

Guidance on

COMPONENT RELIABILITY CRITERIA

*for
State Revolving Fund Loan Projects*

The purpose of this document is to provide criteria for determining the number of units and backup requirements for the major process components of wastewater treatment works built under the State Revolving Fund (SRF) Loan program. These criteria are adapted from the U.S. Environmental Protection Agency (EPA) publication entitled, *DESIGN CRITERIA FOR MECHANICAL, ELECTRICAL, AND FLUID SYSTEM AND COMPONENT RELIABILITY* (EPA-430-99-74-001). These requirements should be considered in the facility planning as well as in the design phase, since the need for multiple units and backup equipment will influence the cost-effective analyses required in the preparation of a Facility Plan.

Based upon the stream to which the treatment works being designed will discharge, three Reliability Classes are suggested in the above referenced EPA publication :

Reliability Class I "Works which discharge into navigable waters that could be permanently or unacceptably damaged by effluent which was degraded in quality for only a few hours." **For projects funded under the SRF Loan Program, treatment works will be required to meet Reliability Class I if the effluent discharge is or will be to a receiving stream that has been designated as "natural and scenic" by the Louisiana Legislature.** A listing of these streams can be found on the Internet at "www.legis.state.la.us/tsrs/rs/56/rs_56_1847.htm".

Reliability Class II "Works which discharge into navigable waterways that would not be permanently or unacceptably damaged by short-term effluent quality degradation, but could be damaged by continued (on the order of several days) effluent quality degradation." **This class will apply, by definition, to those treatment works not classified as Reliability Class I or Reliability Class III.** Most treatment works will fall into this class, which requires a medium level of component backup.

Reliability Class III **For our purposes, this class will apply to treatment works discharging directly to the Mississippi, Red, and Atchafalaya Rivers.** A minimum level of component backup is required for these dischargers, since these rivers have a very large assimilative capacity.

The following presents the reliability design criteria for major components of some of the

more common wastewater treatment processes. For processes using major components not covered, please contact the DEQ project engineer.

IN-PLANT PUMPS: Multiple units and backup pumps must be included in the design so that peak flows can be handled if any pump is out of service. This applies to all reliability classes.

Headworks - Mechanically Cleaned Bar Screens: At least two channels must be provided, each equipped with a bar screen. Provisions are made to isolate flow from any screening unit and to dewater each unit. Works with only two bar screens must have one bar screen designed to permit manual cleaning. For small plants, one channel with one manually-cleaned bar screen may be sufficient. This applies to all reliability classes.

Headworks - Grit Removal Facilities: Where a single grit removal unit is utilized, a bypass must be provided. At least two units are recommended for facilities with a design flow greater than 1MGD. There must be provisions for isolating and dewatering each unit for cleaning and repair. A bar screen or other screening device must precede grit removal facilities. This applies to all reliability classes.

Headworks -Comminutors: There are no backup requirements for comminutors. A screened bypass with the capacity to handle peak flow with all comminutors out of service must be provided. Comminutors should be located downstream of grit removal equipment. This applies to all reliability classes.

Settling - Primary and Intermediate Clarifiers: When utilized, there must be at least two units designed so that, with the largest capacity unit out of service, the remaining unit(s) can handle at least 50% of the design flow. Normally, primary and intermediate clarifiers are not utilized in small treatment plants. However, should they be proposed for a plant with a design capacity of 0.5 MGD or less, single units may be allowed. This applies to all Reliability classes.

Settling - Final Clarifiers: Except for package units with flows of 0.5 MGD or less, there must be at least two units designed so that, with the largest capacity unit out of service, the remaining unit(s) can handle at least 75% of the design flow for Reliability Class I and 50% of the design flow for Reliability Classes II and III.

Chemical Flash Mixers: For reliability Class I, at least two mixing basins or a backup means for adding and mixing chemicals must be provided. If only one basin is provided, at least two mixing devices (one of which may be uninstalled) and a bypass around the basin must be provided. For reliability Classes II and III, no backup for chemical flash mixers is required.

Flocculation Basins: For Reliability Class I, at least two flocculation basins must be provided. No backup is required for reliability classes II and III.

Trickling Filters: There must be at least two units designed so that, with the largest capacity unit out of service, the remaining unit(s) can handle at least 75% of the design flow for Reliability Class I and 50% of the design flow for Reliability Class II. One filter is acceptable for a facility classified as Reliability Class III; however, multiple units are recommended for larger facilities.

Aeration Basins: A single basin is acceptable for Reliability Class III. For Reliability Classes I and II, at least two (2) equal volume basins must be provided, unless one or more of the following criteria are met:

- A. The facility is a package plant with a capacity of 0.5 MGD or less. At least two blowers or surface aerators are required. One aerator or blower may be an uninstalled backup unit, provided that the installed unit can easily be removed and replaced.
- B. The facility is a conventional activated sludge process with a design capacity of 1 MGD or less. At least two blowers or surface aerators must be installed (except that one installed unit with an uninstalled backup is allowed for Reliability Class III).
- C. The facility is an oxidation ditch with a capacity of 1 MGD or less. A single brush or carousel aerator is acceptable. Other aerators will be considered on a case by case basis, but back up provisions will be required. Sufficient spare parts for a brush or carousel aerator and its drive mechanism must be maintained on site.

Aeration Blowers or Mechanical Aerators: There must be a sufficient number of blowers or mechanical aerators to maintain the desired oxygen transfer with the largest unit out of service. An uninstalled backup unit can be utilized to meet this requirement, provided that the installed unit can easily be removed and replaced. However, for Reliability Classes I and II at least two units must be installed. For reliability Class III it is permissible to have only one installed unit with an uninstalled backup.

Air Diffusers: The air diffuser for each aeration basin must be designed so that the largest section of diffusers can be isolated without measurably impairing the oxygen transfer capability of the system. This applies to all reliability classes.

Chlorine Contact Tanks (Basins): Duplicate tanks, mechanical Scrapers or portable deck-level vacuum cleaning equipment must be provided, so that the tanks can be cleaned without reducing the effectiveness of disinfection. This applies to all reliability classes.

Ultraviolet Radiation Disinfection: At least two modules of lamps in series or multiple channels must be provided, so that disinfection will continue during maintenance. Adequate disinfection must be provided with the largest module out of service. This applies to all reliability classes.