TITLE 252. DEPARTMENT OF ENVIRONMENTAL QUALITY
CHAPTER 656. WATER POLLUTION CONTROL FACILITY CONSTRUCTION STANDARDS

SUBCHAPTER 1. INTRODUCTION

252:656-1-2. Definitions

In addition to terms defined in Title 27A of the Oklahoma Statutes, the following words or terms, when used in this Chapter, shall have the following meaning unless the context clearly indicates otherwise:

"25-year flood" means a flood event that has a 4 percent chance of being equaled or exceeded in magnitude in any given year.

"100-year flood" means a flood event that has a 1 percent chance of being equaled or exceeded in magnitude in any given year.

"208 Plan" means an area wide wastewater treatment management plan that states are required to submit to EPA for approval pursuant to section 208 of the Clean Water Act, 33 U.S.C. § 1288.

"ASTM" means the American Standard Testing Method and Material.

"Biosolids" means organically treated wastewater materials from municipal wastewater treatment plants that are suitable for recycling as a soil amendment. This term is within the meaning of "sludge" as defined in 27A O.S. § 2-6-101(11). Biosolids are divided into the following classes:

(A) Class A Biosolids meets the pathogen reduction requirements of 40 CFR § 503.32 (a);

(B) Class B Biosolids meets the pathogen reduction requirements of 40 CFR § 503.32 (b).

"BOD" means total 5-day biochemical oxygen demand.

"Bypass" means the intentional or unintentional diversion of a waste stream from any portion of a wastewater treatment system.

"CBOD" means 5-day carbonaceous biochemical oxygen demand.

"Cell" means an individual basin of a lagoon system.

"cfm" means cubic feet per minute.

"Collection system" means pipelines or conduits, pumping stations, force mains and all other facilities used to collect or conduct wastewater to a treatment works.

"CT" means the product of residual disinfectant concentration, (C) in (mg/l), and the corresponding disinfectant contact time (T) in minutes, i.e., C x T. CT requirements for a variety of disinfectants and conditions is in the EPA Guidance Manual to the Surface Water Treatment Rule.

"DEQ" means the Oklahoma Department of Environmental Quality.

"Discharge point" means the point at which wastewater enters Waters of the State or become Waters of the State.

"Domestic wastewater" means wastewater from drinking fountains, showers, toilets, lavatories and kitchens.

"End-of-pipe" means the terminal points in all reclaimed water users'distribution systems.

"Engineer" means a person licensed to practice engineering in Oklahoma.

"fps" means feet per second.

"Freeboard" means the vertical distance from the surface water level to the overflow elevation in a treatment unit.

"GPM" means gallons per minute.

"Land application" means the controlled application of treated wastewater onto the land surface for beneficial use.

"MGD" or "mgd" means million gallons per day.

"MLSS" means mixed liquor suspended solids.

"MLVSS" means mixed liquor volatile suspended solids.

"New technology" means any method, process or equipment which is used to treat or convey sewage which is not addressed in this Chapter. This does not refer to innovative technology as defined by 40 CFR Part 35.

"NPDES" means the National Pollution Discharge Elimination System.

"OAC" means Oklahoma Administrative Code.

"OSHA" means the Occupational Health and Safety Administration.

"Open storage basin" means an uncovered basin, below or above ground level, that is designed, maintained and operated to store Category 2 or 3 reclaimed water.

"Person" means any individual, company, corporation, government agency, municipality, or any other entity.

"Population equivalent" and **"PE"** mean the calculated population which would normally contribute the same amount of biochemical oxygen demand (BOD) per day of wastewater. It is computed on the basis of 0.17 lb. of 5-day BOD per capita per day.

"PSRP" means process to significantly reduce pathogens.

"PVC" means polyvinyl chloride.

"Reclaimed water" means wastewater that has gone through various treatment processes to meet specific water quality criteria with the intent of being used in a beneficial manner.

"Retention time" means the theoretical time required to displace the contents of a tank or treatment unit at a given rate of flow (volume divided by rate of flow).

"Riprap" means a permanent, erosion resistant ground cover that consists of hard, sound durable stones that average in weight between thirty to fifty pounds (30-50 lbs), with no more than twenty percent (20%) weighing less than twenty pounds (20 lbs).

"Service line" means a wastewater line that connects an individual home, building or business to a permitted collection system.

"Total Kjeldahl nitrogen (TKN)" means the total of the organic and ammonia nitrogen.

"Treatment works" means any plant, disposal field, lagoon, incinerator or other facility used to treat, stabilize, hold or reclaim non-industrial wastewater.

"UL" means Underwriters Laboratories Inc.

"U.S.C." means United States Code.

"Variation" means change from the adopted or current standards for equipment, material or process.

"Wastewater system" means a collection system and treatment works.

"Water reuse system" means a treatment and distribution system designed to treat and supply reclaimed water.

252:656-1-3. Permit requirements

(a) **Permit to construct.** No one shall construct, modify or put into operation a wastewater system or a water reuse system without first obtaining a permit to construct from DEQ. Permits to construct will not be issued for new Category 4 restricted golf course irrigation systems pending further research and evaluation of performance data collected from existing systems.

(b) **Permit to supply.** No one shall supply reclaimed water without first obtaining a permit to supply from DEQ,, except when using reclaimed water within the wastewater treatment plant boundaries pursuant to Category 6.

SUBCHAPTER 3. PERMIT PROCEDURES

252:656-3-4. Engineering report

(a) Applicants shall submit to DEQ two (2) copies of the engineering report for proposed new construction or modifications to sewage collection systems, or treatment works at least thirty (30) days prior to the submittal of plans and specifications. Applicants shall also submit a letter in which the applicant endorses the contents of each engineering report submitted to DEQ. For line extension and lift station construction, the submission of an Engineering Report Form, developed by DEQ, signed and sealed by an engineer licensed by the State of Oklahoma, may be submitted

to meet the requirements of the necessary engineering report, unless a full engineering report is required by DEQ. Engineering reports ~~must~~ shall include:

(1) **Volume and strength of sewage flow.** Establish the existing and anticipated design average and design peak flows and waste load for the existing and ultimate conditions. Include the basis for projecting initial current and/or future dry and wet weather flows and waste load for the existing, or initial, service area, and the anticipated future service area. For discharging facilities, the report must demonstrate that the proposed project complies with the design flow in the 208 Plan and other applicable OPDES permit limits.

(2) **Existing system.** Describe the existing system, including the need~~s~~ for the project related to health and safety, system operations and maintenance, and population growth. Issues that must be addressed include, but are not limited to, suitability of existing facilities for continued use, adequacy of water supply, history of compliance with state and federal requirements, and comparison of existing treatment units with state and federal design requirements.

(3) **Project description and alternatives**. The report must contain a description of the alternatives that were considered to meet the identified need. Provide a service area and project site maps showing the existing and proposed systems. The information must describe legal and natural boundaries, major obstacles, elevations, and any other information necessary to properly evaluate the project. Describe the proposed project and, where two or more solutions exist, discuss the alternatives including cost analysis and discuss the reasons for selecting the one recommended. For each alternative considered, the report must provide the following:

(A) **Description.** A description of the collection system, pumping systems, treatment, and discharge facilities associated with each alternative as applicable.

(B) **Design criteria.** The design parameters used for evaluation purposes.

(C) **Schematic.** A schematic diagram(s) of all existing and proposed treatment processes.

(D) **Land requirements.** The identification of sites and easements that will be used and whether the sites:

(i) are currently owned or leased by the applicant, or

(ii) will be acquired or leased by the applicant.

(E) **Construction problems.** A discussion of concerns such as subsurface rock, high water table, limited access, or other conditions that may affect the cost of construction or the operation of the facility.

(F) **Advantages and disadvantages.** A description of the ability of each alternative to meet the owner's needs, address violations cited in any enforcement orders, satisfy public and environmental concerns, and comply with regulatory requirements. The report must demonstrate the compatibility of each alternative with existing, comprehensive, and area-wide development plans. Provide a short description of environmental impacts that may preclude any alternatives.

(G) **Selected alternative.** A complete description of the proposed project based on the general description presented in the evaluation of alternatives. The report must show that the proposed project will comply with all the requirements of this Chapter. At a minimum, the following information must be included:

(i) **Treatment**. A description of the processes, including biosolids management, in detail and the identification of the location of the plant and the site of any discharges; a status of compliance with the 208 Plan, and if applicable, include current revisions with copy of DEQ approval letter, if approved in the current 208 Plan.

(ii) **Pumping stations**. The size, type, location and any special power requirements, including provisions for emergency operations, of all pumping stations.

(iii) **Collection system layout**. Identify general location of line improvements, including: lengths, sizes and key components.

(iv) **Calculations**. Provide supporting calculations in sufficient detail to demonstrate compliance with DEQ design requirements to assure adequate capacity

for the collection and treatment system as a whole to transport and treat the wastewater or reclaimed water. For collection system projects, the submittal must include a map with a list of manholes and pipes and the associated characteristics, such as elevation of inverts, pipe diameter, pipe segment length, and other information necessary to evaluate the project. The report must provide assurance that the receiving collection and treatment systems have adequate capacity.

(4) **Construction sequence.** A description of the sequence of construction and steps needed to maintain compliance during construction. If the project is not to be completed in one sequence, then provide details of the phases.

(5) **Site.** Describe the topography, soils, geologic conditions, depth to bedrock, groundwater level, floodway or floodplain considerations, and other pertinent site information. The project must be constructed on the site consistent with approved plans. Include 6 months of data on the groundwater level. Provide soil boring information pursuant to OAC 252:656-11-3 (a) for projects that include lagoons or other non-industrial impoundments.

(6) **Water supply.** Identify surface water intakes within five (5) miles of the discharge and known public and private water wells within three hundred feet (300').

(7) **Receiving stream.** Identify the receiving stream and its wasteload requirements according to the Water Quality sections of OAC 252:606 and Oklahoma's Water Quality Management Plan (208 Plan).

(8) **Disposition of biosolids.** Discuss the available alternatives for biosolids reuse and/or disposal (OAC 252:606 and OAC 252:515). Submit a sludge management or sludge disposition plan to DEQ for approval. All biosolids that will be land applied and/or disposed in a landfill must comply, at a minimum, with the Class B pathogen reduction requirements contained at 40 CFR, Part 503, adopted by reference at OAC 252:606.

(9) **Industrial wastes.** Discuss the characteristics and volume of anticipated industrial wastes.

(10) **Collection system.** Describe the area to be served by existing and proposed sewers. Sewer capacities must be designed for the estimated ultimate population that will be served. Similarly, consideration must be given to the maximum anticipated loadings from institutions, industrial parks and other similarly situated facilities.

(11) **Financing.** Provide itemized cost estimates to build, operate and maintain the proposed project including, but not limited to:

(A) development, construction, land and rights-of-way, legal services, engineering services, contingencies, refinancing, and any other factors associated with the proposed project;

(B) discuss financing methods;

(C) provide information regarding rate structures, annual operating and maintenance (O&M) cost, tabulation of users by monthly usage categories and revenue received for the last three fiscal years; and

(D) give status of existing debts and required reserve accounts. Include a schedule of short-lived assets and a recommended annual reserve deposit to fund replacement of short-lived assets such as pumps, paint and small equipment.

(12) **Enforcement orders.** Discuss all applicable enforcement orders, including the violations cited in the orders and how the project will eliminate said violations.

(13) **Conclusions and Recommendations.** Provide any additional findings and recommendations that must be considered in development of the project. This must include:

(A) recommendations for a specific course of action to be undertaken;

(B) any special studies to be developed;

(C) highlight the need for special coordination, include a recommended plan of action to expedite project development, etc.

(14) **Project Schedule**. The report must propose a schedule to:

(A) obtain funds to complete the proposed project;

(B) submit construction plans, specifications, and permit application(s);

(C) start construction;

(D) complete construction~~,~~; and
(E) attain compliance with applicable OPDES discharge permits.

(b) **Water reuse treatment and reclaimed water distribution systems.** Applicants shall submit to DEQ two (2) copies of the engineering report for proposed new construction or modifications to water reuse treatment and reclaimed water distribution systems. Engineering reports shall be submitted at least thirty (30) days prior to the submission of plans and specifications and all engineering reports submitted to DEQ shall be signed and sealed by an engineer licensed by the State of Oklahoma. Applicants shall also submit a letter in which the applicant endorses the contents of each engineering report submitted to DEQ. For line extension and lift station construction, the submission of an Engineering Report Form, developed by DEQ, signed and sealed by an engineer licensed by the State of Oklahoma, may be submitted to meet the requirements of the necessary engineering report, unless a full engineering report is required by DEQ. Engineering reports shall include the following, as applicable:

(1) **Volume and quality of reclaimed water flow.** Describe anticipated flow from wastewater treatment works to the water reuse treatment facility. For discharging facilities, the report must demonstrate how the proposed project impacts the design flow in the 208 Plan and other applicable OPDES permit limits.

(2) **Existing system.** Describe existing wastewater treatment and water reuse systems. Descriptions shall include: the suitability of existing facilities for continued use, adequacy of water supply and the facility's history of compliance with state and federal requirements.

(3) **Project description.** Provide service area and project site maps showing the existing and proposed systems. The information shall describe legal and natural boundaries, elevations, major obstacles and any other information necessary to properly evaluate the project. Project descriptions shall include the following:

(A) **Description.** A description of the wastewater treatment system preceding the water reuse treatment facility.

(B) **Design criteria.** The design parameters used for evaluation purposes.

(C) **Schematic.** Schematic diagrams of all existing and proposed treatment processes.

(D) **Land requirements.** Identification of the sites and easements that will be used and whether the sites:

(i) are currently owned or leased by the applicant, or

(ii) will be acquired or leased by the applicant.

(E) **Treatment**. A detailed description of the treatment processes, including biosolids management, identification of the location of the plant and the site of any discharges:

(i) **Pumping stations**. Identify the size, type, location, any special power requirements and provisions for emergency operations of all pumping stations.

(ii) **Reclaimed water distribution system layout**. Identify the general locations of line improvements, including lengths, sizes and key components.

(iii) **Calculations**. Provide supporting calculations in sufficient detail to demonstrate compliance with DEQ design requirements.

(4) **Construction sequence.** A description of the sequence of construction and steps needed to maintain compliance during construction. If the project is not to be completed in one sequence, then provide details of the phases.

(5) **Site.** Describe the topography, soils, geologic conditions, depth to bedrock, groundwater level, floodway or floodplain considerations, and other pertinent site information. The project must be constructed on the site consistent with approved plans. Include 6 months of data on the groundwater level. Provide soil boring information pursuant to OAC 252:656-11-3 (a) for projects that include lagoons or other non-industrial impoundments.

(6) **Biosolids handling**. If the proposed project will increase the production of biosolids and/or residuals, provide a description of any modifications necessary to properly treat and dispose of biosolids. All biosolids that will be land applied and/or disposed in a landfill must comply, at a minimum, with the Class B pathogen reduction requirements contained at 40 CFR, Part 503, adopted by reference at OAC 252:606. Submit a sludge management or sludge disposition plan as appropriate to the DEQ for approval.

(7) **Reclaimed water distribution system.** A description of the following:

(A) The location, size, and direction of flow of all existing and proposed reclaimed water distribution lines from the point of connection with the existing or proposed treatment works or storage locations to the end user.

(B) A summary of quantities that includes, at a minimum, pipe size, materials and linear feet of piping, types of testing and number and size of pumps.

(C) The disinfection system design based on one of the following criteria:

(i) maintaining a chlorine residual to end-of-pipe pursuant to Appendix A of OAC 252:627; or

(ii) a DEQ approved calibrated model of chlorine decay rate in the distribution system to demonstrate that adequate chlorine residual will be maintained to prevent slime growth and regrowth of pathogens to end-of-pipe.

(8) **Financing.** Itemized cost estimates to build, operate and maintain the proposed project including, but not limited to:

(A) development, construction, land and rights-of-way, legal services, engineering services, contingencies, refinancing, and any other factors associated with the proposed project;

(B) financing methods;

(C) information regarding rate structures, annual operating and maintenance (O&M) cost, tabulation of users by monthly usage categories and revenue received for the last three fiscal years; and

(D) the status of existing debts and required reserve accounts. Include a schedule of short-lived assets and a recommended annual reserve deposit to fund replacement of short-lived assets such as pumps, paint and small equipment.

(9) **Enforcement orders.** A discussion of all enforcement orders, identifying the violations cited in orders and explaining how the project will eliminate those violations.

(10) **Conclusions and Recommendations.** All engineering reports shall include a recommendation for a specific course of action to be undertaken~~,~~. The conclusions and recommendations shall also include any additional findings, identify any special studies to be developed, and any other recommendations that must be considered in development of the project.

(11) **Project Schedule**. A proposed schedule to:

(A) obtain funds to complete the proposed project~~,~~;

(B) submit construction plans, specifications, and permit application(s)~~,~~ ;

(C) start construction~~,~~;

(D) complete construction~~,~~; and

(E) attain compliance with applicable OPDES discharge permits.

252:656-3-5. Plans and specifications

(a) **General plans.** Applicants shall submit to DEQ two (2) copies of general plans that include the following:

(1) **Plan view.** Include a plan view of the plant and any discharge points, using at least 10-foot contours.

(2) **Flood elevations.** Show both the 25-year and 100-year flood elevations and their boundaries.

(3) **Existing and proposed treatment works.** Show the physical arrangement of all treatment units on a project site plat.

(4) **Existing collection systems.** Show the location, size and direction of flow of all existing sanitary sewers at the point of connection with proposed new sanitary sewers. Show the elevations of all sewer inverts close to the manholes.

(5) **Proposed collection systems.** Show the location of all proposed sewers, sewer easements and direction of flow. Number all manholes on the layout and correspondingly on the profile. Provide a summary of quantities that includes, at a minimum, linear feet of trenching, number of manholes, size, materials and linear feet of piping, types of testing and

number and size of pumps (if applicable).

(6) **Existing and proposed reclaimed water distribution systems.** Show the location, size, and direction of flow of all existing and proposed reclaimed water distribution lines from the point of connection with the existing or proposed treatment works or storage locations to the end user. Provide a summary of quantities for proposed reclaimed water distribution lines that includes, at a minimum, pipe size, materials and linear feet of piping, types of testing and the number and size of pumps. Testing specifications shall include requirements for flushing mains to remove any construction debris before placing the system into service. Construction of reclaimed water distribution systems shall be in accordance with OAC 252:626-19-2, except as follows:

(A) locate reclaimed waterlines at least 5 feet horizontally from any existing or proposed potable waterlines;

(B) locate reclaimed waterlines at least 5 feet horizontally from any existing or proposed sewer lines;

(C) locate reclaimed waterlines crossing any existing or proposed potable waterlines at least 2 feet vertically below the potable waterlines; and

(D) locate reclaimed waterlines crossing any existing or proposed sewer lines at least 2 feet vertically above the sewer lines.

(7) **Drawings.** Show the name of the municipality, sewer district, or institution; scale in feet; north point; date; and name, telephone number, address, signature of engineer and/or imprint of engineer's seal on the drawings. In the case of bound documents, engineers must affix their seal, signature and date to the cover sheet or index page, which identifies all documents bound together for which the registrant has responsible charge. In the absence of a cover sheet or index page each sheet must have the seal, and dated signature of the registrant who has responsible charge. For bound documents involving multiple registrants, either each document in the bound set must be sealed, signed and dated by the registrant in responsible charge for that portion of the work, or the cover sheet or index page must be sealed, signed and dated by each registrant with a breakdown of responsibility for each document clearly identified. Draw general plans to a scale of 100 feet per inch. Establish and reference a permanent benchmark. The minimum plan size must be 11" x 17", one-sided and of adequate contrast sufficient for electronic imaging and storage.

(b) **Detailed plans.** The applicant shall submit to DEQ two (2) copies of detailed plans drawn to a suitable scale. Plans to modify or extend existing wastewater treatment systems or water reuse systems shall clearly indicate the changes.

(1) **Non-industrial wastewater systems.** Detailed plans for non-industrial wastewater systems shall include the following:

(A) **Sewer plan and profile.** Include a plan and profile of all sewers to be constructed showing all special features, such as inverted siphons, extra strength pipe, concrete encasements, outfall structures and sewer bridges. Show all stream crossings on the profile with stream bed elevations, normal flow elevation and extreme high and low water levels. Scale the profiles to not more than 100 feet per inch horizontal and 10 feet per inch vertical. Show the scale on the profiles. Show all known existing structures both above and below ground that might interfere with the proposed construction; including water mains, gas mains, storm drains, and nature of street surfacing. Show wyes on the plan view and dimensions from the nearest down-stream manhole recorded on maps.

(B) **Sewer details.** Include profiles showing manhole stationing, size of sewers, top of rim and sewer invert elevations at each manhole and the grade and length of sewers between adjacent manholes. Show ground elevations at the house line or at approximately 50 to 75 feet from the centerline of the sewer in each direction except in the case of out-fall and/or relief sewers, where no wyes for house connections are needed.

(C) **Sewer appurtenances.** Include the details of all ordinary sewer appurtenances such as manholes, drop manholes, inverted siphons and pumping stations. A sufficiently detailed drawing of each structure must show dimensions, equipment, elevations, capacities, and any explanatory notes necessary to make them easily interpreted.

(D) **Sewer cross sections.** Include cross sections for manholes, outfall structures, headwalls, pipe cradling and encasement, and similar structures.

(E) **Sewage pumping station details.** Include complete construction details showing number and size of pumps, isolation valves, check valves, alarm system and emergency operation provisions.

(F) **Treatment works hydraulic profile.** Show hydraulic profiles with sewage, supernatant liquor and sludge flow through the plant.

(G) **Schematic diagrams.** Label schematic piping diagrams with all lines, appurtenances and direction of flow.

(H) **Treatment units.** Provide complete construction details of all treatment units including high and low water levels of receiving stream.

(I) **Fillets.** Eliminate dead spots in all tanks by designing fillets and otherwise rounding edges.

(2) **Water reuse systems.** Detailed plans for water reuse systems shall include the following information:

(A) **Treatment works hydraulic profile.** Show hydraulic profiles with sewage, supernatant liquor and sludge flow through the system.

(B) **Schematic diagrams.** Label schematic piping diagrams with all lines, appurtenances and direction of flow.

(C) **Treatment units.** Provide complete construction details of all treatment units including high and low water levels of receiving stream.

(D) **Distribution system.** Provide complete construction details of the distribution system, which shall be designed in compliance with Subchapter 27.

(c) **Specifications.** Applicants shall submit to DEQ complete detailed specifications for the proposed project with the plans and shall include a detailed summary of equipment and design data, with references to the specific applicable standards (e.g., ASTM, UL, etc.) for construction, installation and testing of said equipment.

(d) **Construction materials.** Applicants are responsible for complying with any occupational, safety and building codes. Reference in the plans or specifications where these codes require special construction materials, such as the National Electrical Code requirement for explosion-proof wiring where gases may accumulate. The DEQ will not, however, determine whether the proposed construction will meet such codes.

(e) **Redundant equipment.** Provide ~~a backup for all~~ redundant treatment units and ~~pumping~~ equipment ~~to provide~~ for ~~equipment~~ maintenance and repair.

(f) **Maintenance and cleaning.** For maintenance and operational controls, all units must be equipped with means for cleaning. Direct discharge of untreated sewage is prohibited.

(g) **Weather protection.** Protect the structures and all electrical and mechanical equipment and controls from elements and a 100-year flood. Protect mechanical units, pumps, valves and piping from freezing.

(h) **Construction sequence.** Include a program for keeping existing wastewater facilities in compliance with all applicable water quality permit conditions during construction of additional facilities in accordance with OAC 252:656-3-4(a)(4) and/or OAC 252:656-3-4(b)(4).

252:656-3-10. Operation and Maintenance (O & M) Manual

Within ninety (90) days of the completion of the construction, the applicant must submit to the DEQ an O & M Manual for the operation and maintenance of the wastewater treatment system or the water reuse system. The O & M Manual must include at a minimum:

(1) System Treatment Requirements;

(2) Current NPDES Permit wasteload requirements to water quality sections of OAC 252:606 including 208 Plan requirements;

(3) Description, Operation and Control of the Treatment Works;

(4) Control of Unit Processes;

(5) Laboratory Testing;

(6) Common Operating Problems;

(7) Start-Up Testing and Procedures;
(8) Normal Operating Procedures;
(9) Alternative and Emergency Operations;
(10) Emergency Shutdown Operations and Emergency Response;
(11) Records Control and Retention;
(12) Safety;
(13) Wastewater Treatment System Maintenance Requirements and/or Water Reuse System Maintenance Requirements;
(14) Spare Parts and Chemical Inventory~~; and~~
(15) Reclaimed water storage and distribution system flushing plan to prevent slime growth, regrowth of pathogens and water age~~.~~; and
(16) Best Management Practices for Category 6 uses within a wastewater treatment plant.

SUBCHAPTER 11. LAGOON STANDARDS

252:656-11-2. Basis of design

(a) **Facultative Lagoons.** Facultative lagoons depend on the relationship between organic loading and surface area (algal photosynthesis) or on surface area and supplemental mechanical aeration to provide an aerobic layer of water at the surface. Facultative lagoons may be either total retention or flow-through (discharge) to waters of the state.

(b) **Flow-through lagoons.**

(1) **Organic loading.** Limit the organic load to 35 pounds BOD per acre (water surface area) per day for any cell depending solely on algal photosynthesis for oxygen. The total water surface area requirement based on organic loading is calculated at the average water depth. Flow-through lagoon systems will not consistently provide ammonia removal through the nitrification process so the effluent from these facilities may be toxic to aquatic life and thus cause whole effluent toxicity test failures.

(2) **Flow Control.** Provide at least two primary cells on new systems. Design the primary cells so they may be operated in either series or in parallel, with at least 60 days retention time. Provide at least two secondary cells operating in series with the primary cells and in series with each other. Provide a bypass line around any secondary cell in a series to the next cell. The secondary cells shall have at least 60 days detention for a total of at least 120 days detention in the system.

(3) **Depth.** The maximum water depth shall not exceed 6 feet in primary cells and 10 feet in secondary cells. Provide structures to allow the primary cells to operate between four foot depth and the maximum design depth plus three feet of freeboard. The operating depth for a flow-through lagoon shall be between 4 and 6 feet.

(c) ~~**Surface evaporation lagoons (total retention)**~~**Total Retention.** ~~Where more than one acre of surface area is needed, provide at least two cells.~~ Size the primary cell(s) for the expected organic loading and additional evaporation cells designed for the hydraulic load. Base the design of all cells receiving raw wastewater on an organic loading of 35 lbs BOD per surface acre per day at the average operating depth. Design the primary cells so they may be operated in either series or in parallel. ~~Provide sufficient area to evaporate the annual influent flow based on the average daily design flow with allowances for infiltration and inflow to the sewage collection system. Base the evaporation rates on the annual average pan evaporation minus the 90th percentile annual precipitation for the geographical location, as contained in Appendix E.~~

(1) **Surface evaporation.** Where more than one acre of surface area is needed, provide at least two cells. For those systems greater than five (5) acres surface area provide at least two primary cells.

(A) Provide sufficient area to evaporate the annual influent flow based on the average daily design flow with allowances for infiltration and inflow to the sewage collection system.

(B) Base the evaporation rates on the annual average pan evaporation minus the 90th percentile annual precipitation for the geographical location, as contained in

Appendix E.

(C) The system shall be designed with a five (5) foot operating depth, with three (3) feet of freeboard.

(2) **Land Application.** Design two (2) primary cells and one storage cell. Follow design guidelines stated in Subchapter 25 of this Chapter.

(A) Primary cells shall have sixty (60) days of retention time.

(B) Secondary cells shall have ninety (90) days of storage with the operating depth not to exceed ten (10) feet.

(d) **Aerated lagoon systems.** The following apply to all new aerated lagoon systems. Only partial-mix systems will be considered for systems with 30 day average concentration limits for BOD and TSS of 30 mg/l and 90 mg/l, respectively, as their basic permit requirement. Aerated lagoon systems will not consistently provide ammonia removal through the nitrification process so the effluent from these facilities may be toxic to aquatic life and thus cause whole effluent toxicity test failures.

(1) **Number of cells.** At least two aerated cells, in series, followed by one settling lagoon and provide a hydraulic retention time of at least two days.

(2) **Depth.** The design water depth shall be 10 to 15 feet.

(3) **Design Requirements.** Submit design calculations to the DEQ for review, and justify the use of any constants not listed.

(4) **Aeration requirements.** Oxygen requirements will depend on organic loading, required treatment, and concentration of suspended solids to be maintained in the aerated cells. Aeration equipment shall be capable of maintaining a minimum dissolved oxygen level of 2 mg/l in the lagoons at all times. In the absence of experimentally determined values, the design oxygen requirements shall be 1.8 lb O_2/lb BOD applied at maximum loading.

(5) **Additional information.** For a more detailed discussion of aerated lagoon design see *Design Manual Municipal Wastewater Stabilization Ponds*, U.S. Environmental Protection Agency, EPA-625/1-83-015 (1983). Also use *Wastewater Engineering: Treatment, Disposal & Reuse*, Metcalf & Eddy, Inc., 4th Edition, (2003).

(6) **Disinfection.** Disinfection shall be required for all lagoon systems proposed to discharge to "waters of the state" where the beneficial use of the receiving water body is designated in Oklahoma's Water Quality Standards (OAC 785:45) as either "Primary Body Contact Recreational" or "Public or Private Water Supply".

252:656-11-3. Lagoon construction details

(a) **Soil borings.** Provide soil boring data conducted by an independent soil-testing laboratory. Borings shall extend at least 5 feet below the proposed lagoon bottom and at least one boring shall be at least 25 feet deep or into bedrock. Borings shall be conducted during the time of highest groundwater level. Provide enough borings to accurately represent the soil characteristics of the entire lagoon site. If bedrock is encountered, describe its general characteristics and identification, and the corresponding geological formation(s). Include a map showing the location of each boring, a log of soil types encountered at each boring, the elevation of the water table where encountered and the permeability of soil samples taken from the same elevation as the proposed lagoon bottom. Fill and seal all borings after testing.

(b) **Dikes.**

(1) **Material.** Construct dikes of relatively impervious material and compact them to at least 90% Standard Proctor Density to form a stable structure. Remove vegetation and other unsuitable materials before construction.

(2) **Top width.** The top of the dike shall be at least 8 feet wide for maintenance vehicles.

(3) **Slope.** Inner and outer dike slopes shall not be steeper than 1 vertical to 3 horizontal (1:3). Steeper slopes will only be considered where surface construction is of soil cement or other material that will prohibit vegetation growth. Inner dikes shall not be flatter than 1 vertical to 4 horizontal (1:4).

(4) **Freeboard.** Design the lagoon to maintain at least 3 feet of freeboard above the design maximum water depth at all times.

(5) **Lagoon shape.** Round, square or rectangular lagoons with rounded corners, with a length not more than three times the width constructed without islands, peninsulas or coves.

(6) **Erosion control.** Protect inner dikes from wave action and outer dikes from runoff and floodwaters.

(A) **Seeding.** Where riprap is not used, apply at least 4 inches of fertile top soil to dikes to establish an adequate vegetative cover. Before prefilling, establish vegetation on dikes from the outside toe to 2 feet above the lagoon bottom on the interior as measured on the slope. Specify perennial, low-growing grasses that spread rapidly. Do not use alfalfa or other long-rooted vegetation for seeding since the roots of this type are apt to impair the water holding efficiency of the dikes.

(B) **Additional protection.** Provide extra protection where inner dikes may be subjected to severe wind action, such as lagoons larger than 5 acres and where the lagoon surface will often be exposed to strong winds. Also, protect areas of turbulence in aerated cells and all pipe penetrations. Install riprap, soil cement or other recognized material. Protect the inner dikes from 1 foot vertically above the high water elevation to 2 feet vertically below the minimum operating elevation. Place riprap on a filter bed at least 6 inches thick, and use material that will stay in place and resist erosion.

(c) **Lagoon seal.** ~~The seepage rate through the lagoon bottom and inside dike shall not exceed 500 gal/day/acre (5.4×10^{-7} cm/s) at a hydraulic head of 6 feet for soil and bentonite seal. Synthetic seals shall have no measurable leakage.~~ Construct a soil seal as specified below. If native soils exceed this seepage rate, then a bentonite seal or synthetic liner shall be specified. ~~Written certification to the effect that the seal was provided and applied in accordance with specifications and that the hydraulic conductivity is equal to or less than 5.4×10^{-7} cm/s shall be furnished by the project engineer.~~ Use ASTM Method 5084. Analysis of soil shall include how soil will be applied. The seepage rate through the lagoon bottom and inside dike shall not exceed 500 gal/day/acre (5.4×10^{-7} cm/s) at a hydraulic head of 6 feet for soil and bentonite seal. Synthetic seals shall have no measurable leakage.

(1) **Soil seal.**

(A) The soil used for sealing shall have a high, uniform content of fine material (clay and silt). Soil containing rock or a high gravel content is not acceptable for a soil seal or for mixing with bentonite.

(B) Soil used to construct the lagoon seal and dike cores shall be relatively incompressible and compacted at a water content up to 4% above the optimum to at least 90% Standard Proctor Density.

(C) The soil used for sealing shall be at least 12 inches thick with the coefficient of permeability (K) no greater than 10^{-7} cm/s. The soil seal shall be applied in lifts no greater than 6 inches.

(D) Written certification to the effect that the seal was provided and applied in accordance with specifications and that the coefficient of permeability is equal to or less than 10^{-7} cm/s shall be furnished by the project engineer and independent soils laboratory. The written certification shall include:

(i) the number of samples taken;

(ii) a map of the location of the samples taken; and

(iii) a demonstration that the location and number of samples taken are representative of the seal of the lagoon, for both the bottom of the lagoon and all sides of the lagoon dike walls.

(2) **Bentonite seal.**

(A) The application rate shall be at least 125% of the minimum rate that is determined to be adequate by laboratory tests.

(B) The water content of the soil-bentonite mixture shall be up to 4% above the optimum for maximum compaction. Bentonite shall be applied to soil that is free of all vegetation, trash, roots, frozen soil, snow or ice, stones over 2 inches in diameter or other objectionable material.

(C) Split the material in half and apply in 2 perpendicular 3-inch lifts for a finished

compacted blanket thickness of at least 6 inches.

(D) After mixing and compacting, analyze a sample of the soil/bentonite mixture for permeability. If the coefficient of permeability exceeds 10^{-7} cm/s, the depth of the mixture or content of bentonite shall be increased as necessary to obtain the required seal.

(E) Compact the mixture at the proper water content to at least 90% Standard Proctor Density (specifically excluding use of a sheepsfoot roller).

(F) Cover the completed seal with at least 4 inches of soil in addition to necessary erosion control.

(G) Hydrate with fresh water and keep at or above the optimum water content until the pond is prefilled.

(H) Written certification to the effect that the seal was provided an applied in accordance with specifications and that the coefficient of permeability is equal to or less than 10^{-7} cm/s shall be furnished by the project engineer and independent soils laboratory. The written certification shall include:

(i) the number of samples taken;

(ii) a map of the location of the samples taken; and

(iii) a demonstration that the location and number of samples taken are representative of the seal of the lagoon, for both the bottom of the lagoon and all sides of the lagoon dike walls.

(3) **Synthetic liner.**

(A) The synthetic liner shall be at least 30 mils (0.030 inch) thick, unless the lagoon is subject to heavy traffic, in which case the liner shall be at least 60 mils (0.060 inch) thick.

(B) Remove or cover sharp objects in the subsoil with a bedding of ~~2 to~~ 4 inches of clean soil or sand.

(C) Use 4-inch perforated pipe to allow venting and draining of the soil to reduce gas and hydrostatic pressures and facilitate monitoring for leakage.

(D) The synthetic liner panels shall be laid out in a longitudinal direction and sealed with an overlap of 4 to 6 inches.

(E) The anchor trench shall be a 6-inch minimum depth and placed at least 9 to 12 inches beyond the slope break of the dike.

(F) Take adequate measures to protect the integrity of the liner <u>including UV protection</u>. ~~On dike slopes, backfill shall consist of at least a 3-inch layer of sand or finely textured soil. and covered with at least a 3-inch layer of heavier cobble, coarse gravel or small riprap.~~

(4) **Uniformity.** The bottom shall be as level as possible. Finished elevations shall not deviate more than 3 inches from the average elevation.

(5) Prefilling. Protect the integrity of the liner by hydrating with fresh water until the lagoon is used.

(d) **Influent lines.** Influent lines shall terminate in a flow distribution manhole or control structure with the invert at least 6 inches above the maximum design high water elevation of the lagoon. Design the control structure to proportionally split the flow to the primary cells.

(1) **Placement.** Raw sewage distribution lines may be placed on the surface of the lagoon bottom. Anchor pipe to prevent floating or settling. Soil shall not be mounded over the distribution lines. The method of construction shall not alter the integrity of the lagoon seal.

(2) **Point of discharge.** To minimize short-circuiting in primary cells, terminate influent lines at the lesser of either the center of the cell or a point at least 100 feet from the inside toe of any dike. Install multiple inlets when the distance from any inlet to the toe of an adjacent dike exceeds 250 feet. Terminate influent lines for aerated cells within the mixing zone of the aeration equipment.

(3) **Discharge apron.** To control erosion of the lagoon bottom, influent lines shall discharge horizontally into shallow, saucer-shaped depressions and terminate on a concrete apron. The apron shall be at least 2 feet square or 2 feet in diameter. Provide additional energy dissipating devices where influent will enter the lagoon at a high velocity.

(e) **Miscellaneous construction standards**. All pipes entering and exiting the seal shall be

constructed with a seepage collar.

(f) **Control structures and interconnecting piping.**

(1) **Structure.** Provide structures to control water depth in cells, route water through the system, and measure flow at discharging facilities. Control structures in primary cells shall be capable of controlling the operating depth between a minimum of 3 feet and the maximum design operating depth. For suspended solids control, the discharge structure should allow the withdrawal point to vary below the surface to obtain the best quality effluent. Valves, slide tubes, dual slide gates or removable interlocking boards are recommended, and they shall:

(A) be accessible for maintenance and adjustment of controls;

(B) control water level and flow rate, and complete shutoff;

(C) be constructed of non-corrosive materials; and

(D) be located to minimize short-circuiting within the cell.

(2) **Discharge piping.** Pipe meeting ASTM standards for sanitary sewers shall be adequately anchored but not interrupt the integrity of the seal.

(A) **Hydraulic capacity.** The hydraulic capacity for continuous discharge structures and piping shall allow for a minimum of 250% of the design flow of the system.

(B) **Minimum pipe size.** All piping within the lagoon shall be at least 12 inches in diameter for facilities serving 100 PE or more and at least 8 inches for facilities serving less than 100 PE. Design influent pipe for rodding. Protect all piping between the lagoon cells from the entrance of turtles.

SUBCHAPTER 13. PRELIMINARY TREATMENT STANDARDS

252:656-13-2. Grit chambers

(a) **Where required.** Grit chambers are required at all mechanical sewage treatment plants, ahead of pumps and other equipment that may be damaged by grit.

(b) **Outside facilities.** Protect grit removal facilities located outside from freezing.

(c) **Chamber design.**

(1) Rectangular horizontal-flow grit chambers shall be designed to regulate velocity to minimize organic matter deposition. Channels shall be designed for velocities of 0.8 to 1.3 fps, with a total detention time of 20 seconds to one minute.

(2) Aerated grit chambers shall be designed for a detention time of two (2) to five (5) minutes. Aerated grit chambers shall be sized in accordance with Appendix A.

(d) **Grit washing.** Provide grit washing devices to further separate organic and inorganic materials in all chambers not equipped with positive velocity control. Include provisions for draining each unit.

(e) **Grit removal.** Provide facilities for hoisting grit to ground level from equipment located in deep pits, provide access by stairways, and provide adequate ventilation and lighting.

(f) **Grit disposal.** Provide for the removal, handling, storage and disposal of grit.

(g) **Vortex-type grit chambers.**

(1) The flow into the grit chamber shall be through a straight and smooth channel. The length of the inlet channel must be at least seven (7) times the width or fifteen (15) feet, whichever is greater.

(2) Total detention time in the chamber at design flow is thirty (30) seconds.

(3) The equipment specifications shall identify the required grit removal rates. Removal rates shall be based on the equipment manufacturer's specifications for downstream processes and meet the following minimum criteria:

(i) 95% removal rate for 50-mesh grit.

(ii) 85% removal rate for 70-mesh grit.

(iii) 65% removal rate for 100-mesh grit.

(4) Provide a propeller with a variable speed drive to operate the unit based on the plant flow.

(5) Provide air or water scour to loosen compacted grit and facilitate the grit lifting and removal from the chamber.

(6) Provide inclined screws, conveyors, chain elevators or pumps, including top mounted self-priming suction lift pumps to lift the grit from the chamber and transfer the grit to the washing and separating facilities. Air ~~or suction~~ lift pumps shall not be used for this purpose.
(7) Automatically controlled grit lifting, washing and separating equipment with the ability to manually override.

SUBCHAPTER 21. DISINFECTION STANDARDS

252:656-21-2. Chlorine disinfection systems

(a) **Equipment capacity.** The following requirements are for the chlorination of non-industrial wastewater. The equipment shall be capable of supplying the following dosage as applicable:
(1) Trickling filter plant effluent - 10 mg/l;
(2) Activated sludge plant effluent - 8 mg/l;
(3) Tertiary filtration effluent - 6 mg/l;
(4) Nitrified effluent - 6 mg/l; and
(5) Category 2 water reuse chlorination systems - 12 mg/l or a dose sufficient to achieve high level disinfection for water reuse requirements.

(b) **Chlorine mixing.**
(1) **Mixing.** The disinfectant shall be mixed as rapidly as possible to ensure complete mixing.
(2) **Contact period.** Provide the following contact periods:
(A) For OPDES permit compliance or Categories 3 and 4 water reuse chlorination systems, provide a minimum contact period of 15 minutes at peak hourly wastewater flow or maximum pumping rate after mixing.
(B) For Category 2 water reuse chlorination systems, alone or in combination with UV, provide sufficient free chlorine residual concentration at the end of the contact tank and modal contact time sized using the anticipated design flow after mixing at a design temperature of 5 °C (41 °F) and a pH of 8.0 to meet the micro-organism log removal requirements in 252:656-27-3(a)(6).
(3) **Contact tank.** Construct chlorine contact tanks to minimize short-circuiting. "Over-and-under" or "end-around" baffling shall be provided to reduce short-circuiting. Design the tanks for easy maintenance and cleaning without reducing the effectiveness of disinfection. Provide duplicate tanks, mechanical scrapers or portable deck-level vacuum cleaning equipment. Provide skimming devices on all contact tanks, and provide for draining the tanks.

(c) **Gas chlorine equipment rooms.**
(1) **Separation.** If the building that houses the gas chlorine equipment is used for other purposes, a gas-tight room shall be provided to separate the gas chlorination equipment and chlorine cylinders from other parts of the building. Do not connect floor drains from the chlorine room to floor drains from other rooms. Doors to this room shall open only to the outside of the building, with panic hardware, at ground level and allow easy access to all equipment. For one-ton chlorine cylinders, separate the storage area from the feed area. Locate chlorination equipment as close to the application point as is reasonably possible. Certify the installation will meet OSHA standards, and that the doors and emergency equipment are compatible with chlorine.
(2) **Inspection window.** Install a shatter resistant, clear glass, gas-tight window in an exterior door or interior wall of the chlorinator room so the units can be viewed without entering the room.
(3) **Heating.** Heat disinfection equipment rooms to maintain at least 60 °F. Protect the gas chlorine cylinders from excess heat, and maintain the cylinders at essentially room temperature.
(4) **Ventilation.** Provide mechanical ventilation capable of one air change per minute for chlorine. The entrance to the room exhaust duct shall be near the floor. The point of discharge shall not contaminate inhabited areas or the air inlet to any buildings. Locate fresh

air inlets to provide cross ventilation with air and at a temperature that will not adversely affect the chlorination equipment. Discharge the chlorinator vent hose above-grade to the outside atmosphere.

(5) **Electrical controls.** Locate fan and light switches outside the room near the entrance. A labeled signal light indicating fan operation shall be provided at each entrance when the fan can be controlled from more than one point.

(d) **Water supply.** Provide an ample supply of water to operate the chlorinator and protect it according to 252:656-9-2(b). Back up any booster pumps according to the power requirements of 252:656-9-2(a).

(e) **Scales.** Provide corrosion-resistant scales to weigh chlorine gas cylinders. Provide at least a platform scale. Provide a recording device for the weight of the chlorine gas cylinders for installation where one-ton cylinders or larger are used.

(f) **Containers.** One-ton containers or larger are required if more than 150 pounds of chlorine per day is needed. Limit the withdrawal rate to 40 pounds per day per cylinder for cylinders up to 150 pounds, and to 400 pounds per day for one-ton cylinders.

(g) **Handling equipment.** For cylinders up to 150 pounds, provide securing restraints and a hand-truck designed for the cylinders. For one-ton cylinders, provide:

(1) a hoist with 4,000-pound capacity;

(2) a cylinder lifting bar;

(3) a monorail or hoist with sufficient lifting height to pass one cylinder over another; and

(4) a cylinder trunnion(s) to allow exchanging the cylinders for proper connection.

(h) **Manifolds.** Gaseous chlorine cylinders may be connected to a manifold, only when all cylinders are maintained at the same temperature or the system is designed for gas transfer from a warm container to a cooler one. Do not connect liquid chlorine cylinders to a manifold.

(i) **Leak detection and controls.** Provide an emergency response plan for chlorine leaks. Provide a bottle of 56% ammonium hydroxide solution for detecting chlorine leaks. Where one-ton containers are used, provide a leak repair kit approved by the Chlorine Institute, include caustic soda solution reaction tanks to absorb leaks. Provide automatic gas detection and related alarm equipment. Air Pollution Control regulations may also require air scrubbing equipment.

(j) **Evaporators.** Demonstrate the required volume of chlorine can be supplied.

(k) **Respiratory protection.** Where chlorine gas is handled, provide respiratory air-pac protection equipment that meets the National Institute for Occupational Safety and Health (NIOSH) standards. Store the equipment and operating instructions at a convenient location outside the room where chlorine is used or stored. The units shall use compressed air, with at least a 30-minute capacity, and be compatible with units used by the local fire department. In the emergency response plan, describe how to maintain the equipment.

(l) **Sodium hypochlorite.** Follow equipment standards in OAC 252:626-11-4(g).

(1) **On-site Generation of Sodium Hypochlorite:**

(A) **Contact Time.** On-site generation is limited by the upper concentration of the chlorine solution produced. Design should account for concentration limit where contact time is required. Contact time is determined from free chlorine concentration only.

(B) **Ventilation.** A by-product of on-site generation is the formation of hydrogen gas. Design shall meet the following:

(i) Ventilation shall be designed to take suction from as near the ceiling as practical.

(ii) Ventilation piping shall slope towards an outlet and in a manner that does not trap hydrogen gas.

(iii) Provide hydrogen gas sensing equipment capable of interlocking with sodium hypochlorite generation equipment.

(iv) System shall have automatic turn off of the equipment in the event that one-half (½) the lower explosive limit (LEL) is reached.

(v) Separate gas sensing equipment shall interlock with the ventilation equipment. System shall automatically turn on in the event that one-fourth (¼) the LEL for hydrogen is reached.

(vi) Provide at least one hydrogen sensor for any space that hydrogen gas is likely to

accumulate.

(vii) Piping penetrating the roof must have a "T" or an "L" shape and a 24 mesh corrosion resistant screen.

(C) **Pretreatment.** To avoid fouling of the electrolytic cell, a water softener or other pretreatment method is required to prevent scaling during the process.

(D) **Brine Solution.** The salt used for the brine shall be high grade (99% pure) and shall be certified for use by the NSF for electrochlorination (NSF Standard 60). Provide the capability for diluting 12.5% bulk sodium hypochlorite to create less than one percent (1%) solution.

(E) **Storage.** Design shall meet the following:

(i) All chemical handling and storage shall be in accordance with OAC 252:626-11.

(ii) Provide at least two (2) tanks with thirty (30) hours storage capacity at average daily for usage solution.

(iii) Protect concrete from corrosion.

(iv) Tanks shall be located in a structure to prevent freezing of all system components.

(v) Tanks shall be clear or provide a sight glass to determine brine level.

(F) **Waste Disposal.** Design shall be in accordance with OAC 252:626-13 to ensure proper disposal of the waste stream.

(G) **Warranty.** Provide a two (2) year warranty and maintenance on all equipment.

(H) **Redundancy.** Provide multiple units to meet maximum daily demand with the largest unit out of service.

(m) **Dechlorination.** When dechlorination is required by DEQ, the discharges shall have less than 0.1 mg/l total residual chlorine.

(1) **Equipment.** Do not chlorinate and dechlorinate with the same units. Handle aqueous solutions of sulphite or bisulfite with positive displacement pumps. Sulfur dioxide (SO_2) feed equipment shall account for the property of the gas to easily liquefy. With one-ton containers, take special precautions to prevent chemicals from liquefying. Provide multiple units to meet the operating requirements between the minimum and maximum wastewater flow rates and to avoid depleting dissolved oxygen in receiving waters.

(2) **Mixing.** Mechanical mixers are required unless the design will provide hydraulic turbulence to assure thorough and complete mixing.

(3) **Sulfonator water supply.** Provide an ample supply of water to operate the sulfonator, and protect it according to 252:656-9-2(b). Back up booster pumps according to the power requirements of 252:656-9-2(a).

(4) **Housing.** Storage and feed equipment for SO_2 shall be in a separate room from chlorine gas storage and feed equipment. The same storage requirements apply to SO_2 as for chlorine gas in (c) of this Section. Mixing, storage, and feed equipment areas shall be designed to contain spillage or leakage or to route it to an appropriate containment unit.

(5) **Respiratory protection.** Same as for chlorine gas in (k) of this Section.

252:656-21-4. Ozone disinfection [NEW]

(a) Use of Ozone for disinfection. Requests for use of ozone disinfection shall be reviewed and approved on a case-by-case basis. All ozone systems shall meet the requirements established in OAC 252:626-9-4 including the following:

(1) Disinfection by ozone shall meet requirements pursuant to OAC 252:656-27-3(b)(3).

(2) Disinfection by ozone shall meet inactivation of mircoorganisms as required in OAC 252:656-27-3(a)(6).

(3) Design shall identify the total CT requirement and evaluate ozone dose, potential ozone demand, plug flow contact time, and whether microflocculation of solids could cause compliance problems with other permit limits, such as effluent, TSS, and turbidity.

(A) These factors shall be determined based on one of the following:

(i) pilot studies

(ii) a minimum of three (3) well documented analogous projects.

(iii) CT calculations, EPA LTIESWTR Disinfection Profiling and Benchmarking

Technical Guidance Manual, EPA 816-R-03-004, May 2003.

SUBCHAPTER 23. SUPPLEMENTAL TREATMENT STANDARDS

252:656-23-4. Membrane filtration [NEW]

Requests to use membrane filtration shall be reviewed and approved on a case-by-case basis. All membrane filtration systems shall meet the construction standards outlined in OAC 252:626-9-9(f) with the following exceptions:

(a) Source water testing [Exception to OAC 252:626-9-9(f)(1)]. For wastewater and reuse applications, source water shall be defined as the effluent from a suitable treatment process designed according to the construction standards outlined in this chapter. This water shall be tested for all parameters that may affect membrane filtration and reuse water quality. Historic information shall be reviewed to determine water quality extremes that may be expected. Tabulated results of tests performed, summaries, and conclusions shall be submitted as part of the engineering report proposing membrane filtration.

(b) Pilot plant verification study [Exception to OAC 252:626-9-9(f)(2)]. Prior to initiating the design of a membrane filtration system for wastewater or reuse applications, a pilot plant study is required to determine the best membrane to use. Submit pilot study protocol to DEQ for approval prior to initiating any pilot study. Pilot study duration shall be a minimum of three (3) months unless low variability in parameters critical to design warrant a shorter duration.

(c) Log removal [Exception to OAC 252:626-9-9(f)(3)]. A pilot verification study shall be required for a membrane filtration system for wastewater or reuse applications only when removal credit is requested pursuant to OAC 252:656-27-3(a)(6).

(d) Pretreatment [Exception to OAC 252:626-9-9(f)(5)]. Membrane filtration systems for wastewater and reuse applications shall be preceded by suitable bioligical treatment, disinfection to prevent biological growth and, if necessary, clarification processes designed according to the construction standards outlined in OAC 252:656-16 and OAC 252 656-17.

(e) Turbidity monitoring [Exception to OAC 252:626-9-9(f)(10)]. Turbidity monitoring equipment shall be installed on all influent and effluent piping of membrane units. Continuous turbidity recording equipment shall be provided on the effluent piping and connected to an alarm system to warn operators of an excessive turbidity breakthrough for reuse applications.

(f) Disinfection [Exception to OAC 252:626-9-9(f)(17)]. Membrane filtration systems shall be properly disinfected each time the membrane units are opened for maintenance and water shall not be sent into the reuse distribution system. Disinfectants prohibited by the membrane manufacturer shall not be used through the membranes.

SUBCHAPTER 27. WATER REUSE

252:656-27-1. Categories of reclaimed water

The following are the categories of and allowed uses for reclaimed water:

(1) **Category 1.** Reserved.

(~~1~~2) **Category 2.** Category 2 reclaimed water shall only be used for the allowed uses in Categories 3, 4 and 5, and:

(A) drip irrigation on orchards or vineyards;

(B) spray or drip irrigation on sod farms, public access landscapes and public use areas/sports complexes, including unrestricted access golf courses;

(C) toilet and urinal flushing;

(D) fire protection systems;

(E) commercial closed-loop air conditioning systems;

(F) vehicle and equipment washing (excluding self-service car washes)~~; and~~

(G) range cattle watering~~.~~; and

(H) make-up water for oil and gas production.

(~~2~~3) **Category 3.** Category 3 reclaimed water shall only be used for the allowed uses in Categories 4 and 5, and:

(A) subsurface irrigation of orchards or vineyards;
(B) restricted access landscape irrigation;
(C) irrigation of livestock pasture;
(D) concrete mixing;
(E) dust control;
(F) aggregate washing/sieving;
(G) new restricted access golf course irrigation systems;
(H) industrial cooling towers, ~~and~~ once-through cooling systems, and closed loop systems such as boiler feed water; ~~and~~
(I) restricted access irrigation of sod farms~~.~~
(J) hydraulic fracturing;

(~~3~~4) **Category 4.** Category 4 reclaimed water shall only be used for the allowed uses in Category 5 and:
(A) soil compaction and similar construction activities; and
(B) existing restricted access golf course irrigation systems utilizing water that has received primary treatment in lagoon systems. Permits to construct shall not be issued for new Category 4 restricted golf course irrigation systems pending further research and evaluation of performance data collected from existing systems.

(~~4~~5) **Category 5.** Category 5 reclaimed water shall only be used for:
(A) restricted access pasture irrigation for range cattle;
(B) restricted access irrigation of fiber, seed, forage and similar crops; and
(C) irrigation of silviculture.

(6) **Category 6.** Category 6 reclaimed water shall only be used within the wastewater treatment plant.
(A) non-chlorinated uses:
(i) dilution water for chemicals used in the process such as polymers, coagulants, chlorination or dechlorination;
(ii) mechanical seal water for gas compressors, pumps and other equipment;
(iii) mechanical seal water and cooling water for pumps;
(iv) odor and gas absorption including bio-filters used for odor control;
(v) centrifuge flushing;
(vi) flushing grit and sludge pipes;
(vii) gravity thickener make-up water;
(viii) supply water for filter backwash;
(ix) headworks screen washing;
(x) headworks screening washer-compactors; and
(xi) belt filter press.
(B) chlorinated uses:
(i) yard hydrants; and
(ii) hose bibs

252:656-27-4. Distribution systems

(a) **Cautionary language required**. The following cautionary language is required for reclaimed water piping, valves, outlets and appurtenances in distribution systems.
(1) Effective July 1, 2012, all reclaimed water piping, valves, outlets and appurtenances in distribution systems shall be colored purple (Pantone 522).
(2) Effective July 1, 2012, reclaimed water piping in a distribution system shall be embossed or integrally stamped on opposite sides every 3 feet with a warning that includes the following language: "CAUTION: RECLAIMED WATER–DO NOT DRINK."
(3) All reclaimed water piping installed prior to July 1, 2012, that does not comply with this subsection shall, at a minimum, be identified with above-ground signs containing the cautionary language in (2) of this subsection together with the international "Do Not Drink" symbol:
(A) every 300 feet;

(B) at every change in direction;
(C) in the road easement on both sides of the road at every road crossing; and
(D) at every outlet.

(b) **Hose bibs and yard hydrants.** Hose bibs shall be located in locked, below-grade vaults. Reclaimed water hose bibs, yard hydrants and/or similar outlets shall be equipped with a warning sign containing the cautionary language required in (a)(3) of this Section.

(c) **Distribution pipes.** Reclaimed water distribution pipes shall be designed and constructed to meet the requirements for sanitary sewer pipes in of 252:656-5-2, 252:656-5-3, 252:656-5-4 and 252:656-5-5.

(d) **Pumping stations and force mains.** Pumping stations and force mains shall be designed and constructed in accordance with 252:656-7-1 through 4, with the following exceptions:

(1) Pump openings less than three inches (3") may be allowed when settled or filtered reclaimed water is pumped.

(2) Water reuse systems with the ability to divert all reclaimed water to the wastewater's permitted discharge point, without operator assistance, may be exempt from the requirement to equip the lift station with emergency wet well storage, backup power supply or duplicate pumps.

(e) **Reclaimed water flushing system.** Reclaimed water distribution systems shall be designed with all appurtenances necessary to adequately flush the distribution system to prevent slime growth and the regrowth of pathogens. Flushing plans shall be developed for all reclaimed water distribution systems and submitted for DEQ approval. Flushing plans shall also be included in reclaimed water systems' O&M manuals [see 252: 656-3-10] and in suppliers' DEQ approved inspection programs [see 252:627-1-5(f)]. All flushing systems shall include at a minimum:

(1) provisions for disposal of flushed water that prevent bypasses and discharges to waters of the state or elsewhere; and

(2) air gaps designed pursuant to 252:656-9-2 for all discharges to sanitary sewers.

APPENDIX A. DESIGN TABLES [REVOKED]

OAC 252:656-13-2 (c) Aerated Grit Chambers:

Grit Chamber Measurement Units[a]		
Item	Unit	Range
Detention time at peak flowrate	Minutes	2-5
Dimension – Depth	Feet	7-16
Dimension – Length	Feet	25-65
Dimension – Width	Feet	8-23
Width to Depth Ratio	Ratio	From 1:1 to 5:1
Length to Width Ratio	Ratio	From 3:1 to 5:1
Air Supply per unit of Length	$Feet^3$ per minute per foot	3 – 8

[a]Chart from *Wastewater Engineering: Treatment, Disposal & Reuse*, Metcalf & Eddy, Inc., 4th Edition, (2003)

OAC 252:656-15-1(d)(3), Activated Sludge Aeration Basins:

AERATION TANK CAPACITIES & PERMISSIBLE LOADINGS FOR ACTIVATED SLUDGE PROCESSES			
Type of Process	Aeration Retention time[b]	Aeration Basin Loading[c]	F/M Ratio
	(Hours)	(lb BOD_5 per 1,000 ft^3/d)	(lb BOD_5/lb MLSS)
Conventional	6 – 8	30 - 40	0.25 - 0.50
Step Aeration	6 – 8	30 - 50	0.17 - 0.50
Extended Aeration/Oxidation Ditch	24	12 - 15	0.05 - 0.10

[b]Larger values for smaller plants, up to 5,000 "PE" design capacity
[c]Larger values for larger plants, over 5,000 "PE" design capacity

OAC 252:656-15-2(b), Trickling Filter Design:

DESIGN PARAMETERS FOR TRICKLING FILTERS				
	Hydraulic Loading		Organic Loading	
	gal/ft^2/day	Million gallons/acre/day	lbs BOD_5/1,000 ft^3 of media/day	lbs BOD_5/acre-ft of media/day
Standard Rate	45-90	2-4	5-12	218-523
High Rate	230-690	10-30	30-100	1300-4300

APPENDIX A. DESIGN TABLES [NEW]

OAC 252:656-13-2 (c) Aerated Grit Chambers:

Grit Chamber Measurement Units[a]		
Item	Unit	Range
Detention time at peak flowrate	Minutes	2-5
Dimension – Depth	Feet	7-16
Dimension – Length	Feet	25-65
Dimension – Width	Feet	8-23
Width to Depth Ratio	Ratio	From 1:1 to 5:1
Length to Width Ratio	Ratio	From 3:1 to 5:1
Air Supply per unit of Length	$Feet^3$ per minute per foot	3 – 8

[a]Chart from *Wastewater Engineering: Treatment, Disposal & Reuse*, Metcalf & Eddy, Inc., 4th Edition, (2003)

OAC 252:656-15~~5~~6-1(d)(~~3~~1), Activated Sludge Aeration Basins:

AERATION TANK CAPACITIES & PERMISSIBLE LOADINGS FOR ACTIVATED SLUDGE PROCESSES			
Type of Process	Aeration Retention time[b]	Aeration Basin Loading[c]	F/M Ratio
	(Hours)	(lb BOD_5 per 1,000 ft^3/d)	(lb BOD_5/lb MLSS)
Conventional	6 – 8	30 - 40	0.25 - 0.50
Step Aeration	6 – 8	30 - 50	0.17 - 0.50
Extended Aeration/Oxidation Ditch	24	12 - 15	0.05 - 0.10

[b]Larger values for smaller plants, up to 5,000 "PE" design capacity
[c]Larger values for larger plants, over 5,000 "PE" design capacity

OAC 252:656-15~~5~~6-2(b), Trickling Filter Design:

DESIGN PARAMETERS FOR TRICKLING FILTERS				
	Hydraulic Loading		Organic Loading	
	gal/ft^2/day	Million gallons/acre/day	lbs BOD_5/1,000 ft^3 of media/day	lbs BOD_5/acre-ft of media/day
Standard Rate	45-90	2-4	5-12	218-523
High Rate	230-690	10-30	30-100	1300-4300