SUBCHAPTER K: CHEMICAL DISINFECTION
§§217.271 – 217.283

Statutory Authority

[Language drafted and provided for inclusion by OLS attorney assigned to this rulemaking project (this should be done simultaneously while the Fiscal Note information is being drafted (if not before)).

Note: The **1st paragraph** of a Statutory Authority should state what the rules are proposed "under the authority of," and the **2nd paragraph** should list (no titles) any bills, statutes (state or federal) the rules implement.]

RULE OF THUMB: for existing rules/sections, language must have been downloaded from 30 Texas Administrative Code as this is the *official* version of the rules.

- **NEW language**: to designate language that is *new* to 30 TAC, you ***must*** underline new language that does *not* currently exist in TAC, including punctuation
- **Delete existing language**: to designate existing language in 30 TAC that is *obsolete, no longer required/needed*, [you ***must*** place that language between brackets] in order to show deletion of that language from 30 TAC
- new language before [old language]

§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.

$$Cyl = \frac{PPD}{W_{g1}}$$

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_{g1} = 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.

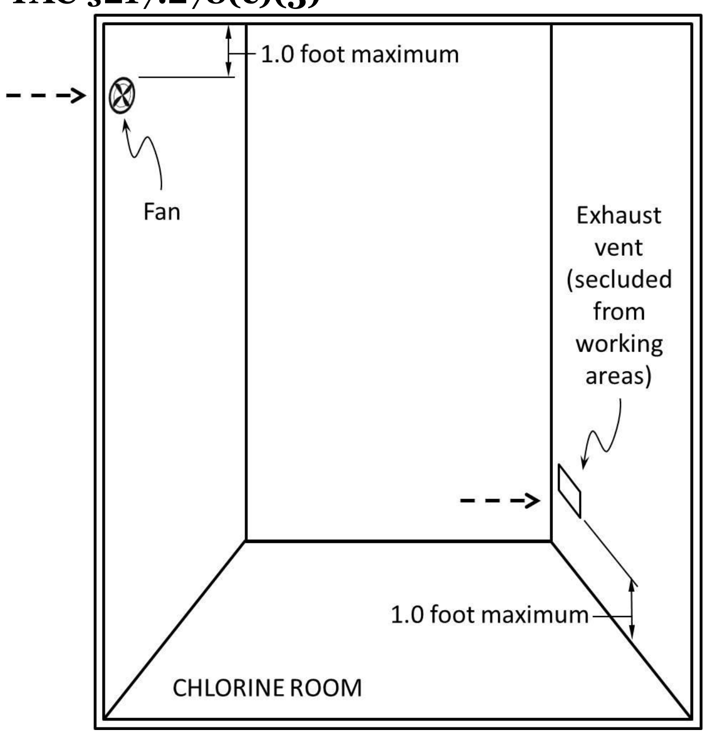
(2) Exhaust equipment must have:

(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)

(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.

Removing §217.282 and §217.283 which will be replaced by §217.283 and §217.284

§217.282. Peracetic Acid Disinfection Design Requirements.

(a) Peracetic acid disinfection systems are subject to the requirements of §217.7(b)(2) of this title (relating to Types of Plans and Specifications Approvals).

(b) Peracetic acid disinfection systems must disinfect the effluent to the bacterial limits in the wastewater treatment facility's wastewater permit.

(c) Using peracetic acid disinfection may increase the BOD concentration in the treated effluent, which may cause a violation of the permit; therefore, it must be designed accordingly.

(d) Redundancy. Peracetic acid 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.

(e) Capacity and Sizing. The size of a chemical liquid solution pump and pipe system must be determined as follows:

(1) The capacity of a PAA disinfection 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).

(2) Pounds Per Day of PAA Required. Figure: 30 TAC §217.282(e)(2), Equation K.6. must be used to determine the pounds per day of peracetic acid required.

(3) PAA Determination. The pounds of available PAA per gallon peracetic acid solution must be determined using values and appropriate references supplied by the chemical manufacturer.

(4) Gallons per Hour Determination. In order to size the chemical metering equipment, the gallons per hour must be calculated using Equation K.7. in Figure: 30 TAC §217.282(e)(4).

Figure: 30 TAC §217.282(e)(2)

Equation K.6.

$$PPD = Q \times D \times 8.34$$

Where:
PPD = pounds per day of PAA required for treatment Q = Peak two-hour flow (millions of gallons per day)
D = PAA dose. Typical doses range from 1.0 to 10 mg/L. Design PAA doses shall be determined through bench-scale, pilot-scale, and full-scale testing.
8.34 = conversion factor.

Figure: 30 TAC §217.282(e(4)

Equation K.7.

$$R = \frac{PPD}{24C}$$

Where:
R = gallons per hour of PAA solution
PPD = pounds per day of PAA that must be delivered to the wastewater, pound per day
C = pounds of available PAA per gallon of peracetic acid solution, pound of PAA per gallon.

(f) Dosage Control. A dosage control system must automatically adjust the PAA feed rate to correspond to the flow of the effluent stream.

(g) Chemical Handling

(1) Storage Tank Sizing

(A) A storage facility for peracetic acid with a solution strength equal to 12 to 21.5% must not be sized to store more than a 30-day supply, based on the daily average consumption.

(B) 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 peracetic acid tank that is stored outdoors must block sunlight from penetrating the tank.

(B) Peracetic acid must be stored in a well-ventilated place, with average temperatures not exceeding 30 °C (86 °F) during storage period.

(h) Equipment and Materials

(A) Equipment and materials used for storage, pumping, and transport of peracetic acid must be used according to the manufacturer's recommendations and designed for use in a corrosive chemical environment.

(B) Peracetic acid bulk storage tanks must be fabricated of compatible materials such as high-density polyethylene (HDPE) and passivated stainless steel 304L or 316 L.

(i) Application of PAA

(1) Mixing zones.

(A) A mixing zone within a PAA contact basin must not be considered as part of the volume needed for disinfection. A mixing zone must be designed to ensure that the peracetic acid is thoroughly mixed with the wastewater before entering a PAA contact chamber as described below:

(B) A peracetic acid disinfection system must apply the peracetic
acid solution in a highly turbulent flow regime created by in-line diffusers, static mixers, 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.

(C) A serpentine disinfection channel or contact tank may be used in place of mechanical mixing if the length-to-width ratio is at least 40-to-1 and complete mixing is demonstrated by a dye test.

(2) PAA Contact Basin

(A) A PAA contact basin must provide a peracetic acid contact time that ranges between 7.5 min and 30 minutes at the peak flow. Design PAA contact times shall be determined by bench-scale or pilot-scale studies. Alternative methods to determine the PAA contact must be approved by the executive director.

(3) PAA Application Points. Peracetic acid application point must be located near the inlet to the contact tank. If the facility experiences large flow variation between the peak flow and current average daily flows, a second application point can be considered at or near the mid-point of the contact tank for use during average daily flow conditions.

(4) Residual Requirements. The maximum peracetic residual concentration from a wastewater treatment facility must be 1.0 mg/L. TCEQ can review this concentration at any time based on the potential impact of the PAA residual in the receiving body.

(j) Safety

(1) Ventilation. A PAA storage area must be ventilated to exhaust fumes.

(2) Venting and Pressure-Relief. Bulk pressure tanks must be provided with venting and pressure-relief devices that allow the tank to breath and prevent operator exposure to PAA vapors, and damage caused by over-pressurization in a decomposition event.

(3) Instrumentation. Storage tanks must be fitted with the following instrumentation:

(A) Temperature in PAA storage tanks must be continuously monitored to provide early indication in case of decomposition. Temperature must be displayed continuously, and alarms triggered whenever temperature exceeds 50 °C (122 °F).

(B) Storage tank level indications must include continuous monitoring, high-level alarm, and a high-high level switch with alarm and safety interlock to shut down the transfer pump filling the tank.

(4) Spill Containment

(A) A chemical storage area for peracetic acid must have a secondary containment equal to 125% of the volume of the largest storage tank.

(B) manifolded tanks must have a 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.

(5) Emergency and Protective Equipment. Chemical storage and handling areas must have at least one emergency eyewash station and personal protective equipment for all wastewater treatment facility staff working in the area.

§217.283[2]. 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.

§217.284[3]. 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
Effective December 4, 2015

§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).

(d) A UV light disinfection system design must have multiple at least two parallel channels of the same capacity that ensures continuous disinfection at peak flow capacity when one of the channels is out operation for cleaning or 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

(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.

(c) An ultraviolet light (UV) system must be limited to a high-quality effluent having at least 65% ultraviolet radiation transmittance at 254 nanometers wavelength, and a BOD and TSS solids concentrations no greater than 30 mg/L at any time.

(d) An ultraviolet light (UV) disinfection system for an activated sludge effluent must be sized with a UV radiation dosage of not less than 30 mJ/cm^2 after adjustments for lamp age and quartz sleeve fouling factors.

§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).] U.S. Environmental Protection Agency. *Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (2006).

(3) International Ultraviolet Association (IUVA). *Uniform Protocol for Wastewater UV Validation* Applications (Whitby et al., 2011).

(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 be [:

(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.

(g)The UV channels must be completely covered to prevent exposure to light and the development of biofilms on the walls of the UV channels and on UV equipment. UV channels shall be cleaned and disinfected on a periodic basis to remove biofilm growths.

§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 – 217.333

Statutory Authority

[Language drafted and provided for inclusion by OLS attorney assigned to this rulemaking project (this should be done simultaneously while the Fiscal Note information is being drafted (if not before)).

Note: The **1st paragraph** of a Statutory Authority should state what the rules are proposed "under the authority of," and the **2nd paragraph** should list (no titles) any bills, statutes (state or federal) the rules implement.]

RULE OF THUMB: for existing rules/sections, language must have been downloaded from 30 Texas Administrative Code as this is the *official* version of the rules.

- **NEW language**: to designate language that is *new* to 30 TAC, you ***must*** underline new language that does *not* currently exist in TAC, including punctuation
- **Delete existing language**: to designate existing language in 30 TAC that is *obsolete, no longer required/needed*, [you ***must*** place that language between brackets] in order to show deletion of that language from 30 TAC
- new language before [old language]

§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. The annual security audit must analyze:

A. Physical security items (fences, gates, hatches etc.)

B. Cyber security of all SCADA and electronic systems at the wastewater plant and within the 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 8.0 [4.0] feet above ground must have a railing that extends from the top of the walls to at least 4.0 feet above the top of the wall [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) All above ground basins should include standard width catwalks or walkways to allow all maintenance operations to be performed safely on all sides of the basins within the plant.

(f) [(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.

(g) [(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.

(h) [(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.

(i) [(h)] Basins with vertical walls terminating more than 4.0 feet above or below ground level must be designed with a stairway for access.

(j) [(i)] Guard rails on walkways shall have adequate clearance space for maintenance operations.

(k) [(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.

(l) [(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.

§217.331. Freeze Protection.

A horizontal surface subject to freezing temperatures and water accumulation must be sloped to prevent ice formation.

§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.