) per day, whichever is greater.

(f) Imhoff Tank Dimensions. The total depth of an Imhoff tank must not be less than 16.5 feet from the water surface to the bottom of a digestion compartment at design flow.

(g) Sludge Removal.

(1) The digestion compartment of an Imhoff tank must have a sludge withdrawal pipe.

(2) A sludge withdrawal pipe must have a minimum diameter of 8.0 inches and include a provision for regular cleaning.

(3) A digestion compartment design must allow a portable pump to remove accumulated sludge.

(h) Odor Management.

(1) The design of an Imhoff tank must minimize the effect of odor from the gas vents.

(2) The executive director may require a bio-filter, a carbon filter, or other odor control device to minimize odor.

(i) Treatment Efficiency.

(1) An Imhoff tank must be followed by at least one subsequent treatment unit.

(2) A design may assume that an Imhoff tank removes 35% of the influent BOD_5.

(j) Material and Construction.

(1) An Imhoff tank must be constructed of reinforced and sealed concrete.

(2) Each component of an Imhoff tank must be resistant to the corrosive effects of a wastewater environment.

§217.205. Facultative Lagoons.

(a) Configuration, Inlets, and Outlets.

(1) The length-to-width ratio of a facultative lagoon must be 3.0 to 1.0.

(2) The flow in a facultative lagoon must be from an inlet along one end of the lagoon to an outlet at the opposite end of the lagoon.

(3) The length of a facultative lagoon must be oriented in the direction of the prevailing winds with the inlet side located such that debris will be blown toward the inlet.

(4) A facultative lagoon must have inlet baffles to collect floatable material when no pre-screening is provided.

(5) An outlet must be adjustable to allow the water level of a facultative lagoon to vary under normal operating conditions.

(b) Depth.

(1) The deeper portion of a facultative lagoon near the inlets must have a minimum depth of 12 feet to provide sludge storage and anaerobic treatment.

(2) The deeper portion of a facultative lagoon must cover at least 25% of the area of the lagoon bottom.

(3) The remainder of a facultative lagoon must have a minimum depth of 8.0 feet.

(c) Organic loading. The organic loading must not exceed 150 pounds of five-day biochemical oxygen demand (BOD_5) per acre per day based on the surface area of the facultative lagoon.

(d) Odor Control.

(1) A facultative lagoon inlet must be at least 24 inches below the water surface to minimize odor.

(2) An outlet must be at least 12 inches below the water surface, but not further below the water surface than a distance equal to one-half the depth of the lagoon at the outlet.

(3) The design of a facultative lagoon must allow for recirculation of at least 50%, but not more than 100% of the design flow.

(4) The design of a facultative lagoon must prevent siphoning of lagoon contents through a submerged inlet.

(e) Removal efficiency. The design of a facultative lagoon must not be based on more than 50% removal of the influent BOD_5.

§217.206. Aerated Lagoons.

(a) The requirements of this section apply to both completely mixed aerated lagoons and partially mixed aerated lagoons, unless otherwise specified.

(b) A minimum of 1.6 pounds of oxygen per pound of influent five-day biochemical oxygen demand (BOD_5) must be maintained in an aerated lagoon system, even with the largest single aeration unit in a lagoon system out of service.

(c) The aeration equipment must have an audio-visual alarm system. If a wastewater treatment facility is not staffed 24 hours per day, the alarm system must be connected to a telemetry system, such as an auto dialer or Supervisory Control and Data Acquisition system, with battery backup.

(d) The BOD_5 removal in each aerated lagoon must be calculated using the following equation:

Figure: 30 TAC §217.206(d)

Equation H.1.

$$E = 1 - \frac{1}{1+K\left(\frac{V}{Q}\right)}$$

Where:
E = fraction of five-day biochemical oxygen demand removed in aerated lagoon
K = first order removal rate constant, day^{-1}
V = aeration basin volume, million gallons
Q = design influent wastewater flow rate, million gallons per day.

(1) The value of K for domestic wastewater in a completely mixed lagoon is 0.50 day^{-1} at 20 degrees Celsius. The value of K for domestic wastewater in a partially mixed lagoon is 0.28 day^{-1} at 20 degrees Celsius.

(2) The value of K must be adjusted for the minimum monthly water temperature using the following equation:

Figure: 30 TAC §217.206(d)(2)

Equation H.2.

$$\boldsymbol{K_T = K_{20} \times 1.06^{T-20^{\circ}C}}$$

Where:
K_T = the lowest average water temperature during any 30-day period.
K_{20} = K value at 20° C
T = lowest average water temperature (°C) expected during any 30-day period

(3) The value of K must be determined for high-strength or industrial wastewater by either a laboratory study or an evaluation of an existing wastewater

treatment facility treating wastewater with similar organic strength and industrial contributions.

(e) Aeration Equipment.

(1) The size of the aeration equipment in an aerated lagoon must be able to supply the oxygen demand determined in subsection (b) of this section.

(2) For the purpose of sizing aeration equipment, an aerated lagoon must comply with the mechanical and diffused air requirements in §217.155(c) of this title (relating to Aeration Equipment Sizing).

(3) If multiple partially mixed aerated lagoons are used in series, the power input may be reduced as the influent BOD_5 to each lagoon decreases.

(f) Aerated Lagoon Design Requirements. An aerated lagoon system must be designed according to the requirements for a wastewater treatment lagoon in §217.203(f) of this title (relating to Design Criteria for Natural Treatment Facilities) and §217.207(d) of this title (relating to Stabilization Lagoons).

(g) Scour Prevention. An earthen-lined aerated lagoon system must include a concrete scour pad in each area of the earthen liner that is subject to a velocity equal to or greater than 1.0 foot per second.

§217.207. Stabilization Lagoons.

(a) Primary treatment must remove the settleable and floatable solids in the influent prior to the wastewater entering a stabilization lagoon.

(b) Odor Management.

(1) A stabilization lagoon must be located so that odors from the stabilization lagoon will not cause a nuisance.

(2) If uncontaminated water is available, a stabilization lagoon must be pre-filled with uncontaminated water to the 2.0 foot level at start-up.

(3) A stabilization lagoon system must include a piping arrangement that allows the recirculation of effluent from a final lagoon to the influent side of an initial stabilization lagoon.

(4) A stabilization lagoon may return recirculation water by surface spray to assist in maintaining aerobic conditions at the lagoon surface and to reduce potential odor.

(c) Minimum Number of Wastewater Stabilization Lagoons. At least two stabilization lagoons are required to comply with secondary treatment limits. The stabilization lagoons must be operated in series, following the primary treatment unit.

(d) Stabilization Lagoon Design.

(1) The minimum length-to-width ratio of a stabilization lagoon is 3.0 to 1.0.

(2) Inlet and outlet structures must be adjustable to assist in controlling vegetative growth. Inlet and outlet structures must allow the water level to be raised and lowered by at least 6.0 inches.

(e) Pipe and Hydraulic Equipment.

(1) All structures and pipes in a stabilization lagoon must be sized to transport at least 250% of the wastewater treatment facility's design flow.

(2) The inlet and outlet structures must be sized to convey the volume contained within the top 6.0 inches of a lagoon within a 24-hour period, based on the normal water level at design flow and the corresponding pressure head.

(3) The pipe and recirculation system must allow a stabilization lagoon system to comply with the wastewater treatment facility's permitted effluent limitations, even with any one lagoon out of service.

(f) Maximum Surface Organic Loading Rate for Stabilization Lagoons.

(1) The maximum surface organic loading rate on a stabilization lagoon series is 35 pounds (lbs) of five-day biochemical oxygen demand (BOD_5) per acre per day.

(2) The maximum surface organic loading rate on the first lagoon in a stabilization lagoon series is 75 lbs of BOD_5 per acre per day.

(3) The surface organic loading rate applied to a stabilization lagoon series is equal to the total influent organic loading minus any reduction in organic load provided by the primary treatment units.

(g) Inlet and Outlet Structures.

(1) A stabilization lagoon outlet must include removable baffles to prevent floating material from being discharged, and must be constructed to operate correctly as the level of the lagoon surface varies under normal operating conditions.

(2) An outlet must be at least 18 inches but not more than 24 inches below the water surface in a stabilization lagoon to control the discharge of duckweed and floating algae.

(3) A multipurpose control structure may be used to facilitate normal operational functions such as drawdown, flow distribution, adjusting water depth, flow measurement, sampling, access for pump for recirculation, chemical addition, and exclusion of floating materials. A multipurpose control structure may also be used to minimize the number of special purpose structures in a stabilization lagoon.

(4) A pipe embankment penetration must have a seep water-stop collar.

(5) A stabilization lagoon must have a drainpipe that allows the stabilization lagoon to be emptied for maintenance and may use a pump as part of a

drainage system. If a permanent drain pipe will not be installed, a temporary pipe suction station must be provided.

§217.208. Evaporative Lagoons.

(a) Design.

(1) If evaporative lagoons are used, the wastewater treatment facility must have at least two evaporative lagoons.

(2) The primary evaporative lagoon must provide at least 60% of the total surface area of the total evaporative lagoon system.

(3) The number and size of evaporative lagoons must provide adequate evaporation for the design flow during periods of low evaporation. For the purposes of this chapter, the low evaporation rate used in design must be the lowest annual evaporation rate in the past 25 years from the Texas Water Development Board's precipitation and lake evaporation dataset for the quadrangle where the evaporation lagoon is located.

(b) Odor Management. An evaporative lagoon must be located so that odors from the evaporative lagoon will not cause a nuisance.

(c) Configuration, Depth, and Loading.

(1) An evaporative lagoon may be constructed in a round, square, or rectangular shape. The corners of a square or rectangular shaped evaporative lagoon must be rounded in order to minimize accumulation of floating materials.

(2) The depth of an evaporative lagoon is dependent on its location within the lagoon system, as set forth in subparagraphs (A) and (B) of this paragraph.

(A) The maximum operating depth for a primary evaporative lagoon is 5.0 feet, but the area around an inlet must be designed with additional depth for solids deposition according to the criteria in §217.205 of this title (relating to Facultative Lagoons).

(B) The maximum operating depth for a secondary evaporative lagoon is 8.0 feet.

(3) Evaporation and Organic Loading.

(A) The size of an evaporative lagoon system must be based on the evaporation rate for the site and a maximum allowable organic loading rate.

(B) The evaporation loss must be calculated by using the Penman-Monteith method or a comparable, established method.

(C) An evaporative lagoon system must be sized to account for the influent flows and precipitation from a 25-year frequency, one-year rainfall event in accordance with §309.20(b)(3)(B) of this title (relating to Land Disposal of Sewage Effluent), unless the engineering report includes an alternate method of disposing of the wastewater, along with supporting documentation.

(D) The five-day biochemical oxygen demand (BOD_5) loading on a primary evaporative lagoon must not exceed 150 pounds of BOD_5 per acre of surface area per day.

(d) Embankment. The embankments for an evaporative lagoon must be constructed in accordance with §217.203(f) of this title (relating to Design Criteria for Natural Treatment Facilities).

(e) Inlet and Outlet Structures.

(1) An influent line for an evaporative lagoon must terminate into a manhole located along the embankment edge.

(2) An inlet manhole invert must be a minimum of 6.0 inches above the maximum high water level of a primary evaporative lagoon or provide other means to prevent backflow into an upstream treatment unit.

(3) A submerged discharge pipe must extend from a manhole along and anchored to the bottom of an evaporative lagoon.

(4) An inlet discharge pipe must discharge onto a concrete apron in a depression near the center of the primary evaporative lagoon to prevent scour. A concrete apron must be at least 2.0 square feet in surface area, be at least 8.0 inches thick, and be resistant to the corrosive effects of a wastewater environment.

(5) Inlet and outlet structures for an evaporative lagoon must be designed and constructed in a manner that allows the water surface elevation to be varied during normal operating conditions.

§217.209. Constructed Wetlands.

(a) Types of Constructed Wetlands. A constructed wetland may be either a free water surface system or subsurface flow system.

(b) Natural Wetlands. The use of natural wetlands for wastewater treatment is prohibited. For the purposes of this chapter, a natural wetland is an area which was not constructed for wastewater treatment that meets the definition of wetlands in 40 Code of Federal Regulations, Part 230.

(c) Constructed Wetland Design.

(1) A constructed wetland must be preceded by primary treatment or secondary treatment.

(2) A primary treatment system that precedes a constructed wetland must be designed to control odor and algae.

(3) A primary treatment system must produce an effluent quality with no more than 150 milligrams per liter of five-day biochemical oxygen demand to discourage

anaerobic conditions and stress on vegetative communities in any subsequent wetland treatment unit.

(4) A wastewater treatment facility that uses a constructed wetland as the means of complying with a permit effluent limit must be sized and designed to ensure that the permit limitations will be met even when any one wetland cell is out of service. The engineering report must include water balance calculations and the potential effect of evaporation on the predicted effluent concentrations.

(d) Vegetation. A constructed wetland must have a diverse vegetative community of emergent and floating plants to minimize any adverse impact from potential disease, insect pests, or species-specific toxicity. A constructed wetland must include a diversity of plants selected from the following categories of emergent plants, floating plants, or both.

(1) Emergent plants for use in constructed wetlands include:

(A) *Schoenoplectus spp*. (bulrush);

(B) *Sagittaria spp*. (arrowhead);

(C) *Phragmites spp.* (reeds);

(D) *Juncus spp.* (rushes);

(E) *Eleocharis spp.* (spikerush);

(F) *Carex spp.* (sedges);

(G) *Caladium spp.* (elephant ear);

(H) various aquatic grass species (e.g., wild rice); and

(I) other appropriate emergent plant species approved in writing by the executive director.

(2) Floating plants for use in constructed wetlands include:

(A) *Lemna spp.* (duckweed);

(B) *Hydrocotyle umbellata* (water pennywort);

(C) *Limnobium spongia* (frogbit);

(D) *Nymphaea spp.* (water lily);

(E) *Wolffia spp.* (water meal); or

(F) other appropriate floating plant species approved in writing by the executive director.

(3) The vegetation used in a constructed wetland must be suitable for the local growing conditions. The use of indigenous plants is recommended if the species have been demonstrated effective in a constructed wetland wastewater environment. The engineering report must identify the plants that will be used in each constructed wetland.

(4) Plans for harvesting aquatic plants from water in the state must be reviewed with the United States Army Corps of Engineers to determine if regulatory coordination is required.

(5) Gathering seed plants from natural wetlands must minimize any impact on the harvested plant community and the natural wetlands.

(6) The use of any harmful or potentially harmful wetland plant or organism is subject to review by the Texas Parks and Wildlife Department, as required by 31 TAC §§57.111 - 57.118 and §§57.251 - 57.258 (relating to Definitions; General Rules; Exceptions; Health Certification of Harmful or Potentially Harmful Exotic Shellfish; Transportation of Harmful or Potentially Harmful Exotic Species; Exotic Species Transport Invoice; Exotic Species Permit: Application Requirements; Exotic Species Permit Issuance; Definitions; General Provisions; Permit Application; Denial; Renewal; Amendment; Reporting and Recordkeeping; and Prohibited Acts, respectively).

(e) Maintenance of a constructed wetland must not result in a deterioration of effluent quality.

(1) The use of herbicides, insecticides, and fertilizers in a constructed wetland is prohibited.

(2) Floating Material Removal.

(A) A constructed wetland must be designed to allow the removal of an algal mat or other floating material prior to the effluent entering each cell of the constructed wetland.

(B) A removal mechanism must be a screen, a submerged adjustable inlet, a baffle, or another method approved in writing by the executive director. The removal mechanism must be justified in the engineering report.

(C) The removed floating material must be stored and disposed of in a manner that minimizes odor and complies with the requirements of Chapter 330 of this title (relating to Municipal Solid Waste).

(3) The operation and maintenance manual for a wastewater treatment facility that has a constructed wetland must include a detailed description and schedule for maintaining the constructed wetlands. The maintenance plan must include a schedule and procedure for removing overabundant live plant material and dead plant material.

(f) A constructed wetland system must have an established plant community and must be functioning properly before wastewater effluent is processed. The engineering

report must include a management and oversight program that specifies construction scheduling, plant species selection, planting practices, and start-up procedures.

(g) Liners.

(1) The liner for a constructed wetland system must comply with the requirements of §217.203(d) and (e) of this title (relating to Design Criteria for Natural Treatment Facilities).

(2) A layer of productive topsoil at least 6.0 inches thick must be placed above a liner to encourage root propagation.

(h) Berms. A berm of a constructed wetland must comply with the requirements of §217.203(f) of this title.

(i) Flood Hazard Analysis. A constructed wetland must be protected from flooding according to the requirements of §217.35 of this title (relating to One Hundred-Year Flood Plain Requirements).

(j) Nitrification. A constructed wetland that provides nitrification is an innovative and non-conforming technology and is subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specification Approvals).

(k) Allowed Uses. A constructed wetland may be used as a secondary treatment unit, as an advanced secondary treatment unit, or for polishing wastewater effluent. A constructed wetland may not be used for primary treatment.

§217.210. Constructed Wetlands--Free Water Surface Design.

(a) Areas of emergent vegetation in a free water surface (FWS) wetland must have a maximum water depth less than or equal to 24 inches at design flow.

(b) Plants.

(1) Emergent plant spacing must be no more than 66 inches on center.

(2) If floating plants are used in a FWS wetland, the wetland must also contain emergent plants.

(c) Multiple Cells. An FWS wetland must include multiple cells that can be operated independently, allowing an individual cell to be removed from service while maintaining system operations.

(d) System Size. An FWS wetland system must be sized to meet permit effluent limits, even when any single cell is removed from service.

(e) Bottom slope.

(1) An FWS wetland cell must have adequate bottom slope, or other means such as strategically placed deep-water zones, to facilitate drainage for maintenance.

(2) Plants selected for an FWS wetland cell shall be compatible with the water depths under all anticipated operational flow conditions.

(f) Parallel trains. An FWS wetland must have parallel treatment trains to increase operational flexibility.

(g) Wind protection. An FWS wetland cell must either be oriented to avoid prevailing winds perpendicular to the process flow direction, or must use elevated berms or vegetative windbreaks.

(h) Inlets and Outlets.

(1) The inlets and outlets of an FWS wetland cell must ensure uniform distribution of influent flow and uniform collection of effluent flow across the entire cell cross section.

(2) An FWS wetland must have multiple inlet and outlet devices designed to minimize scouring of wetland substrate caused by locally high velocity effluent flow.

(3) Each inlet and outlet device in an FWS wetland must be adjustable to allow variations in the operational water level.

(4) Submergence. An FWS wetland inlet must be submerged under normal operational conditions.

(5) Inspection and Cleaning. An FWS wetland must be designed to allow for the inspection and cleaning of inlet and outlet devices.

(i) Organic Loading and Treatment Efficiency.

(1) The design of an FWS wetland must be based on the design organic loading of the influent to the FWS wetland.

(2) Organic removal efficiency for FWS wetlands must be calculated from the area-based loading rate equation found in Figure: 30 TAC §217.210(i)(2), unless the engineering report justifies an alternate method to determine the organic removal efficiency by identifying a method, the sources of the method, and all supporting calculations.

Figure: 30 TAC §217.210(i)(2)

Equation H.3.

$$C_0 = C^* + (C_i - C^*) \exp^{-\frac{Ka}{0.0365Q}}$$

Where:
C_i = influent five-day biochemical oxygen demand (BOD_5) concentration, milligrams per liter (mg/l)
C_o = target effluent BOD_5 concentration, mg/l
C* = wetland background limit, mg/l
(for total suspended solids (TSS), $C^* = 5.1 = 0.16C_i$)
(for BOD_5, $C^* = 3.5 + 0.053\ C_i$)
K = first-order areal rate constant:
(34 meters/year (m/yr) @ 20° C for BOD_5)
(1,000 m/yr @ 20° C for TSS)
a = is required wetland area, hectare (active treatment area, not including dike, buffers, etc.)
Q = design flow in cubic meters per day

(j) Vector Control.

(1) The design of an FWS wetland must include mosquito control by:

(A) using mosquito fish (*Gambusia spp.*) or other natural predators;

(B) maintaining aerobic conditions; or

(C) using other biological controls.

(2) A design must minimize the potential for damage to wetlands caused by mammals such as nutria and muskrats.

§217.211. Constructed Wetlands--Subsurface Flow System General Design.

(a) A wetted subsurface media must allow adequate root penetration. The type of subsurface media must be identified in the engineering report.

(b) The operational water depth of a subsurface flow system (SFS) wetland must not exceed the lesser of:

(1) 18 inches at design flow; or

(2) the maximum normal root depth of the emergent plant species used in the SFS wetland.

(c) Seasonal draw down of the water level must be performed to encourage deeper root penetration into the wetted media.

(d) Plant spacing must be sufficient to allow maturity of a wetlands flora ecosystem, but must not exceed 36 inches on center.

(e) Configuration. An SFS wetland must include the following minimum configuration standards:

(1) Multiple cells. An SFS wetland must include multiple cells that can be operated independently, allowing individual cells to be removed from service while maintaining system operations.

(2) Cell Size. SFS wetland cells must meet permit effluent limitations, even when any single cell is removed from service.

(3) Hydraulic profile.

(A) An SFS wetland must maintain between 6.0 inches and 9.0 inches of dry media cover at design flow. The wetland must have at least 2.0 inches of upstream media cover during peak flow conditions, and not more than 12.0 inches of upstream media cover during diurnal low flow conditions.

(B) An SFS wetland hydraulic profile must be based on Figure 1: 30 TAC §217.211(e)(3)(B), unless an alternate design method is justified in the engineering report. The engineering report must include the method, the source of the method, and all supporting calculations and documentation.

Figure 1: 30 TAC §217.211(e)(3)(B)

Equation H.4. Darcy's Law.

$$Q = K_s \times A \times S$$

Where:
Q = Design flow (gallons/day)
K_S = Media hydraulic conductivity (gallons/square foot/day)
(see Figure 2: 30 TAC §217.211(e)(3)(B), Table H.1.)
S = Hydraulic gradient (foot/foot)
A = Cross sectional area perpendicular to the flow (square feet)

Figure 2: 30 TAC §217.211(e)(3)(B)

Table H.1. - Typical Media Characteristics

Media	**Effective Size** *(inches)*	**Porosity** *(%)*	**Hydraulic Conductivity** *(gallons/square foot/day)*
Fine Gravel	5/8	38	185,000
Medium Gravel	1.25	40	250,000
Coarse Rock	5.0	45	2,500,000

(4) Maximum depth. The maximum wetted media depth of an SFS wetland is the lesser of:

(A) 24 inches at design flow; or

(B) the maximum normal root depth for a planned primary population of emergent plant species.

(5) Minimum slope. An SFS wetland cell must have an adequate bottom slope to facilitate drainage for maintenance and to maintain media water depth over the entire cell length under all operational flow conditions.

(6) Parallel trains. An SFS wetland must have parallel treatment trains to increase operational flexibility.

(f) Flow Distribution. An SFS wetland must be designed with effective flow distribution and collection by meeting the following standards for inlets and outlets, submergence, maintenance, and staged influent feed.

(1) Inlets and Outlets.

(A) The inlet and outlet system of an SFS wetland cell must ensure uniform distribution of influent flow and uniform collection of effluent flow across an entire cell.

(B) The inlet and outlet devices of an SFS wetland cell must not cause locally high velocities that could result in movement of wetland media.

(C) Each inlet and outlet system must be adjustable to allow variation in operational water level and flooding of a cell for weed control.

(2) Submergence. Each inlet and outlet of an SFS wetland must be below the media surface.

(3) Maintenance. Inlet and outlet devices must allow inspection, cleaning, and maintenance.

(4) Staged influent feed. If an average influent five-day biochemical oxygen demand concentration greater than 200 milligrams per liter is anticipated, an SFS wetland must allow for staged influent feed to improve process control.

(g) Organic Loading and Treatment Efficiency.

(1) A constructed wetland process must be based on the design organic loading of the influent to the constructed wetland.

(2) The design of an SFS wetland must be based on the organic removal treatment efficiency for an SFS wetland on Equation H.5. in Figure: 30 TAC §217.211(g)(2), unless an alternate method to determine the organic removal treatment efficiency is justified in the engineering report. The engineering report must include the method, the source of the method, and all supporting calculations.

Figure: 30 TAC §217.211(g)(2)

Equation H.5.

$$C_0 = C^* + (C_i - C^*) \exp^{-\frac{Ka}{0.0365Q}}$$

Where:

C_i = influent five-day biochemical oxygen demand (BOD_5) concentration, milligram per liter (mg/l)
C_o = target effluent BOD_5 concentration, mg/l
C* = wetland background limit, mg/l
(for total suspended solids (TSS) $C^* = 7.8 + 0.063C_i$)
(for BOD_5, $C^* = 3.5 + 0.053C_i$)
K = first-order areal rate constant:
(180 meters per year (m/yr) @ 20° C for BOD_5)
(3,000 m/yr @ 20° C for TSS)
a = is required wetland area, hectare (active treatment area, not including dike, buffers, etc.)
Q = design flow in cubic meters per day

(h) Temperature. An SFS wetland must be able to treat the wastewater treatment facility's wastewater at all water temperatures.

(i) Vector Control. Vegetation maintenance, including removal of excessive plant litter and detritus, is required to limit mosquito production.

(j) Media Design. SFS wetland media must meet the following minimum requirements.

(1) The media must be hard rock, slag, or other clean, comparable media material.

(2) The media must contain less than 0.1% by weight of clay, sand, and other fine materials.

(3) The media materials must have a Mohs hardness of at least 5.0.

(4) The media must be resistant to acidic conditions.

(5) Synthetic media is a non-conforming or innovative technology and is subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(6) Media gradation and uniformity must be used to determine the SFS wetland's hydraulic conductivity.

(7) The media must be placed in an SFS wetland by light-weight equipment to prevent introduction of clay or other undesirable materials, to avoid compaction, clogging of the media, and damage to the liner.

(8) If an SFS wetland has gravel media larger than 1.5 inches in diameter, it must include a top layer of smaller gravel to encourage healthy plant rooting. The layer of smaller gravel must be above the normally saturated media zone. Also, an SFS wetland must include a transitional (medium grade) layer between small gravel and coarse gravel to minimize small gravel migration into lower void spaces.

§217.212. Overland Flow Process.

(a) An overland flow process is a non-conforming technology and is subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(b) The distribution system for an overland flow process must ensure uniform sheet flow of the wastewater onto and across the overland flow terraces.

§217.213. Integrated Facultative Lagoons.

(a) Non-conforming technology. An integrated facultative lagoon is a non-conforming technology and is subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(b) Integrated Facultative Lagoon Design.

(1) The length-to-width ratio of an integrated facultative lagoon must be 3.0 to 1.0.

(2) A pit must not be less than 0.25 acre in total surface area.

(3) The outer lagoon area must not be less than 10 times the surface area of the pit.

(4) A pit must have adequate volume to contain:

(A) 0.1 cubic foot per capita per year of sludge storage for a minimum of 20 years; and

(B) two days of design flow above the sludge storage area.

(5) The up-flow velocity in the pit must be less than 2.0 feet per day at design flow.

(6) If an integrated facultative lagoon has more than one pit, influent flow must be split proportional to the pit volumes.

(7) An inlet must be located in the pit portion of a lagoon.

(8) An outlet must be at a depth of 1.0 foot from the lagoon surface.

(9) An integrated facultative lagoon must meet the buffer zone requirements specified in §309.13 of this title (relating to Unsuitable Site Characteristics).

(10) Depth.

(A) A pit must be at least 15 feet deep during normal operating conditions, measured from the water surface to the influent inlet point.

(B) An integrated facultative lagoon must have berms around the pit.

(C) The berm height must be at least 5.0 feet or one-half the depth of the outer lagoon, whichever is greater.

(D) The distance from the water surface elevation during normal operating conditions to the top of the berm around a pit must be at least 5.0 feet.

(11) Organic Loading. The organic loading into a pit must not exceed 300 pounds of five-day biochemical oxygen demand per acre of total lagoon area per day.

(12) Odor Control.

(A) An inlet to a pit must be 3.0 feet above the bottom of the lagoon and the influent flow must be directed downward.

(B) An integrated facultative lagoon must be capable of recirculating at least 50% of the design flow from an outlet of the downstream lagoon.

(C) Oxygenated water from a downstream stabilization lagoon must be recirculated to the surface of the integrated facultative lagoon.

(D) An integrated facultative lagoon must prevent siphoning of lagoon contents through a submerged inlet.

(13) Removal Efficiency.

(A) The design of an integrated facultative lagoon must not be based on more than 60% organic removal efficiency in the pit.

(B) The design of an integrated facultative lagoon must not be based on a subsequent organic removal efficiency of more than 50% in the outer portion of the integrated facultative lagoon.

(C) The design organic removal efficiency for the entire integrated facultative lagoon must not exceed 80%.

(14) Detention Time. An integrated facultative lagoon must provide a minimum of 21 days hydraulic retention time at design flow.

SUBCHAPTER J: SLUDGE PROCESSING

§§217.241 - 217.252

Statutory Authority

The amendments are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.241. General Requirements.

(a) For purposes of this subchapter, sludge processing includes thickening, stabilization, and dewatering.

(b) A design must base the selection and operation of the sludge processing units on the desired final sludge product.

(c) A wastewater treatment facility that disposes of sludge under Chapter 312 of this title (relating to Sludge Use, Disposal, and Transportation) must stabilize the sludge according to the requirements of that chapter.

(d) A wastewater treatment facility that disposes of sludge under Chapter 330 of this title (relating to Municipal Solid Waste) must comply with the requirements of that chapter.

§217.242. Control of Sludge and Supernatant Volumes.

(a) Supernatant, filtrate, or centrate resulting from sludge processing must be returned to the headworks of the wastewater treatment facility, the influent lift station, or to a point preceding an aeration system or secondary treatment unit.

(b) A sludge processing unit must limit digester supernatant liquor volume to the greatest extent practicable.

(c) Returned supernatant, filtrate, or centrate from a sludge processing unit must not interfere with wastewater treatment processes in another treatment unit.

§217.243. Sludge Pipes.

(a) Each pipe associated with a sludge processing unit must have a slope that ensures the flow of sludge.

(b) A pipe under a stationary structure must allow a blockage to be easily eliminated by rodding or a sewer-cleaning device.

(c) A gravity pipe must have uniform grade and alignment.

(d) The slope of a gravity discharge pipe must not be less than 3.0%.

(e) The minimum diameter for a pipe associated with sludge processing is shown in Figure: 30 TAC §217.243(e):

Figure: 30 TAC §217.243(e)

Table J.1. Sludge Processing Minimum Pipe Diameter

Pipe	Diameter
Sludge drainpipe	4.0 inches
Pipe in a sludge digester	4.0 inches
Suction pump pipe	4.0 inches
Discharge pipe	4.0 inches
Gravity withdrawal pipes associated with an anaerobic digester or gravity thickener	6.0 inches

(f) The available head on a discharge using a gravity withdrawal pipe must be at least 4.0 feet.

(g) A gravity withdrawal pipe from a clarifier must allow for the removal of sludge.

(h) Each sludge pipe must include a means to observe the quality of the supernatant from each of the withdrawal outlets.

(i) Each individual sludge processing unit must have a dedicated means of dewatering.

(j) Pipes located inside a digestion tank must be designed for use in corrosive environments and must be sufficiently supported to prevent damage to the pipe or adjacent equipment.

(k) A sludge pipe must not contain any bends that form an acute angle with the pipe.

§217.244. Sludge Pumps.

(a) A sludge transfer pump size must be based on the quantity and character of the solids load.

(b) A mechanical pumping system must provide the required firm pumping capacity with the largest sludge pumping unit out of service.

(c) A centrifugal sludge pump must have a positive suction head, unless the pump includes a priming device.

(d) A positive displacement pump or other type of pump must have demonstrated solids handling capability for handling sludge.

(e) A positive suction head of 24 inches or more is required for all sludge pumps.

(f) An air lift pump may be used as a sludge pump, and must comply with requirements of §217.162 of this title (relating to Air Lift Pump Design).

§217.245. Exclusion of Grit, Grease, and Debris from Sludge Processing Units.

(a) A wastewater treatment facility must minimize the amount of grit, debris, oil, and grease entering a sludge processing unit.

(b) A sludge processing unit must be designed for the final use or final disposal of the various solids generated during the treatment of domestic sewage.

(c) If sludge will be land applied, a sludge processing unit must remove and separately dispose of debris, grit, and grease before land application of the sludge.

§217.246. Ventilation and Odor Control.

(a) A design must include sufficient ventilation to eliminate an accumulation of fumes or gases at a level that could adversely impact human health, safety, welfare, or the environment.

(b) An enclosed area that is accessible to individuals must have automatic mechanical ventilation. Automatic mechanical ventilation consists of:

(1) a continuous ventilation system that provides at least one complete air exchange every 10 minutes; or

(2) an intermittent ventilation system that provides at least one complete air exchange every two minutes.

(c) A sludge processing unit must prevent nuisance odors.

§217.247. Chemical Pretreatment of Sludge.

(a) All chemicals used to treat sludge must be compatible with the operation of the sludge processing unit and must not adversely affect any other treatment unit or the receiving waters.

(b) The engineering report must justify appropriate chemicals and feed ranges. A pilot plant study or data from a treatment unit must be used. The organic, metal, and hydraulic loadings at the pilot plant must be within 25% of the design organic, metal, and hydraulic loadings.

(c) Each chemical must be handled, stored, and disposed of according to its safety data sheet.

(d) A liquid chemical storage tank must have:

(1) a liquid level indicator; and

(2) an emergency overflow receiving basin or drain capable of retaining any spill.

(e) Powdered activated carbon must be stored in an isolated fireproof area.

(f) A storage or handling area where potentially volatile chemicals are present must have electrical outlets, lights, and motors that meet the National Fire Protection Association 70 National Electrical Code® in effect at the time the storage or handling area was constructed, including explosion prevention requirements.

(g) Systems for transport, transfer, storage, and use of any volatile chemical must prevent volatile chemicals from discharging to the atmosphere.

(h) A wastewater treatment facility must have at least a 30-day supply of each chemical in dry storage conditions, unless the engineering report justifies a reduced amount.

(i) A solution storage tank or direct-feed day tank must have sufficient capacity for operation at the design flow of the wastewater treatment facility.

(j) The procedures for measuring the quantity of each chemical used to prepare each feed solution must be included in the wastewater treatment facility's operation and maintenance manual.

(k) A chemical storage tank, pipe, or other equipment must be compatible with the chemical it is designed to handle.

(l) Chemicals must only be combined in a feed solution. Intermixing of chemicals prior to preparing a feed solution is prohibited.

(m) Concentrated liquid acid must not be stored in an open vessel, and must be pumped in undiluted form from the original container to a point of treatment, to an enclosed acid-resistant day tank, or to an enclosed acid resistant storage tank.

(n) Concentrated liquid acid must be kept in a closed, acid-resistant shipping container or storage unit.

(o) The transfer of a toxic material must be controlled by an actuating device.

(p) A wastewater treatment facility must have one or more of the following control methods to ensure that dust will be minimized during the transfer of a dry chemical:

(1) a closed conveyor system with vacuum pneumatic equipment;

(2) a facility for emptying shipping containers in a special enclosure; or

(3) an exhaust fan and dust filter that uses a hopper or bin under negative pressure to eliminate chemical particles in the air.

(q) Disposing of a chemical or an empty chemical container must be done in a manner that minimizes the potential for harmful exposure and in compliance with Chapter 335 of this title (relating to Industrial Solid Waste and Municipal Hazardous Waste).

(r) A chemical delivery system must meet the following requirements:

(1) Structures housing equipment.

(A) A floor surface must be smooth, slip resistant, impervious, and must have a minimum slope of 1/8 inch per foot.

(B) An open basin, tank, or conduit must be protected from a chemical spill or accidental drainage.

(C) An area that houses a chemical delivery system must provide access for servicing, repair, and observation of operations.

(2) Redundancy. A chemical delivery system must have at least two feeders and must be able to supply the amount of chemicals needed for process reliability throughout the feed range. Chemical delivery equipment must be able to maintain operation at design flow with the largest operational unit out of service.

(3) Design and Capacity.

(A) A chemical delivery system must be able to deliver a proportional amount of chemical feed based on the rate of flow.

(B) A chemical delivery system must not use positive displacement type solution feed pumps to feed chemical slurries, unless the engineering report justifies such use.

(C) If using potable water, the potable water supply must be protected by at least the equivalent of two backflow preventers, including at least one air gap between a supply pipe and a solution tank.

(D) A chemical delivery system component must be resistant to the chemical it is designed to apply.

(E) A dry chemical delivery system must:

(i) measure the chemical volumetrically or gravimetrically;

(ii) provide effective mixing and solution of the chemical in a solution pot;

(iii) provide gravity feed from a solution pot;

(iv) completely enclose chemicals; and

(v) prevent emission of dust to the operation room.

(4) Spill Containment. The chemical delivery equipment must have protective curbing to contain a chemical spill.

(5) Control Systems.

(A) All chemical delivery systems must have an automatic control system that is capable of manual control.

(B) A chemical delivery system must have manual starting equipment.

(C) A chemical delivery system may be designed with an automatic chemical dose or residual analyzer.

(D) If an automatic chemical dosing or residual analyzer is used, the design must require both recording charts and an alarm for any critical value.

(6) Weighing Scales. A volumetric dry chemical feeder or a non-volumetrically calibrated carboy must have weighing scales that measure in increments of no greater than 0.5% of the load.

(7) Chemical Delivery System Protection. A chemical delivery system must have freeze protection and must be accessible for cleaning.

(8) Water Supply.

(A) A water supply for chemical mixing may be potable water or reclaimed water.

(B) A chemical delivery system must protect its water supply from contamination. If using potable water, the potable water supply must be protected by at least the equivalent of two backflow preventers, including at least one air gap between a supply pipe and a solution tank.

(C) A water supply must have sufficient pressure to ensure dependable operations.

(D) A water supply must include a means for measuring solution concentrations.

(E) A water supply design must include sufficient duplicate equipment to ensure process reliability.

(F) A water supply design may include a booster pump to maintain water pressure.

(9) Solution Tanks.

(A) A solution tank must be able to maintain uniform strength of solution consistent with the nature of the chemical solution and must provide continuous agitation.

(B) A chemical delivery system must have at least two solution tanks.

(C) The solution tank(s) must provide storage for at least one full day of operation at design flow.

(D) A solution tank must have a drain and a solution level indicator.

(E) An intake point for potable water must have an air gap.

(F) A chemical solution tank must be covered and have an access opening that is curbed and fitted with a tight cover.

(G) Each subsurface solution tank must:

(i) be impermeable;

(ii) be protected against buoyancy;

(iii) include a means to drain groundwater or other accumulated water away from the tank;

(iv) include leak detection; and

(v) allow for containment and remediation of any chemical spill.

(H) An emergency overflow pipe must:

(i) be turned downward;

(ii) have an unobstructed discharge;

(iii) be clearly visible;

(iv) drain to a containment area; and

(v) must not contaminate the wastewater or receiving stream.

(10) Chemical Application.

(A) A chemical application system must be efficient and operate safely.

(B) The chemical application system must prevent backflow or back-siphoning between multiple points of feed through common manifolds.

(C) The application of a pH-affecting chemical to the wastewater must be done before the addition of a coagulant.

§217.248. Sludge Thickening.

(a) If a sludge thickening system is used, the following criteria are required:

(1) Capacity. The maximum monthly sludge production rate must be used as the basis for sludge thickening system sizing and design.

(2) Flexibility.

(A) A sludge thickening system must have a bypass to the digester.

(B) A wastewater treatment facility with a design flow greater than 1.0 million gallons per day must have:

(i) at least two sludge thickening units;

(ii) an alternate means of sludge thickening; or

(iii) an alternate sludge disposal method.

(b) Specific Requirements for a Mechanical Gravity Thickener.

(1) Equipment Features.

(A) A mechanical gravity thickener must have:

(i) a low-speed stirring mechanism for continuous mixing and flocculation;

(ii) sufficient sludge storage, or sufficient additional storage in other external tanks; and

(iii) a means of controlling the rate of sludge withdrawal.

(B) A mechanical gravity thickener must use either a chemical addition or dilution water feed system.

(C) A scraper mechanical train must be capable of withstanding any expected torque load. The working torque load must not exceed 10% of the manufacturer's recommended torque load.

(2) Design Basis.

(A) The design of a mechanical thickener must be justified in the engineering report.

(B) The executive director may require data from a pilot study or similar mechanical gravity thickener operating under similar conditions.

(C) The mechanical gravity thickener surface loading rate must be at least 400 gallons per day per square foot, but not more than 800 gallons per day per square foot.

(D) The minimum side water depth for a mechanical gravity thickener is 10 feet.

(E) A circular mechanical gravity thickener must have a minimum bottom slope of 1.5 inches per foot.

(F) The peripheral velocity of a scraper must be at least 15 feet per minute but no more than 20 feet per minute.

(G) A mechanical gravity thickener must prevent short-circuiting.

(c) Specific Requirements for a Dissolved Air Flotation (DAF) Basin.

(1) Equipment Features.

(A) A DAF basin must have a bottom scraper that functions independently of the surface skimmer.

(B) A recycle pressurization system for a DAF basin must use effluent instead of potable water.

(C) A DAF basin must have a polymer feed system that meets the requirements of §217.247(r) of this title (relating to Chemical Pretreatment of Sludge).

(D) A DAF basin must be located in a covered building with positive air ventilation.

(2) Design Basis.

(A) The design of a DAF basin must be justified in the engineering report.

(B) The executive director may require data from a pilot study or similar DAF basin operating under similar conditions.

(C) The hydraulic loading rate must not exceed 2.0 gallons per minute per square foot.

(D) The solids loading rate must be at least 1.0 pound per hour per square foot, but not more than 4.0 pounds per hour per square foot.

(E) The air to solids weight ratio must be at least 0.02, but not more than 0.04.

(F) A retention tank system must have a minimum pressure of 40 pounds per square inch, gauge.

(G) A skimmer must have multiple or variable speeds that allow an operational range of at least 1.0 foot per minute, but not more than 25.0 feet per minute.

(d) Specific Requirements for a Centrifugal Thickener.

(1) The design of a centrifugal thickener must be justified in the engineering report.

(2) The executive director may require data from a pilot study or data from a similar centrifugal thickener operating under similar conditions.

(3) A centrifugal thickener must be preceded by pretreatment to prevent plugging of a nozzle or excessive wear in the bowl.

(4) The centrate is subject to the requirements of §217.242 of this title (relating to Control of Sludge and Supernatant Volumes).

(e) Specific Requirements for a Gravity Belt Thickener.

(1) Equipment Features.

(A) A gravity belt thickener must include a wash water system capable of providing 60 gallons per minute of flow per meter of belt width at a pressure of at least 60 pounds per square inch. Booster pumps may be used.

(B) A gravity belt thickener must include a polymer feed system that meets the requirements of §217.247(r) of this title.

(C) A filtrate drainage system must be sized to remove the full hydraulic capacity of a gravity belt thickener without accumulation or ponding of filtrate.

(2) Design Basis. Unless otherwise justified in the engineering report, gravity belt thickener sizing must be based upon:

(A) a maximum solids loading of 1,250 pounds per meter of belt width; or

(B) a maximum hydraulic loading of 250 gallons per minute per meter of belt width.

(3) Gravity belt thickener filtrate is subject to the requirements of §217.242 of this title.

§217.249. Sludge Stabilization.

(a) Design Requirements. The design requirements for the stabilization processes in this section are based on only one stabilization process being used at the wastewater treatment facility.

(b) Variance. An owner must request a variance in accordance with §217.4 of this title (relating to Variances) if a design includes a series of two or more stabilization

processes. Any deviations from the requirements of this section must be documented in the variance request.

(c) Anaerobic Digestion.

(1) A wastewater treatment facility with a design flow exceeding 0.4 million gallons per day must have at least two anaerobic digesters.

(2) Anaerobic digesters may be operated in series or in parallel. Each anaerobic digester may be used for treating sludge from both primary and secondary clarifiers.

(3) Each anaerobic digester must have a means for transferring a portion of its contents to another anaerobic digester.

(4) A wastewater treatment facility that has been granted a variance to operate without multiple anaerobic digesters must have an emergency storage basin for storing sludge during times when the anaerobic digester needs to be taken out of service.

(d) Depth. An anaerobic digester must provide a minimum of 6.0 feet of storage depth for supernatant liquor.

(e) Maintenance Provisions. A digester design must allow access to each unit for maintenance.

(f) Digester Configuration.

(1) The bottom of a digester must slope towards a drainpipe.

(2) A flat-bottomed digestion chamber is prohibited.

(g) Access Manholes.

(1) The top of a digester must have at least two access manholes and a gas dome.

(2) One manhole must have a sufficient diameter to permit the use of mechanical equipment to remove grit and sand.

(3) A digester system must have a separate sidewall manhole at ground level.

(h) Safety.

(1) The wastewater treatment facility operation and maintenance manual must require the use of non-sparking tools, rubber soled shoes, a safety harness, and gas detectors for flammable and toxic gases when working in a digester.

(2) At least one self-contained breathing apparatus must be maintained in operational condition and kept on site.

(i) Sludge Inlets and Outlets. To facilitate effective mixing of the digester contents a digester must have:

(1) multiple sludge inlets located to prevent short-circuiting and at least one inlet located in the center of the digester above the liquid level at design flow;

(2) at least three recirculation sections; and

(3) at least three outlets.

(j) Digester Capacity.

(1) The digester capacity must be calculated using the expected volume and character of the sludge. The engineering report must include the calculations used to justify the design.

(2) The total digester volume must be based upon:

(A) the volume of sludge added;

(B) the percent solids and character of the sludge;

(C) the temperature to be maintained in the digester;

(D) the degree or extent of mixing to be obtained; and

(E) the size of the installation with appropriate allowance for sludge and supernatant storage.

(3) A digester must be able to maintain a minimum sludge digestion temperature of 35 degrees Celsius, plus or minus 4 degrees.

(4) Sludge that will be disposed of in a landfill must undergo at least 15 days of digestion for stabilization in the primary digester. Sludge that will be land-applied must undergo at least 60 days of digestion for stabilization, or the period required to achieve the necessary level of pathogen control and vector attraction reduction as required by Chapter 312, Subchapter D of this title (relating to Pathogen and Vector Attraction Reduction), whichever is less.

(5) A Completely Mixed System.

(A) A digester must have an average feed loading rate of less than 200 pounds of volatile solids per 1,000 cubic feet of volume per day in the active digestion volume.

(B) Complete mixing in 30 minutes or less is required for:

(i) a confined mixing system, if gas or sludge flow is directed through a vertical channel;

(ii) a mechanical stirring or pumping system; and

(iii) an unconfined continuously discharging gas mixing system.

(C) A digester tank over 60 feet in diameter must have multiple mixing devices.

(D) The minimum gas flow supplied for complete mixing must be 15 cubic feet per minute per 1,000 cubic feet of digestion volume.

(E) A complete mixing system must have a flow-measuring device and a throttling valve.

(F) The minimum power supply for a mixing system is 0.5 horsepower per 1,000 cubic feet of digestion volume.

(6) Moderately Mixed Systems.

(A) A digestion system where mixing is accomplished only by circulating sludge through an external heat exchanger must be loaded at less than 40

pounds of volatile solids per 1,000 cubic feet of volume per day in the active digestion volume. A design must be based on the volatile solids loading in accordance with the degree of mixing.

(B) The engineering report must include a justification for the loading rates, if mixing is accomplished by another method.

(k) Gas Collection, Pipes, Storage, and Appurtenances.

(1) General Requirements. Each portion of a gas system must maintain positive gas pressure under all normal operating conditions, including sludge withdrawal.

(2) Safety Equipment.

(A) A gas system must include a pressure valve, vacuum relief valve, a flame trap, and an automatic safety shut-off valve.

(B) Installation of water seal equipment on a gas pipe is prohibited.

(3) Gas Pipes and Condensate.

(A) A gas pipe system must be designed for the volume of gas expected.

(B) A gas pipe must be pressure tested for leakage at 1.5 times the design pressure before a digester is placed into service.

(C) A gas pipe must slope at least 1/8 inch per foot to drain condensate.

(D) The main gas pipe from a digester must have a sediment trap and a drip trap.

(E) Float controlled condensate traps are prohibited.

(F) A condensation trap must be accessible for daily servicing and draining.

(G) A drip trap must be located at each low point in the pipes.

(H) A gas pipe to each gas outlet must have a flame check or a flame trap.

(I) A burner pilot must use natural or bottled gas.

(J) Each main gas pipe must have a flame trap with a fusible shut-off.

(K) A gas pipe to a waste gas burner must have a pressure valve and a vacuum relief valve.

(4) Electrical Fixtures and Equipment. The electrical equipment near sludge digester pipes containing gas must be designed to prevent potentially explosive conditions.

(l) Waste gas.

(1) A waste gas burner must be accessible for inspection and maintenance and must be located at least 50 feet away from any structure, if placed at ground level.

(2) A waste gas burner may be located on the roof of the control building.

(3) A waste gas burner must not be located on top of a digester.

(4) A discharge of less than 100 cubic feet per hour of digester gas through a return bend screened vent with a flame trap terminating at least 10 feet above a walking surface is allowed.

(m) Ventilation.

(1) An underground enclosure connected to an anaerobic digester tank, gas pipe, or sludge equipment must have forced ventilation in accordance §217.246 of this title (relating to Ventilation and Odor Control).

(2) An underground enclosure must have a tight-fitting, self-closing door to minimize the spread of gas.

(n) Gas Meter.

(1) An anaerobic digester system must have a gas meter to measure total gas production.

(2) A meter must have a bypass.

(o) Manometer.

(1) A gas manometer must have a tight shut-off vent and vent cock.

(2) A vent pipe must be extended from a manometer to the outside of the building.

(3) A vent pipe opening must have a screen and be designed to prevent the entrance of rainwater.

(4) A manometer design must specify all safety devices that are needed for a manometer pipe system and must list the safety items in the engineering report.

(p) Gas Piping. The gas piping for an anaerobic digester must be equipped with gauges that measure the following in inches:

(1) the pressure of the main pipe;

(2) the pressure to gas-utilization equipment; and

(3) the pressure to waste burners.

(q) Digestion Temperature Control.

(1) Passive Temperature Control.

(A) A digester must be constructed above the shallowest groundwater table, including any perched water tables.

(B) A digester must be insulated to minimize heat loss.

(2) Heating Facilities.

(A) The sludge must be heated by circulating the sludge through an external heater.

(B) A piping system must allow for the preheating of feed sludge before introduction to the digesters, unless effective mixing is provided within a digester.

(C) A pipe and valve layout must facilitate cleaning.

(D) The size of a heat exchanger sludge pipe must be based on the heat transfer requirements.

(3) Heating Capacity.

(A) A digester system must have the heating capacity to maintain the temperature required for sludge stabilization established in subsection (j)(3) of this section.

(B) A digester system must be able to use an alternate source of fuel and must have an alternate source of fuel available for emergency use.

(4) Mixing. A digester system must have equipment to mix the sludge.

(5) Location of a Sludge Heating Device. A sludge heating device with an open flame must be located above grade and in an area separate from gas production and any storage area.

(r) Supernatant Withdrawal.

(1) Pipe Size. The minimum diameter for a supernatant pipe is 6.0 inches.

(2) Withdrawal Arrangements.

(A) The supernatant pipes must be arranged to allow withdrawal from three or more levels in a tank.

(B) A supernatant selector must have at least two draw-off levels located in the digester's supernatant zone, in addition to an unvalved emergency supernatant draw-off pipe.

(C) A supernatant withdrawal system must have a positive, unvalved, vented emergency overflow. The engineer must specify where overflow is routed in the engineering report.

(D) A supernatant withdrawal level design must be based on a fixed cover digester design.

(E) Supernatant withdrawal must be by means of interchangeable extensions at the discharge end of a withdrawal pipe.

(F) A supernatant piping system must have high-pressure backwash equipment.

(3) Sampling.

(A) A supernatant pipe must have sampling points at each supernatant draw-off level.

(B) The minimum diameter for a sampling pipe is 1.5 inches.

(4) Supernatant Handling.

(A) The engineering report must include how the treatment units are designed to handle shock organic loads associated with digester supernatant.

(B) Supernatant liquor from an anaerobic digester must either be returned directly to the headworks of the wastewater treatment facility for treatment, or may be chemically treated before being returned to the headworks for treatment. Any other method of treating supernatant liquor must be approved in writing by the executive director.

(C) If treating the supernatant liquor with lime, each of the following requirements must be met:

(i) Lime must be applied to obtain a pH of at least 11.5 standard units.

(ii) A lime feeder must be capable of feeding 2,000 milligrams per liter of hydrated lime or its equivalent.

(iii) Lime must be mixed with the supernatant liquor by a rapid mixer or by agitation with air in a mixing chamber.

(iv) After adequate mixing, the solids must be allowed to settle.

(D) A supernatant liquor treatment system may be either a batch or a continuous process.

(i) A batch process may have both the mixing and the settling processes in the same tank.

(ii) A sedimentation tank for a batch process must have the capacity to hold at least 36 hours of supernatant liquor at design flow, but not less than 1.5 gallons per capita based on the design population of the service area.

(iii) A sedimentation tank for a continuous process must have a detention time of not less than 8.0 hours.

(E) The solids from the supernatant liquor treatment must be returned to a digester or conveyed to a sludge handling unit.

(F) The clarified supernatant liquor must be returned to the headworks of the wastewater treatment facility in accordance with §217.242 of this title (relating to Control of Sludge and Supernatant Volumes).

(s) Anaerobic Digester Covers.

(1) An uncovered anaerobic digester is prohibited.

(2) The sludge and supernatant withdrawal pipes for a single-stage or a first-stage digester with a fixed cover must be arranged to minimize the possibility of air being drawn into a gas chamber above the liquid in a digester.

(3) A digester cover must include a gas chamber.

(4) A digester cover must be gas tight. The specifications must include a test of each digester cover for gas leakage.

(5) A digester cover must be equipped with an air vent with a flame trap, a vacuum breaker, and a pressure relief valve.

(t) Aerobic Sludge Digestion. This subsection applies to the stabilization by aerobic digestion of waste sludge to Class B biosolids, as defined in Chapter 312 of this title (relating to Sludge Use, Disposal, and Transportation).

(1) Solids Management. The engineering report must include a solids management plan.

(2) Detention Time. The design temperature of an aerobic digester system must be based on the average of the lowest consecutive seven-day water temperature

from an aerobic digester at a wastewater treatment facility located within 50 miles of the proposed site.

(3) Mass Balance Requirements. Mass balance calculations must be included in the engineering report. The mass balance calculations must take into account design sludge age, wastestream concentration, operational hours, operational volume in the tanks, decant or dewatering volumes and characteristics, time needed for decanting or dewatering, and the volume needed for storage and sampling.

(4) Single Stage. Single stage aerobic digestion consists of utilizing one tank operating in continuous-mode-no-supernatant removal, continuous-mode-feeding-batch removal, or other mode detailed in a solids management plan.

(A) The size of an aerobic digester must be based on the minimum total detention time for the water temperature in the table located in subparagraph (B) of this paragraph based on Chapter 312 of this title and 40 Code of Federal Regulations Part 503.

(B) The digester size must be sufficient to provide both the detention time in the following table and to provide for the mass load received by the unit:

Figure: 30 TAC §217.249(t)(4)(B)

Table J.2. - Minimum Detention Times for Aerobic Digesters

Temperature (Degrees Celsius)	Total Detention Time
15°	60 days
20°	40 days

(5) Multiple Stage. Multiple stage aerobic digestion consists of two or more completely mixed digesters operating in series.

(6) Field Data.

(A) Any increase in flow or organic loading, or any change in process requires new testing and verification of time and temperature operating parameters.

(B) An expansion of an existing wastewater treatment facility may be designed and operated according to previously established time and temperature operating parameters.

(C) The executive director may re-rate a wastewater treatment facility under Subchapter B of this chapter (relating to Wastewater Treatment Facility Design Requirements), if an owner requests a re-rating and submits sufficient supporting data.

(7) Design Requirements.

(A) The maximum solids concentration used to calculate the total detention time for an aerobic digester that concentrates the waste sludge only in a digester tank must be

2.0% solids concentration, unless:

(i) supporting data is submitted in the engineering report to increase the solids concentration to 3.0%; or

(ii) a higher concentration is justified by the use of a sludge thickening unit upstream of a digester.

(B) A diffuser must be designed to minimize clogging.

(C) A diffuser must be removable without dewatering a tank for inspection, maintenance, and replacement. Removable diffusers are not required if the wastewater treatment facility is designed with a redundant basin.

(D) The volatile solids loading rate must be designed to be at least 100 pounds but not more than 200 pounds of volatile solids per 1,000 cubic feet per day, unless otherwise justified in the engineering report.

(E) The dissolved oxygen concentration maintained in the liquid in an aerobic digester must be at least 0.5 milligrams per liter.

(F) If mechanical aerators are used, the energy input for mixing must be at least 0.5 horsepower per 1,000 cubic feet.

(G) If diffused air mixing is used, the energy input for mixing must be at least 20 standard cubic feet per minute per 1,000 cubic feet of aeration tank.

(H) An aerobic digester must be able to separate and withdraw solids, or must decant the supernatant.

(u) Heat Stabilization.

(1) The design of a heat treatment system must be based on the anticipated sludge flow, sludge characteristics, and sludge concentration.

(2) A heat treatment system must operate continuously to minimize the additional heat input necessary to start up the system, unless justified in the engineering report.

(3) A heat treatment system must have multiple units, unless storage or an alternate stabilization method is available.

(4) A single unit heat treatment system must have a standby grinder, a fuel pump, an air compressor, and dual sludge pumps.

(5) The engineering report must identify the expected downtime for maintenance and repair, based on data from a comparable wastewater treatment facility.

(6) The engineering report must include a design for adequate storage for process feed and downtime.

(7) A heat treatment system must provide heat stabilization in a reaction vessel:

(A) at a minimum of 175 degrees Celsius (350 degrees Fahrenheit) for 40 minutes, but not more than 205 degrees Celsius (400 degrees Fahrenheit) for 20 minutes and at a pressure of not less than 250 pounds per square inch, gauge, but not more than 400 pounds per square inch, gauge; or

(B) provide for pasteurization at temperatures of 30 degrees Celsius (85 degrees Fahrenheit) or more and gauge pressure of more than 1.0 standard atmosphere (14.7 pounds per square inch) for a period of at least 25 days.

(8) A heat treatment system must have a sludge grinder to protect a heat exchanger from damage or clogging caused by rags or other debris.

(9) A heat treatment system must include an acid wash or high-pressure water wash system to remove scale from heat exchangers and reactors.

(10) A decant tank must have a sludge scraper mechanism and must be covered.

(11) A heat exchanger must be constructed of corrosion-resistant material.

(12) A heat treatment system must have a continuous temperature recorder.

(v) Recycle Loads.

(1) The engineering report must identify a method of treatment for the recycle stream from the heat treatment system.

(2) A recycle stream must not impact effluent quality or the wastewater treatment facility's treatment processes.

(w) Alkaline Stabilization.

(1) Design Basis.

(A) Alkaline Dosage. The engineering report must include the calculation of the alkaline dosage required to stabilize sludge based on the type of sludge, chemical composition of sludge, and the solids concentration in the sludge.

Performance data taken from a pilot test program or from a comparable wastewater treatment facility must be used to determine the proper dosage.

(B) Temperature, pH, and Contact Time. An alkaline stabilization system must uniformly mix an alkaline additive-sludge mixture to maintain the pH, temperature, and contact time, as specified in §312.82 of this title (relating to Pathogen Reduction) and §312.83 of this title (relating to Vector Attraction Reduction).

(2) Reliability.

(A) An alkaline stabilization system must have multiple units, unless storage or an alternate stabilization method is available to continue operations when a unit is not in service.

(B) A single unit that has adequate storage or an alternate stabilization method must have a standby conveyance and mixer, a backup heat source, and dual blowers.

(C) A design must include:

(i) the expected downtime for maintenance and repair based on data from a comparable wastewater treatment facility; and

(ii) adequate storage for process, feed, and downtime.

(3) Alkaline Stabilization Housing Unit.

(A) A housing unit must meet the requirements in §217.247(r)(1) of this title (relating to Chemical Pretreatment of Sludge).

(B) A housing unit must have mechanical or air agitation to ensure uniform discharge from the storage bins.

(4) Feeding Equipment.

(A) The alkaline additive feeding equipment must meet the requirements of §217.247(r)(1) of this title.

(B) Hydrated lime must be fed as a slurry consisting of at least 6% calcium hydroxide ($Ca(OH)_2$) by weight but not more than 18% $Ca(OH)_2$ by weight, unless otherwise justified in the engineering report.

(C) The engineering report must identify a means for controlling the feed rate of any other dry additive.

(5) Mixing Equipment.

(A) An additive and sludge blending or mixing vessel must be large enough to hold the mixture for a minimum of 30 minutes at the maximum feed rate.

(B) A batch process must maintain a pH greater than 12 standard units in a mixing tank during the blending period.

(C) A continuous flow process must maintain a pH greater than 12 standard units in an exit pipe.

(D) A continuous flow process must be designed for a detention time that is the tank volume divided by the volumetric input flow rate.

(E) A slurry mixture may be mixed with either a diffused air mixer or a mechanical mixer.

(F) The mixing equipment must maintain an alkaline slurry mixture in complete suspension.

(G) If using a diffused air mixer, the following requirements apply:

(i) a coarse bubble diffuser must have a minimum air supply of 20 standard cubic feet per minute per 1,000 cubic feet (cf) of tank volume; and

(ii) a mixing tank must be ventilated and include odor control equipment.

(H) If using a mechanical mixer, the following requirements apply:

(i) a mechanical mixer must provide at least 5.0 horse power per 1,000 cf of tank volume but not more than 10 horse power per 1,000 cf of tank volume; and

(ii) the impellers must minimize debris fouling in the sludge.

(6) Detention Time. A pasteurization vessel must provide a minimum detention period of 30 minutes.

(7) External Heat. The engineering report must include specifications about any supplemental external heat necessary for sludge stabilization.

§217.250. Sludge Dewatering.

(a) The engineering report must include a justification for the proposed sludge dewatering units, including design calculations, results from any pilot studies, all assumptions, and appropriate references.

(b) The design of a dewatering unit must be based on mass balance principles.

(c) General Requirements.

(1) Centrate or Filtrate Recycle.

(A) The drainage from beds and centrate or filtrate from dewatering units must be returned to the headworks of the wastewater treatment facility for treatment.

(B) The design of a treatment unit downstream from a dewatering unit must be based on the organic load from the centrate or filtrate recycle.

(2) Sludge with Industrial Waste Contributions. A dewatering system must prevent the release of any constituent (such as a free metal, an organic toxin, or a strong reducing or oxidizing compound) that adversely impacts human health, safety, or welfare, water quality, or compliance with the associated wastewater permit.

(3) Redundancy.

(A) A mechanical dewatering system must have at least two dewatering units, unless the engineering report justifies adequate storage or an alternative means of sludge handling.

(B) Mechanical dewatering units must be able to dewater the average daily sludge flow with the largest dewatering unit out of service.

(4) Storage Requirements.

(A) A mechanical dewatering system must have separate storage if the equipment will not operate on a continuous basis and the wastewater treatment facility has no digesters with built-in short-term storage.

(B) In-line storage of stabilized or unstabilized sludge must not interfere with any treatment unit.

(C) The separate sludge storage from a primary digester must be aerated and mixed to prevent nuisance odor conditions.

(5) Sampling Points. A dewatering system must have sampling stations before and after each dewatering unit and must allow periodic evaluation of the dewatering process.

(6) Maintenance. Each dewatering system unit must have a bypass to allow for maintenance, repair, and replacement. The engineer must specify where the bypass flow will be routed in the engineering report.

(d) Sludge Conditioning.

(1) The design and location of a chemical addition point must consider interactions of the chemical with other chemicals and processes used in the wastewater treatment facility.

(2) A dewatering system must provide adequate mixing time for the reaction between an additive and the sludge. Any subsequent handling must eliminate floc shearing.

(3) The engineering report must include a pilot plant or full-size performance data used to determine the characteristics and design dosage of any sludge additive.

(4) The engineering report must justify the in-stream flocculation and coagulation system design by including comparable performance data or pilot plant data.

(5) The engineering report must include whether the mixers require conditioning tanks.

(6) The engineering report must include calculations for a range of detention times.

(7) Solution storage capacity, at maximum chemical demand, must be based on:

(A) the amount of chemical needed per shift for continuous processes; or

(B) the amount of chemical needed for a full batch for intermittent and batch processes.

(8) Solution storage capacity may be reduced if the specific chemical or additive selected is adversely affected by storage.

(9) The engineering report must justify any storage volume reduction and any other method used to ensure a continuous supply of chemicals by accounting for chemical use through a full operating day or a full batch.

(e) Sludge Drying Beds.

(1) The size of sludge drying beds must be based on data from a similar wastewater treatment facility in the same geographical area with the same influent sludge characteristics.

(2) If the data required by paragraph (1) of this subsection is not available, or if the executive director determines that the data is not appropriate for a proposed wastewater treatment facility, the design of sludge drying beds must be based on the following:

(A) Open Beds.

(i) A sludge drying bed system must have at least two sludge drying beds.

(ii) The engineering report must include the calculation of the minimum surface area for a sludge drying bed using the values in the following figure for an area of the state with less than 45 inches annual average rainfall or less than 50% annual average relative humidity, as determined by data from the nearest National Oceanic and Atmospheric Administration's weather station that has at least ten years of data. The entire period of record for the weather station must be used.

Figure: 30 TAC §217.250(e)(2)(A)(ii)

Table J.3. - Surface Area Requirements for Sludge Drying Beds

Stabilization Process	**Pounds of Digested Dry Solids** ***per square foot per year***
Anaerobic Digestion	20.0
Aerobic Digestion	15.0

(iii) Another method of sludge dewatering is required in lieu of a sludge drying bed in an area of the state that experiences either 45 or more inches of average annual rainfall or 50% or greater annual average relative humidity, as determined by data from the nearest National Oceanic and Atmospheric Administration's weather station that has at least ten years of data. The entire period of record for the weather station must be used.

(iv) A sludge drying bed system must:

(I) dewater sludge during normal operations;

(II) provide accelerated sludge dewatering during abnormally wet conditions;

(III) store accumulated sludge during periods of extended high humidity and rainfall;

(IV) use an alternative dewatering method to dewater the sludge during periods of extended high humidity and rainfall; and

(V) prevent the unauthorized discharge of solids from the sludge drying beds.

(v) The engineering report must justify the use of innovative or non-conforming sludge drying beds in high rainfall, high relative humidity areas of the state, as described in clause (iii) of this subparagraph.

(B) Gravel Media Beds. A gravel media bed must be laid in two or more layers. The gravel around the underdrains must be properly sized to allow drainage. The gravel around the underdrains must be at least 12 inches deep, extending at least 6.0 inches above the top of the underdrains. The top layer of a gravel media bed must be at least 3.0 inches thick and must consist of gravel 1/8 inch to 1/4 inch in size.

(C) Sand Media Beds. A sand media bed must consist of at least 12 inches of sand with a uniformity coefficient of less than 4.0 and an effective grain size of

at least 0.3 millimeters but not more than 75 millimeters above the top of the underdrain.

(D) Underdrains.

(i) The underdrains must be at least 4.0 inches in diameter and a slope of at least 1.0% to the drain.

(ii) The underdrains must not be spaced more than 20 feet apart.

(iii) The engineering report must specify where the flow from the underdrains will be routed.

(E) Decanting. A sludge drying bed may have a method of decanting supernatant installed on the perimeter of the bed. The decanted liquid from a sludge drying bed must be returned to the headworks of the wastewater treatment facility or to the beginning of the secondary treatment process.

(F) Walls.

(i) The interior walls of a sludge drying bed must be watertight and extend 12 inches to 24 inches above and at least 6 inches below the bed surface.

(ii) The exterior walls of a sludge drying bed must be watertight and extend 12 inches to 24 inches above the bed surface or ground elevation, whichever is higher.

(G) Sludge Removal.

(i) A sludge drying bed system must be arranged to facilitate sludge removal.

(ii) The sludge drying beds must have concrete pads for vehicle support tracks on 20 foot centers for all percolation type sludge beds.

(H) Sludge Influent.

(i) A sludge pipe to the sludge drying beds must terminate at least 12 inches above the surface of the media and be arranged so that the pipe drains to

a sump that pumps to the headworks of the wastewater treatment facility or the influent lift station.

(ii) A sludge discharge point must have a concrete splash plate.

(I) Drying Bed Bottom.

(i) The bottom of a sludge drying bed must consist of a layer of clayey subsoil having a thickness of a least 1.0 foot and a permeability of less than 1×10^{-7} centimeters per second.

(ii) An impermeable concrete pad must be installed over a liner in locations where the groundwater table is within 4.0 feet of the bottom of the liner.

(3) Innovative or Non-Conforming Sludge Drying Beds. The executive director will review any vacuum assisted sludge drying beds or other variations to the gravity drying bed concept as innovative and non-conforming technologies subject to §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(4) Rotary Vacuum Filtration.

(A) Filtration Rate. The engineering report must justify the value calculated for the rates of filtering for various types of sludge with proper conditioning, using Table J.4. in Figure: 30 TAC §217.250(e)(4)(A)

Figure: 30 TAC §217.250(e)(4)(A)

Table J.4. - Filtration Rates

Type of Treatment	**Pounds of Dry Solids** ***per square foot per hour (minimum-maximum)***
Primary	4-6
Primary and Trickling Filter	3-5
Primary and Activated Sludge	3-4

(B) Duplicate Equipment. Unless two treatment trains are provided, a feed pump, a vacuum pump, and a filtrate pump must be provided in duplicate to allow equipment alternation. Spare filter fabric must be kept at the wastewater treatment facility, except when metal coil filters are used.

(C) Filter Equipment. Parts that will get wet must be constructed of corrosion-resistant material. Drum and agitator assemblies must be equipped with

variable-speed drives, and provisions must be made for adjusting the liquid level in the filtration system.

(D) Pumps.

(i) A vacuum pump with a capacity of at least 1.5 cubic feet per minute per square foot must be provided for metal-covered drums.

(ii) A dry-type vacuum pump must have a vacuum receiver.

(iii) A filtrate pump must have adequate capacity to pump the maximum amount of liquid to be removed from the sludge.

(iv) Each filter must be fed by a separate feed pump to ensure a proper feed rate.

(5) Centrifugal Dewatering.

(A) The engineering report must justify the sizing and design of a centrifugation system. A centrifuge design must be based on performance data from a

similar centrifuge when available. If no performance data is available, the results of a pilot or full-scale test must be used.

(B) Selection of a material for a scroll must include consideration of the amount of grit expected in the sludge.

(C) A centrifugation system must include adequate sludge storage, based on the disposal process.

(D) Unless two treatment trains are provided, a centrifugation system must have the following spare equipment, including necessary connecting pipes and electrical controls:

(i) drive motor;

(ii) gear assembly; and

(iii) feed pump.

(E) A feed pump must have a variable speed drive.

(F) Each centrifuge must have a separate feed system.

(G) A centrifuge must be equipped for variable scroll speed and pool depth.

(H) A centirugation system must have a crane or monorail for equipment removal and maintenance.

(I) A centrifuge system must provide access for wash down of the interior of each centrifuge.

(6) Plate and Frame Presses.

(A) Sizing.

(i) The design of a plate and frame press must be based on performance data developed from a plate and frame press of similar size with similar operational characteristics. If no performance data is available, the results of pilot scale tests or full-scale tests must be used.

(ii) The design of a plate and frame press may be based on appropriate scale-up factors for full size designs if pilot scale testing is done in lieu of full-scale testing.

(iii) The engineering report must justify the size of a plate and frame press.

(B) Duplicate Equipment and Spare Parts. Unless multiple units are provided, a plate and frame press system must include the following spare equipment:

(i) one duplicate feed pump;

(ii) two extra plates, or at least one extra plate for every ten plates required for startup, whichever is greater;

(iii) one complete filter fabric set;

(iv) one closure drive system;

(v) one air compressor; and

(vi) one washwater booster pump.

(C) Operational Requirements.

(i) The filter feed pumps must be able to handle initial high volume flow, low pressure filling, and sustained periods of operating at 100 pounds per square inch to 225 pounds per square inch.

(ii) A plate and frame press system may include an integral pressure vessel to produce initial high volume flow.

(iii) A plate and frame press system may use operating pressures less than 225 pounds per square inch if the engineering report justifies the design operating pressure using actual performance data from a plate and frame press that processes similar sludge.

(iv) A plate and frame press system may include provisions for sludge-cake breaking to protect or enhance down line processes.

(D) Maintenance.

(i) A plate and frame press system must have a crane or monorail capable of removing the plates.

(ii) A plate and frame press system must have a high-pressure water or acid wash system to clean the filter.

(7) Belt Presses.

(A) Sizing.

(i) Actual performance data developed from a wastewater treatment facility with similar operational characteristics must be used to size a belt press system. If pilot plant testing is performed in lieu of full-scale testing, appropriate scale-up factors must be used to develop a full-scale design.

(ii) A belt press system must have a duplicate belt press, or another method of sludge processing or disposal that has been approved in writing by the executive director, if the design flow exceeds 4.0 million gallons per day.

(iii) The engineering report must include all data used to size a belt press system.

(B) Duplicate Equipment and Spare Parts. Unless multiple belt press units are provided, a belt press system must have the following spare equipment:

(i) one duplicate feed pump;

(ii) one washwater booster pump;

(iii) one complete set of belts;

(iv) one set of bearings for each type of press bearing;

(v) one set of tensioning equipment;

(vi) one set of tracking sensors;

(vii) one set of wash nozzles;

(viii) one doctor blade; and

(ix) conditioning or flocculation drive equipment.

(C) Conditioning. The engineering report must include the polymer selection methodology, account for sludge variability, and document the anticipated sludge loading to the belt press.

(D) Sludge Feed.

(i) The sludge must be fed at a relatively constant rate that does not interfere with polymer addition and belt press operation.

(ii) The engineering report must include the range in feed rate variability.

(iii) A belt press system may include grinders ahead of a flocculation system.

(iv) The sludge feed must provide a method for uniform sludge dispersion on a belt.

(v) A belt press system must use thickening of the feed sludge, unless the engineering report justifies separate thickening or dual purpose thickening.

(E) Filter Press Belts.

(i) A belt must have a variable speed drive.

(ii) A belt press system must have belt tracking and tensioning equipment.

(iii) The engineering report must justify the weave, material, width, and thickness of the belts.

(F) Filter Press Rollers.

(i) The rollers must have a protective finish.

(ii) The maximum roller deflection and operating tension of the belt must be included in the engineering report to justify equipment selection.

(iii) The roller bearings must be watertight and rated for a life of 100,000 hours.

(G) Spray Wash System.

(i) A belt press system must use high-pressure wash water for each belt.

(ii) The design of a spray wash system must specify the operating pressure at the point of washwater discharge.

(iii) A spray wash system must allow cleaning without interfering with the spray wash system operation.

(iv) The engineering report must justify the nozzle and nozzle cleaning system selection.

(v) A belt press system must have replaceable spray nozzles and spray curtains.

(H) Maintenance Requirements.

(i) A belt press system must have drip trays under the belt press and under the thickener when gravity belt thickening is employed.

(ii) The side and floor of a belt press must have adequate clearance for maintenance and removal of the dewatered sludge.

(iii) An electrical panel or other component subject to corrosion must be protected from splashes and corrosive gases, or be located outside of the belt press area.

(iv) A doctor blade clearance must be adjustable.

§217.251. Sludge Storage.

(a) This section applies to the storage of sludge after processing but before final disposal or removal from the wastewater treatment facility site.

(b) Sludge in liquid, dewatered, or dry form may be stored at the wastewater treatment facility if the solids have been stabilized in a treatment process.

(c) General Storage Requirements.

(1) A sludge storage facility must prevent nuisance odor conditions and minimize vector attraction.

(2) A sludge storage facility must provide storage of waste sludge separate from a biological treatment process.

(3) The design of a sludge storage facility must be based on process design, sludge age, waste stream concentration, operational hours, operational volume in tanks, decant or dewatering volumes and characteristics, time frames needed for decanting or dewatering, and volume needed for storage and sampling.

(4) The engineering report must include a solids management plan that describes a method for managing the waste solids that will maintain the design sludge age for a biological process.

(d) Storage of Solids - Not Dewatered.

(1) Aerobically Digested Solids.

(A) A storage facility may store aerobically digested solids.

(B) A sludge storage basin must have diffused air or mechanical mixing.

(C) A diffused air-mixing unit must provide a minimum air capacity of 30 standard cubic feet per minute per 1,000 cubic feet of volume.

(D) A mechanical surface aerator must have a minimum of 1.0 horsepower per 1,000 cubic feet of volume.

(E) An earthen sludge storage basin must be lined in accordance with §217.203(d) and (e) of this title (relating to Design Criteria for Natural Treatment Units).

(2) Anaerobically Digested Solids. Anaerobically digested solids must be stored in a covered basin with gas release valves and gas control measures.

(e) Storage of Dewatered Solids.

(1) Dewatered solids must be stored in a steel or concrete container, or in an open stockpile.

(2) Dewatered solids with a solids content of less than 35% must not be stored for more than seven days. Dewatered solids with a solids content of at least 35% but not more than 50% must not be stored for more than 90 days.

(f) Open Stockpiles.

(1) An open stockpile must have an impervious pad underneath the solids to prevent groundwater contamination.

(2) An open stockpile must have a system for collecting stormwater runoff and returning it to the headworks of the wastewater treatment facility.

(g) Dried Solids Storage.

(1) A storage facility may store dewatered solids with a solids content of greater than or equal to 50% in a covered bin or covered facility for a period of time that does not exceed two years.

(2) An enclosed storage structure must be mechanically ventilated with at least 20 complete air exchanges per hour and must have an odor control system for the exhaust.

§217.252. Final Use or Disposal of Sludge.

(a) The engineering report must identify the final use or final disposal of the sludge. The use, disposal, and transportation of sludge must be conducted in accordance with the requirements contained in Chapter 312 of this title (relating to Sludge Use, Disposal, and Transportation) or in Chapter 330 of this title (relating to Municipal Solid Waste).

(b) Quantities of Sludge.

The quantity of solids generated by the treatment process must be estimated using a mass-balance approach or actual data from a similar full-scale wastewater treatment facility or pilot study. The methods, calculations, and analyses used to estimate quantities of solids must be included in the engineering report.

(c) Final Disposition. The sludge use or disposal option must be based on the pathogen and vector attraction characteristics of the sludge.

(d) Sludge Constituents.

(1) The concentrations of metals in sludge must be determined using methods approved in 40 Code of Federal Regulations §136.3 and must be less than the levels specified in §312.63 of this title (relating to Metal Limits (Other Than Domestic Septage)).

(2) A sludge processing system must reduce pathogens in sludge to levels that comply with §312.82 of this title (relating to Pathogen Reduction).

(3) A sludge processing system must produce digested sludge that complies with §312.83 of this title (relating to Vector Attraction Reduction).

(e) Emergency Provisions for Sludge Disposal. The design of a sludge processing system must include a secondary method of sludge disposal to use in the event of conditions that prevent the use of a wastewater treatment facility's primary use or primary disposal method. The secondary sludge disposal method must be included in the engineering report.

(f) Weather Factors. Weather factors such as rainfall, wind conditions, and humidity must be considered as process selection and storage constraints in the determination of the use or disposal of sludge.

SUBCHAPTER K: CHEMICAL DISINFECTION

§§217.271 - 217.283

Statutory Authority

The amendments are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.271. Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination System Redundancy Requirements.

(a) Each gaseous chlorine disinfection and sulfur dioxide dechlorination system must include the number of cylinders required for normal operation at peak flow, plus at least one additional cylinder.

(b) Gaseous chlorine disinfection systems and sulfur dioxide dechlorination systems must include a device that automatically switches between cylinders in a manner that ensures continuous disinfection and dechlorination.

(c) A wastewater treatment facility must have sufficient space to store at least as many empty cylinders as the number of cylinders required for normal operation at peak flow.

(d) A gaseous chemical delivery system must meet the pounds per day requirements in §217.272 of this title (relating to Capacity and Sizing of Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination) when the largest chlorinator, sulfonator, or evaporator is out of service.

(e) If an injector water supply requires a booster pump, a duplicate backup pump is required.

(f) A gaseous chemical delivery system must include an emergency power source capable of operating the chlorination and dechlorination systems during an extended power outage, in accordance with §217.36 of this title (relating to Emergency Power Requirements).

§217.272. Capacity and Sizing of Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) The capacity of a chlorine or a sulfur dioxide gas-withdrawal system must be based on the peak flow, in compliance with §217.32(a)(1) of this title (relating to Organic Loadings and Flows for New Wastewater Treatment Facilities) and Equation K.1. in Figure: 30 TAC §217.272(a).

Figure: 30 TAC §217.272(a)

Equation K.1.

$$PPD = Q \times D \times 8.34$$

Where:

PPD = Pounds per day of chlorine or sulfur dioxide required for treatment
Q = Peak two hour flow (millions of gallons per day)
D = chlorine concentration from Table K.1. in Figure: 30 TAC §217.272(b), or sulfur dioxide dosage needed to dechlorinate the expected chlorine residual
8.34 = conversion factor

(b) Table K.1. in Figure: 30 TAC §217.272(b) establishes the minimum acceptable design chlorine dosage for disinfection:

Figure: 30 TAC §217.272(b)

Table K.1. - Minimum Design Chlorine Concentration Needed for Disinfection

Type of Effluent	**Chlorine Concentration** *milligrams per liter (mg/l)*
Primary	15
Fixed Film	10
Activated Sludge	8
Tertiary Filtration Effluent	6
Nitrified Effluent	6

(c) At the point of dechlorination, a dechlorination system must provide at least one unit of sulfur dioxide gas for each unit of residual chlorine.

§217.273. Cylinder Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) Cylinder Withdrawal Rates for Chlorine and Sulfur Dioxide Gases.

(1) Gas Withdrawal. The gas withdrawal rate per cylinder for chlorine and sulfur dioxide cylinders must be based on Equation K.2. and the variables from Table K.2. in Figure: 30 TAC §217.273(a)(1).

Figure: 30 TAC §217.273(a)(1)

Equation K.2.

$$W_g = (T_A - T_{th}) \times F$$

Where:
T_A = Low ambient temperature, ° F
T_{th} = Threshold temperature, ° F
F = Withdrawal factor, pound/° F/day
W_g = Maximum gas withdrawal rate per cylinder, pound per day

Table K.2. - Threshold Temperatures and Withdrawal Rates for Chlorine and Sulfur Dioxide

Gas and Cylinder Size	**Withdrawal Factor, (F) pound/° F/day**	**Threshold Temperature, (T_{th}) for Cylinder Mounted Vacuum Regulator, ° F**	**Threshold Temperature, (T_{th}) for Manifold Systems at 10-15 psig pressure, ° F**
150 pound Chlorine Cylinder	1.0	0	10
1-ton Chlorine Cylinder	8.0	0	10
150 pound Sulfur Dioxide Cylinder	0.75	30	40
1-ton Sulfur Dioxide Cylinder	6.0	30	40

Values from the *Handbook of Chlorination*, Second Edition, White, Reinhold

(A) If the chlorine or sulfur dioxide cylinders are not stored in a temperature-controlled enclosure, the engineering report must include the ambient temperature based on the lowest consecutive seven-day average of the average daily local temperatures over the last ten years, as measured at the nearest National Oceanic and Atmospheric Administration's National Weather Service weather station with at least ten years of records.

(B) Heating blankets on chlorine gas cylinders are prohibited.

(2) Liquid Withdrawal. If liquid withdrawal from one-ton cylinders is proposed, the maximum withdrawal rates are:

(A) 9,600 pounds per day (lbs/day) of chlorine; and

(B) 7,200 lbs/day of sulfur dioxide.

(b) Number of Cylinders Required. The number of cylinders required for normal operation at peak flow must be based on Equation K.3. in Figure: 30 TAC §217.273(b).

Figure: 30 TAC §217.273(b)

Equation K.3.

$$Cyl = \frac{PPD}{W_{gl}}$$

Where:
Cyl = minimum number of cylinders required per bank (round up to the nearest whole number)
PPD = pound per day (lb/day) of chemical required as determined in Figure: 30 TAC §217.272(a), Equation K.1.
W_{gl} = lb/day of chemical that may be withdrawn per cylinder as determined in Figure: 30 TAC §217.272(a), Equation K.1. or Figure: 30 TAC §217.273(a)(1), Equation K.2.

§217.274. Dosage Control for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

Gaseous chlorine and sulfur dioxide systems must include automatic dosage control that adjusts the dosage relative to the flow of the effluent stream.

§217.275. Requirements for 150 Pound Cylinders used in Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) Heated Rooms.

(1) A chlorine and sulfur dioxide system that uses 150 pound cylinders must be located indoors at a minimum room temperature of 65 degrees Fahrenheit. This provision applies to all chemical feed equipment, including all connected cylinders, the chlorinators, and the sulfonators.

(2) An unconnected chlorine or sulfur dioxide cylinder may be stored outdoors, but the cylinder must reach a surface temperature of at least 65 degrees Fahrenheit before it is connected to a system.

(b) Heating Blankets.

(1) Heating blankets on chlorine gas cylinders are prohibited.

(2) A heating blanket may only be placed on a sulfur dioxide cylinder in a temperature-controlled room to increase the temperature inside the cylinder to above the ambient room temperature.

(A) A heating blanket on a sulfur dioxide cylinder must include a mechanism that ensures that a blanket does not heat a cylinder above 100 degrees Fahrenheit. The engineering report must include a calculation that documents the setting for a heating blanket to maintain a sulfur dioxide cylinder temperature of less than 100 degrees Fahrenheit.

(B) A cylinder with a heating blanket that is connected to a dechlorination system must have a downstream pressure-reducing valve.

(C) A sulfur dioxide system must be capable of automatically deactivating a heating blanket if high pressure is detected in the cylinder or the delivery system.

(c) Outdoor Storage. If a 150 pound cylinder is stored outdoors, it must be kept in a storage structure that:

(1) protects the cylinder from direct sunlight; and

(2) allows safe removal and replacement of the cylinder.

§217.276. Requirements for One-Ton and Larger Cylinders used in Gas-Withdrawal Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) Heated Rooms. The chlorinators and sulfonators for a system using one-ton cylinders must be located indoors and maintained at a minimum room temperature of 65 degrees Fahrenheit.

(b) Outdoor Storage.

(1) If one-ton cylinders are stored outdoors, the system sizing must be done in accordance with §217.273(a) of this title (relating to Cylinder Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems). Calculations supporting system sizing must be included in the engineering report.

(2) If a one-ton cylinder is stored outdoors, it must be kept in a storage structure that:

(A) protects the cylinder from direct sunlight; and

(B) allows safe removal and replacement of a cylinder.

(3) A one-ton cylinder stored outdoors may be connected to heated pipes to prevent gas from liquefying in the transfer pipes.

(c) Heating Blankets.

(1) A heating blanket on a one-ton chlorine gas cylinder is prohibited.

(2) A heating blanket may only be placed on a sulfur dioxide cylinder to increase the operating temperature of the sulfur dioxide system. The design must specify the temperature a heating blanket may be set to maintain an adequate temperature inside a cylinder, based on the lowest consecutive seven-day average of the local daily low temperatures over the last ten years, as measured at the nearest National

Oceanic and Atmospheric Administration's National Weather Service weather station with at least ten years of records.

(3) The ambient temperature must be used to calculate a cylinder withdrawal rate in §217.273(a) of this title.

(4) A heating blanket on a sulfur dioxide cylinder must include a mechanism that ensures that a blanket does not heat the cylinder surface above 100 degrees Fahrenheit. The engineering report must include a calculation that documents the setting for a heating blanket to maintain a sulfur dioxide cylinder surface temperature of less than 100 degrees Fahrenheit.

(5) A cylinder with a heating blanket that is connected to a dechlorination system must have a downstream pressure-reducing valve.

(6) A sulfur dioxide system must be capable of automatically deactivating a heating blanket if high pressure is detected in the cylinder or delivery system.

§217.277. Requirements for One-Ton and Larger Cylinders used in Liquid-Withdrawal Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) Heated Rooms. The chlorinators and sulfonators must be located indoors at a minimum room temperature of 65 degrees Fahrenheit.

(b) Outdoor Storage. The chlorine and sulfur dioxide cylinders for systems using liquid withdrawal may be stored outdoors without reducing the withdrawal rates calculated from §217.273(a)(2) of this title (relating to Cylinder Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems).

(c) Separation. The separation requirements for a one-ton cylinder liquid-withdrawal systems are the same as those for a one-ton cylinder gas-withdrawal system under §217.278(e) of this title (relating to Safety Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems).

§217.278. Safety Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) Floor Drains. A floor drain from a chlorine or sulfur dioxide feed or storage room must not drain to a pipe system connected to any other room of the wastewater treatment facility. Drainage must be routed for safe disposal or for further processing at a rate that does not disrupt a treatment process or violate a water quality permit requirement.

(b) Doors and Windows.

(1) Each door in a chlorine or sulfur dioxide room must:

(A) open to the outside of the building; and

(B) include panic hardware.

(2) Each chlorine or sulfur dioxide room must have at least one clear, gas-tight window in a gas-tight exterior door.

(3) A chlorine or sulfur dioxide room may have additional clear, gas-tight windows to ensure the disinfection and dechlorination systems may be viewed without entering an enclosed room.

(c) Ventilation.

(1) An enclosed storage and feed room must have continuous forced mechanical ventilation with at least one complete air exchange every 3.0 minutes.

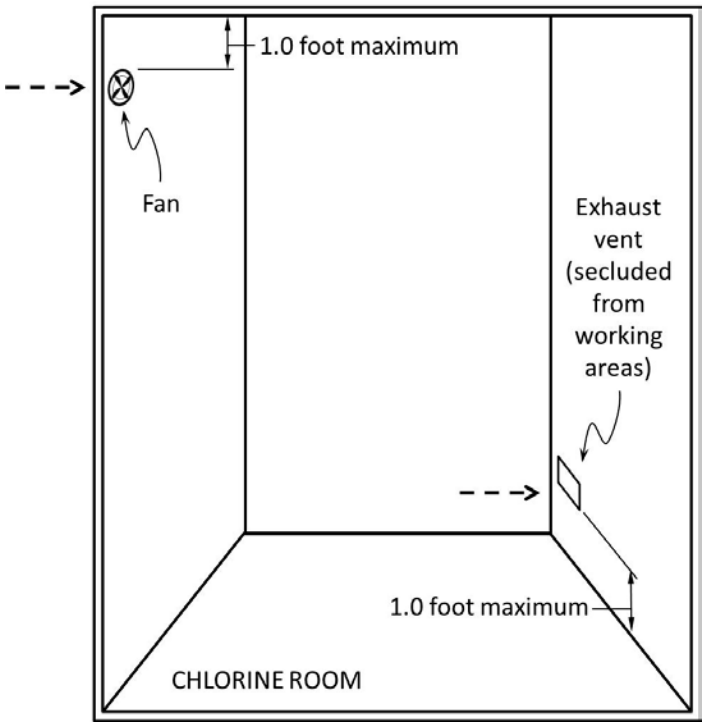
(2) Exhaust equipment must have:

(A) external controls; and

(B) leak detection equipment.

(3) A fan must be located at the top of the room to push air across the room and through an exhaust vent located at the bottom of the room on the opposite side (see Figure: 30 TAC §217.278(c)(3)). The top of the fan must be no more than one foot below the ceiling. The bottom of the exhaust vent must be no more than one foot above floor level.

Figure: 30 TAC §217.278(c)(3)



(4) An exhaust system may use vacuum pressure ventilation instead of forced mechanical ventilation if the ventilation facility has gas containment and treatment as prescribed by the National Fire Protection Association 1 Fire Code®.

(5) A vent from the sulfur dioxide or chlorine gas feed systems must:

(A) exhaust to a point that is not frequented by wastewater treatment facility staff, such as stairs, walkways, and common areas;

(B) exhaust to a point that is not near a fresh air intake; and

(C) be clearly marked with at least a four inch tall font that reads "Danger: Hazardous Exhaust."

(d) Gas Detectors and Protection.

(1) An area containing chlorine or sulfur dioxide under pressure must have a gas detector and alarm system.

(2) An area used for handling pressurized chlorine or sulfur dioxide gases must have respiratory and protective equipment. The respiratory and protective equipment must meet the requirements of the National Institute for Occupational Safety and Health.

(A) The respiratory and protective equipment must be immediately accessible at the wastewater treatment facility. The location and use of the respiratory and protective equipment must be described in the wastewater treatment facility's operation and maintenance manual.

(B) The storage of respiratory equipment in any room where gas under pressure is stored or used is prohibited.

(C) Instructions for using the respiratory and protective equipment must be kept with or posted next to the equipment.

(D) The respiratory equipment must use compressed air and must have at least a 30-minute capacity.

(e) Separation.

(1) Chlorine cylinders must not be stored in the same room as sulfur dioxide cylinders.

(2) Chlorine feed equipment must not be housed in the same room as sulfur dioxide feed equipment.

(3) Cylinders and feed equipment that supply chlorine must be separated by at least one gas-tight wall from cylinders and feed equipment that supply sulfur dioxide.

§217.279. Equipment and Material Requirements for Gaseous Chlorine Disinfection and Sulfur Dioxide Dechlorination Systems.

(a) All equipment and material used in a disinfection and dechlorination system must meet the manufacturer's recommendations.

(b) A 150 pound cylinder must be stored vertically and secured by a clamp or chain to prevent it from falling over. A one-ton cylinder

must be stored horizontally on trunnions.

(c) Measurements. A gaseous chlorine and sulfur dioxide system must have a scale designed for determining the amount of chemical remaining in the connected cylinders.

(d) Pressure Pipe Systems for Gas Transport.

(1) Gas transport pressure pipes must be at least equivalent to Schedule 80 black seamless steel pipe. Gas transport fittings must be at least equivalent to 2,000 pound forged steel fittings.

(2) The use of polyvinyl chloride (PVC) in a pressure pipe system is prohibited.

(3) A one-ton cylinder system must use a gas filter upstream of a pressure-reducing valve.

(4) A pressure pipe system must have a pressure-reducing valve if:

(A) the system has more than 20 linear feet of supply pipes;

(B) the system is a gaseous sulfur dioxide system with a heating blanket; or

(C) there are pressure pipes on the discharge side of an evaporator.

(5) A pressure pipe on the gas discharge side of an evaporator must have a rupture disk and a high-pressure alarm to warn wastewater treatment facility staff of disk rupture.

(6) A gas pipe entering a chlorinator or sulfonator must have a heated leg drop sediment trap.

(7) A gaseous sulfur dioxide system must have a seat and stem constructed of material with corrosion resistance and brittle strength at least equivalent to 316 stainless steel.

(8) A gaseous chlorine system must have at least the equivalent of a Monel® seat and stem.

(e) Pressure Pipe Systems - Liquid Transport.

(1) The use of PVC in a pressure pipe system is prohibited.

(2) The manifolding of one-ton containers for simultaneous liquid chemical withdrawal is prohibited.

(3) A liquid pipe system must include a rupture disk, a pressure switch to warn wastewater treatment facility staff of disk rupture, and an expansion chamber.

(f) Vacuum Pipes.

(1) Vacuum pipes and fittings downstream from a vacuum regulator must have corrosion resistance equivalent to PVC or 316 stainless steel.

(2) A vacuum pipe must have socket joints.

(g) Diffusers. The minimum velocity through any chlorine or sulfur dioxide system diffuser must be at least 10 feet per second. The engineering report must include calculations that verify this requirement is met, unless a diffuser has a mechanical mixer.

§217.280. Design of Sodium Hypochlorite Disinfection and Sodium Bisulfite Dechlorination Systems.

(a) Redundancy. Sodium hypochlorite and sodium bisulfite systems must include at least two chemical solution pumps and must ensure that the capacity requirements in subsection (b) of this section are met with the largest pump out of service.

(b) Capacity and Sizing. The size of a chemical liquid solution pump and pipe system must be determined as follows:

(1) Sodium Hypochlorite.

(A) Pounds Per Day of Chlorine Required. Figure: 30 TAC §217.272(b), Table K.1. and Figure: 30 TAC §217.272(a), Equation K.1. must be used to determine the pounds per day of chlorine required.

(B) Chlorine Determination. The pounds of available chlorine per gallon of sodium hypochlorite solution must be determined using values and appropriate references supplied by the chemical manufacturer.

(C) Gallons per Hour Determination. In order to size the chemical metering equipment, the gallons per hour must be calculated using Equation K.4. in Figure: 30 TAC §217.280(b)(1)(C).

Figure: 30 TAC §217.280(b)(1)(C)

Equation K.4.

$$R = \frac{PPD}{24C}$$

Where:
R = gallons per hour of sodium bisulfite solution
PPD = pounds per day of chlorine that must be delivered to the wastewater, pound per day
C = pounds of available chlorine in one gallon of sodium hypochlorite, (pound of chlorine per gallon)

(2) Sodium Bisulfite.

(A) Equation K.4. in Figure: 30 TAC §217.280(b)(1)(C) must be used to determine the pounds per day of sodium bisulfite required.

(B) The minimum amount of sodium bisulfite needed to dechlorinate one pound of chlorine is 1.465 pounds. The pounds per day of chlorine that must be dechlorinated, as determined in subparagraph (A) of this paragraph, multiplied by 1.465 pounds of sodium bisulfite per pound of chlorine, determines the pounds of sodium bisulfite needed.

(C) The gallons per hour of sodium bisulfite solution needed from the chemical metering equipment must be calculated using Equation K.5. in Figure: 30 TAC §217.280(b)(2)(C).

Figure: 30 TAC §217.280(b)(2)(C)

Equation K.5.

$$R = \frac{\text{lbs } NaHSO_3}{10.9 \text{ lbs } NaHSO_3/\text{gallon } NaHSO_3}\left(\frac{1}{S}\right) \times 24$$

Where:
S = solution strength in percent
R = gallons per hour of sodium bisulfite solution

(c) Dosage Control. A dosage control system may be positive pressure or vacuum and must automatically adjust the sodium hypochlorite or sodium bisulfite feed rate to correspond to the flow of the effluent stream.

(d) Chemical Handling.

(1) Storage Tank Sizing.

(A) A storage facility for sodium hypochlorite with a solution strength greater than or equal to 10% must not be sized to store more than a 15-day supply, based on the design average daily consumption, unless a residual analyzer or oxidation-reduction potential (ORP) monitor provides automatic feed control to compensate for solution degradation. Where a residual analyzer or ORP monitor is included in the design, a storage facility must not be sized to store more than a 30-day supply, based on the daily average consumption.

(B) A storage facility for sodium hypochlorite with a solution strength less than 10% must not be sized to store more than a 30-day supply, based on the daily average consumption.

(C) A wastewater treatment facility with a design flow greater than or equal to 1.0 million gallons per day must have at least two chemical storage tanks for each chemical.

(2) Temperature considerations.

(A) A sodium hypochlorite tank that is stored outdoors must be opaque or otherwise block sunlight from penetrating the tank.

(B) An outdoor sodium bisulfite storage facility and associated pipes must be insulated and heat traced if located in an area where the ambient temperatures fall below 40 degrees Fahrenheit, based on the lowest 7-day average of the average daily local temperatures over the last 10-years, as measured at the nearest National Oceanic and Atmospheric Administration's National Weather Service weather station with at least ten years of data.

(e) Equipment and Materials.

(1) Equipment and materials used for storage, pumping, and transport of sodium hypochlorite must be used according to the manufacturer's recommendations and designed for use in a corrosive chemical environment.

(2) Equipment and materials used for storage, pumping, and transport of sodium bisulfite must be used according to the manufacturer's recommendations and designed for use in an acidic chemical environment.

(f) Safety.

(1) Ventilation. A chemical storage area must be ventilated to exhaust fumes.

(2) Liquid-depth indicators. A chemical storage tank must have an external liquid-depth indicator.

(3) Spill Containment.

(A) A chemical storage area for sodium hypochlorite and sodium bisulfite must have secondary containment equal to 125% of the volume of the largest storage tank.

(B) Manifolded tanks must have secondary containment equal to 125% of the cumulative manifolded tank volume. If the pipe system is designed to

prevent a combined release, then the secondary containment must equal 125% of the largest tank volume.

(C) A tank must either:

(i) be placed on an equipment pad that is elevated above the secondary containment maximum liquid level; or

(ii) be placed in a secondary containment structure that is able to be drained to prevent the tank from floating.

(D) A containment structure for sodium hypochlorite must be separate from a containment structure for sodium bisulfite.

(4) Emergency and Protective Equipment. A chemical storage area must have at least one emergency eyewash station and personal protective equipment for all wastewater treatment facility staff working in the area.

§217.281. Application of Chlorination and Dechlorination Chemicals.

(a) Mixing Requirements.

(1) Mixing Zones. A mixing zone within a chlorine contact basin must not be considered as part of the volume needed for disinfection. A mixing zone must be designed to ensure that the chlorine is thoroughly mixed with the wastewater before entering a chlorine contact chamber, as described in paragraph (2) of this subsection.

(2) Chlorine and Sodium Hypochlorite Application. A disinfection system must apply the chlorine gas or solution in a highly turbulent flow regime created by in-line diffusers, mechanical mixers, or jet mixers. Effective initial mixing for the mean velocity gradient (G value) in the area of turbulent flow must exceed 500 per second. A serpentine disinfection channel may be used in place of turbulent initial mixing if the length-to-width ratio is at least 40-to-1 and complete mixing is demonstrated by a dye test.

(3) Sulfur Dioxide and Sodium Bisulfite Application.

(A) The mixing for a sulfur dioxide or sodium bisulfite system must ensure compliance with the effluent limits in the wastewater permit.

(B) A disinfection system must provide a mean velocity gradient (G value) of at least 250 per second.

(b) Chlorine Contact Basins.

(1) A chlorine contact basin must provide a minimum chlorine contact time of 20 minutes at the peak flow.

(2) A chlorine contact basin must prevent short-circuiting to ensure that the wastewater is retained in a chlorine contact basin for at least 20 minutes at peak flow.

(3) A rectangular chlorine contact basin must have rounded corners.

(4) If a wastewater treatment facility is designed with more than one chlorine contact basin:

(A) the design must provide a means of verifying the chlorine contact time and residual chlorine in each basin; and

(B) separate sampling points must be provided after each chlorine contact basin, unless the effluent from the basins is commingled at a single sampling point.

(5) The design of an aerated chlorine contact basin must include an analysis of the chlorine feed rate required to offset chlorine volatilization.

(6) The engineering report must include supporting data from a chlorine contact basin design model, performance data of a similar design, or a field tracer study.

(7) A chlorine contact basin must include a drain to facilitate removal of accumulated settled solids.

(c) Dechlorination Contact Time.

(1) A dechlorination system must have sufficient mixing and contact time between the disinfected wastewater and a dechlorinating agent to ensure continuous compliance with the chlorine limits in the wastewater permit.

(2) A dechlorination system must prevent short-circuiting and provide a minimum contact time of 20 seconds at the peak flow.

§217.282. Other Chemical Disinfection and Dechlorination Processes.

(a) Any chemical disinfection or dechlorination process not discussed in this subchapter, such as chlorine dioxide, ozone, tablet or powder disinfection and dechlorination processes, and liquid solution disinfection and dechlorination processes are subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(b) Chemical disinfection processes not discussed in this subchapter must be flow-paced and must use chemicals approved by the manufacturer for the purpose of wastewater disinfection.

§217.283. Post-Disinfection Requirements.

(a) Sampling points must be identified in the engineering report. A design must include a sufficient number of sampling points to:

(1) allow an operator to monitor the disinfection system for process control; and

(2) allow monitoring of permitted effluent limits.

(b) Dissolved Oxygen Requirements. A treatment facility must be designed with the ability to add post-aeration if needed to meet effluent limits for dissolved oxygen in the wastewater permit. If the wastewater permit requires a minimum dissolved oxygen of 5.0 milligrams per liter or greater, the engineering report must include calculations that demonstrate how the post-aeration system will maintain the minimum dissolved oxygen level.

SUBCHAPTER L: ULTRAVIOLET LIGHT DISINFECTION

§§217.291 - 217.300

Statutory Authority

The amendments are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.291. Ultraviolet Light Disinfection System Definitions.

(a) Module--A grouping of ultraviolet lamps electrically and physically connected to each other.

(b) Bank--A grouping of modules that:

(1) can be automatically turned on and off in relation to effluent flow variations;

(2) is electrically or physically connected together or physically adjacent to each other; and

(3) forms a complete unit capable of treating the full design width and depth of the disinfection channel.

§217.292. Ultraviolet Light Disinfection Systems Effluent Limitations.

Ultraviolet light disinfection systems must disinfect the effluent to the bacteria limits in the wastewater treatment facility's wastewater permit.

§217.293. Ultraviolet Light Disinfection Systems Redundancy Requirements.

(a) An ultraviolet (UV) disinfection system must include at least two banks positioned in series in a disinfection channel.

(b) A UV light disinfection system must meet the dosage requirements determined in §217.295 of this title (relating to Ultraviolet Light Disinfection Dosage and System Sizing) under all conditions.

(c) An owner must maintain an inventory of replacement equipment, including lamps, ballasts, quartz sleeves, banks, and modules, to replace equipment during emergency repairs and scheduled maintenance. The minimum inventory of replacement lamps, ballasts, and quartz sleeves is described in §217.298(b) of this title (relating to Ultraviolet Light Disinfection System Cleaning and Maintenance).

§217.294. Ultraviolet Light Disinfection Systems Monitoring and Alarms.

(a) An ultraviolet (UV) system shall continuously monitor and display the following information on the system control panel:

(1) the flow rate in each disinfection channel;

(2) the relative intensity of the lamps in one bank of a disinfection channel;

(3) the operational status and condition of each bank;

(4) the on or off status of each lamp in the system;

(5) the number of operating hours of the lamps in each bank in the system;

(6) the total number of hours of operation for each bank in the system; and

(7) the transmissivity of UV light in the disinfection channel.

(b) Flow pacing is required and shall be accomplished by automatically turning the appropriate number of banks on or off in proportion to effluent flow. Set points used to energize the banks must be adjustable.

(c) A UV system must include an alarm system.

(1) A wastewater treatment facility that is not supervised 24-hours per day must have a telemetry system with battery backup as part of the alarm system. A telemetry system must notify a wastewater treatment facility operator in the event of a UV alarm and must distinguish between major and minor alarms.

(2) A UV system must include the following minimum alarm conditions:

(A) A minor alarm must activate if:

(i) the UV intensity of the system is less than 45%, relative to the peak intensity after 100 hour burn in; or

(ii) there is a lamp outage.

(B) A major alarm must activate if:

(i) the UV intensity of the system is less than 25%, relative to the peak intensity after 100 hour burn in;

(ii) more than 10% of the lamps fail;

(iii) there is a loss of flow signal upon failure of a bank to energize;

(iv) there is an outage of any module or bank; or

(v) the transmissivity is low, based on the manufacturer's recommendations.

§217.295. Ultraviolet Light Disinfection Dosage and System Sizing.

(a) An ultraviolet light (UV) system must be sized based upon the results of an independent bioassay that meets the following minimum criteria.

(1) The lamp and ballast in a bioassay test system must have the same spectral characteristics and 254 nanometers (nm) wavelength output as the full-scale system.

(2) Spacing of the lamps in a bioassay test unit must be the same as in the full-scale system.

(3) The arrangement of the lamps must mirror the full-scale system.

(4) The maximum scale-up factor is 10.

(5) Scale down is prohibited.

(6) The minimum number of lamps in a bioassay is four lamps per reactor.

(b) If a variable output lamp is used, detailed documentation from the lamp manufacturer must be provided to document 254 nm ultraviolet output, operational wattage versus lamp input power (voltage and current), along with data demonstrating power requirements to the lamp and ballast to achieve the stated output.

§217.296. Ultraviolet Light Disinfection Bioassay Test Procedure.

(a) A bioassay procedure must conform to one of the following protocols:

(1) National Water Research Institute's *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse* (3rd edition, 2012); or

(2) NSF International, The Public Health and Safety Company, 40 CFR §35.6450 *Environmental Technology Verification Protocol* (October 2002).

(b) The following minimum standards are required for validation of a bioassay.

(1) The source of water for the test organism solution must be identified and its UV transmittance must be recorded. If potable water is used, the bioassay must also address how disinfectant residues were removed.

(2) The depth of the suspension must be 1.0 centimeter.

(3) The organism density must be 105 to 107 plaque forming units or colony forming units per milliliter.

(4) The dose response relationship must be based on a range of five to seven exposure times.

(5) The bioassay procedure must be conducted at least three times, each from a separate dilution of the same stock suspension. All results must be included for a bioassay to be valid.

(6) A minimum of two controls (unexposed) must be sampled and analyzed with each dose run. All results must be included for a bioassay to be valid.

(7) The diameter of the collimating tube must be at least equal to the diameter of the Petri dishes. Any difference between the diameter of the collimating tube and the diameter of the Petri dishes must be accounted for in the supporting calculations.

(8) The narrow band detector used for intensity determination must be calibrated for accuracy.

(9) 254 nanometer ultraviolet must be measured and reported as the dose response.

(10) The speed of the mixing bar must not cause spatter or cavitation.

(11) Any difference between the velocity profile in the bioassay and the velocity profile in the full-scale unit must be justified.

(12) Any difference between the gallons per minute per inch of UV lamp in the bioassay and the gallons per minute per inch of UV lamp in the full-scale unit must be justified.

(13) The lamp intensity data obtained in the bioassay must be used to set the operating parameters of the lamps.

(14) Lamp intensity used in the flow through test reactor shall be set after a 100-hour burn in and stabilization period.

(15) Electrical input for 100% lamp output must be recorded and verified.

(16) Lamp intensity in the bioassay must be measured at the exact height of the surface of the suspension.

(17) No operating condition may be used that has not been proven effective by the bioassay.

(18) Any variation from the criteria in this subsection must:

(A) be justified by using industry best practices such as *Standardization of Method for Fluence (UV Dose) Determination in Bench-Scale UV Experiments*, Bolton and Linden (2003); and

(B) approved through the variance procedures in §217.4 of this title (relating to Variances).

(19) Bioassay procedures and results must be signed and sealed by a licensed professional engineer.

(c) Effluent percent transmission during the full scale testing shall be established in accordance with the terms and conditions of the wastewater treatment facility's wastewater permit.

§217.297. Ultraviolet Light Disinfection Reactor Design.

(a) An approach channel must be unobstructed and have a minimum length of 4.0 feet before the first ultraviolet (UV) bank.

(b) The downstream channel length must be unobstructed for a minimum length of 4.0 feet following the last bank of UV lamps and before a fluid-level control device.

(c) Inlet channels must provide equal flow distribution across all UV channels.

(d) A downstream discharge point of a UV system must include a level control that ensures that the UV lamps remain submerged, according to the manufacturer's recommendations, regardless of flow.

(e) The UV system must prevent an individual's exposure to UV light from the UV system, including upstream and downstream portions of a UV channel.

(f) An enclosed UV system must have a dehumidifier or must be designed to prevent corrosion of electrical components.

§217.298. Ultraviolet Light Disinfection System Cleaning and Maintenance.

(a) An ultraviolet (UV) disinfection system must include provisions for draining each UV disinfection channel to another treatment unit within the wastewater treatment facility and for routine cleaning of the UV lamps and modules.

(b) A UV system must include the following replacement parts, as a percentage of the total system, equal to at least:

(1) 5% of the lamps;

(2) 2% of the ballasts; and

(3) 5% of the quartz sleeves.

(c) The UV system must ensure continuous disinfection during maintenance.

§217.299. Ultraviolet Light Disinfection System Safety.

Signs must be posted in an ultraviolet (UV) reactor area with "WEAR UV-RATED EYE PROTECTION" and "DO NOT LOOK AT UV LAMPS" in English and Spanish. Anyone in a reactor area must wear appropriate personal protection, including a UV-rated face shield and safety glasses or goggles.

§217.300. Post-Disinfection Requirements.

(a) Sample points. Sampling points must be identified in the engineering report. A design must include a sufficient number of sampling points to:

(1) allow an operator to monitor the disinfection system for process control; and

(2) allow monitoring of permitted effluent limits.

(b) Dissolved Oxygen Requirements. A wastewater treatment facility must be designed with the ability to add post-aeration if needed to meet effluent limits for dissolved oxygen in the wastewater permit. If the wastewater permit requires a minimum dissolved oxygen of 5.0 milligrams per liter or greater, the engineering report must include calculations that demonstrate how the post-aeration system will maintain the minimum dissolved oxygen level.

SUBCHAPTER M: SAFETY

§§217.321 - 217.330, 217.332, 217.333

Statutory Authority

The amendments are adopted under the authority of Texas Water Code (TWC), §5.013, which provides the commission's general jurisdiction; TWC, §5.103, which provides the commission's authority to adopt any rules necessary to carry out its powers and duties under the laws of Texas; TWC, §5.105, which provides the commission's authority to, by rule, establish and approve general policy of the commission; TWC, §5.120, which provides the commission's authority to administer the law to promote conservation and protection of the quality of the environment; TWC, §26.027, which authorizes the commission to issue permits; TWC, §26.034, which provides the commission's authority to adopt rules for the approval of disposal system plans; and TWC, §26.121, which provides the commission's authority to prohibit unauthorized discharges.

The adopted amendments implement TWC, §§5.013, 5.103, 5.105, 5.120, 26.027, 26.034, and 26.121.

§217.321. Safety Design of a Wastewater Treatment Facility.

(a) The safety aspects of a wastewater treatment facility design must be based on *Design of Municipal Treatment Plants*, WEF Manual of Practice No. 8, 5th edition, 2009, published by the Water Environment Federation. Other safety design guidelines may be used only if submitted in the design submittal and approved in writing by the executive director.

(b) Occupational safety and health hazards, and risks to workers and the public, must be addressed in the design of collection system and wastewater treatment facility equipment and processes.

(c) The design of a wastewater treatment facility must incorporate processes that use the least hazardous and least toxic chemicals and the smallest amounts of those chemicals that will effectively treat and disinfect the influent so that the effluent and sludge meet the requirements in the associated wastewater permit, and do not degrade the water quality in a receiving stream or cause accumulation of hazardous or toxic chemicals in a land application area.

(d) Where applicable, a design must follow the guidelines pursuant to 29 Code of Federal Regulations, Part 1910.

§217.322. Safety and Security Audits.

(a) Safety Audit.

(1) The owner of a wastewater treatment facility must conduct an annual safety audit of the wastewater treatment facility and collection system that evaluates injuries and incidents during the prior year in order to determine the locations, causes, types of injuries, and jobs being performed when the injuries or incidents occurred.

(A) For the purposes of this subchapter, an injury is harm or damage to an individual that results in any of the following: death, time away from work, restricted work or transfer to another job, medical treatment beyond first aid, or loss of consciousness.

(B) For the purposes of this subchapter, an incident is harm or damage to an individual that results in first aid.

(2) The annual safety audit must identify the locations and jobs associated with injuries and incidents and the owner must develop a corrective action plan with a reasonable risk-based schedule for implementing corrective actions to address the causes of the injuries and incidents.

(3) The owner must complete corrective actions according to the schedule in the owner's risk-based corrective action plan.

(b) Security Audit.

(1) The owner of a wastewater treatment facility must conduct an annual security audit of the wastewater treatment facility and collection system.

(2) The annual security audit must be based on the *Asset Based Vulnerability Checklist for Wastewater Utilities* (2002) by the Association of Metropolitan Sewerage Agencies. An equivalent security audit protocol may be used, but only if approved in writing by the executive director.

§217.323. Hazardous Operation and Maintenance.

(a) An owner shall perform a job safety analysis to identify potentially hazardous situations for a new or altered wastewater treatment unit or collection system unit before construction begins.

(b) For those identified potentially hazardous tasks, a list must be prepared for each task that identifies the necessary:

(1) tools, equipment, and supplies;

(2) fixed and portable lifting equipment;

(3) fixed and portable monitoring equipment;

(4) personal protective equipment and clothing;

(5) warning signs and guards; and

(6) first-aid supplies.

(c) The tools at a wastewater treatment facility must be sufficient to:

(1) allow workers to safely and properly operate equipment;

(2) perform required preventive maintenance, in compliance with the manufacturers' minimum requirements;

(3) make repairs; and

(4) maintain processes, pumps, motors, blowers, compressors, laboratory instrumentation, and other equipment.

§217.324. Chemical Handling.

(a) An owner must make available personal protective equipment for breathing, eyes, face, head, and extremities, as well as all other equipment recommended by the Safety Data Sheet, for all individuals that will handle any chemical known to pose a potential health risk. The owner must train the wastewater treatment facility staff in the use of the equipment.

(b) A wastewater treatment facility that uses any chemical must be designed to provide eye washing and showering systems within each chemical work area for immediate emergency use. The specifications must reference a recognized national reference standard, such as American National Standards Institute Z358.1, for placement and installation of eye wash stations and showers.

(c) All personal protective equipment and chemical neutralizers must be immediately accessible outside a chemical storage area.

§217.325. Railings, Ladders, Walkways, and Stairways.

(a) A guard rail with an opening that is designed to provide access must have a removable chain across the opening when the opening is not in use.

(b) An open valve box, pit, tank, or basin with walls that extend less than 4.0 feet above ground must have a railing that extends from the top of the walls to at least 4.0 feet above ground level. The railing must be capable of preventing an individual from falling into the open valve box, pit, tank, or basin.

(c) Equipment and work areas that are more than 4.0 feet above or below ground level must be designed with a permanent stairway for access unless the work area is a manhole or a similar confined space.

(d) A ladder must have flat safety tread rungs and must extend at least 3.5 feet out of a vault.

(e) A walkway above an open tank must have a toe board at least four inches tall that is designed to prevent a person from slipping off the walkway. Owners and engineers should refer to 29 Code of Federal Regulations, Part 1910, Subpart D, for additional guidance on walking and working surfaces.

(f) Walkways, steps, landings, and ladder rungs must have a non-slip finish. The vertical rise between adjacent steps on a stairway must not exceed 9.5 inches. Stairways must be designed with no horizontal gap between the tread run of adjacent steps.

(g) An overhead pipe or other overhead obstruction must have at least a 7.0-foot clearance, unless the pipe or obstruction is padded to prevent head injury and has a warning sign.

(h) Basins with vertical walls terminating more than 4.0 feet above or below ground level must be designed with a stairway for access.

(i) Guard rails on walkways shall have adequate clearance space for maintenance operations.

(j) Clarifiers must have grating across the discharge pipe in the launder or stop bars across the launder before the discharge pipe to prevent an individual from entering the discharge pipe from the clarifier.

(k) All guard rails, railings, ladders, walkways, and associated appurtenances must be designed and constructed to ensure the safety of individuals at the wastewater treatment facility.

§217.326. Electrical and Fire Code Compliance.

(a) The electrical elements of a wastewater treatment facility and collection system must conform to local electrical codes. If the wastewater treatment facility or collection system is located in an area that does not have a local electrical code, the electrical elements must comply with the most recent edition of the National Fire Protection Association 70 National Electrical Code® at the time of installation.

(b) The wastewater treatment facility and collection system must conform to local fire codes. If the wastewater treatment facility is located in an area that does not have a local fire code, the wastewater treatment facility and collection system must comply with the most recent edition of National Fire Protection Association 1 Fire Code® at the time of installation.

(c) Electrical elements must be protected from environmental hazards with a housing. Environmental hazards include moisture, extreme temperatures, and pests.

§217.327. Non-Potable Water.

Each hydrant and outlet for non-potable water must have signs in both English and Spanish reading "NON-POTABLE WATER, DO NOT DRINK" and "NO BEBA EL AGUA."

§217.328. Wastewater Treatment Facility Access Control.

(a) A wastewater treatment facility must be completely enclosed by an intruder-resistant fence.

(1) The intruder resistant fence must have a locked gate at each access point.

(2) The intruder-resistant fence must be at least 6.0 feet tall, and the bottom of the fence must be close enough to surface grade to prevent human access.

(3) The intruder-resistant fence must be constructed of wood, concrete, masonry, or metal. Other materials may be used, but only if approved in writing by the executive director.

(4) The top of the intruder-resistant fence must have at least three strands of barbed wire. A fence that is at least 8.0 feet tall does not require barbed wire. The top of an intruder-resistant fence may have outwardly-directed iron bars spaced on four-inch centers instead of barbed wire.

(5) A five-strand barbed wire fence may be used in a rural area for fencing lagoons or overland-flow plots, but only if approved in writing by the executive director.

(b) A wastewater treatment facility must have hazard signs on the outward facing side of the fence, stating "DANGER - NO TRESPASSING" in English and Spanish. At least one clearly visible and legible hazard sign must be placed on each gate and each side fence.

(c) A wastewater treatment facility must be accessible by truck during all weather conditions, including a 25-year, 24-hour rainfall event, and must have at least one all-weather access road with the driving surface situated above the 100-year flood plain.

§217.329. Color Coding of Pipes.

(a) A new wastewater treatment facility must have color-coded pipes in accordance with subsection (e) of this section.

(b) A new wastewater treatment facility must have detectable underground warning tape for each non-metallic underground pipe.

(c) An existing wastewater treatment facility must color-code and install detectable underground warning tape for each pipe installed as part of an alteration.

(d) A non-potable water pipe must be painted purple and be stenciled "NON-POTABLE WATER, DO NOT DRINK" and "NO BEBA EL AGUA."

(e) A wastewater treatment facility design must use the following color-coding for pipes:

(1) sludge - brown;

(2) natural gas - red;

(3) potable water - light blue;

(4) chlorine - yellow;

(5) sulfur dioxide - lime green with yellow bands;

(6) sewage - grey;

(7) compressed air - light green;

(8) heated water - blue with 6 inch red bands spaced 30 inches apart;

(9) power conduit - in compliance with the National Fire Protection Association 70 National Electrical Code®;

(10) reclaimed water – purple with black lettering;

(11) gray water – purple with yellow writing;

(12) instrument air - light green with dark green bands;

(13) liquid alum - yellow with orange bands;

(14) alum (solution) - yellow with green bands;

(15) ferric chloride - brown with red bands;

(16) ferric sulfate - brown with yellow bands;

(17) polymers - white with green bands;

(18) ozone - stainless steel with white bands;

(19) raw water - tan; and

(20) effluent after clarification - dark green.

§217.330. Drinking Water Supply Connections.

(a) A connection between a drinking water supply system and any part of a wastewater treatment facility or collection system must be made through an air gap or a

reduced-pressure backflow assembly (RPBA) in accordance with American Water Works Association (AWWA) Standard C511-97 or AWWA Manual M14.

(b) Each RPBA must be tested and passed annually by a commission licensed backflow prevention assembly tester. If an RPBA fails an annual test, it must be repaired or replaced, and then retested by a commission licensed backflow prevention assembly tester.

(c) RPBA test results and maintenance records must be retained at the wastewater treatment facility for at least three years.

(d) Vacuum breakers are required on all potable water spigots.

§217.332. Noise Levels.

(a) An area accessed by individuals must be designed to comply with 29 Code of Federal Regulations §1910.95.

(b) Removable noise attenuation equipment, such as removable mufflers or removable noise-reducing panels , must remain attached to the equipment at all times

to reduce noise, unless the noise attenuation equipment is removed for maintenance activities .

§217.333. Confined Spaces.

(a) A design must, to the extent practicable, avoid creating confined spaces as defined in 29 Code of Federal Regulations §1910.146.

(b) A ventilating manhole must be equipped with a connection for a portable ventilator.

(c) A confined space entry must be conducted according to the requirements of 29 Code of Federal Regulations §1910.146.