

Optimize Aeration, Secondary Clarifier and Disinfection Processes

Problem and Research Objectives

The U.S. Army's Schofield Barracks Wastewater Treatment Plant has a history of not consistently meeting the microbial requirements for discharge into the Waialua Sugar Company irrigation system. The disinfection challenge of reducing the total coliform is that the final effluent quality shall not exceed 23/100 ml for a 30-day median or exceed 240/100 ml in any sample.

The research objectives are (1) to determine whether the chlorine disinfection process is adequate for meeting the microbial requirements and (2) to determine whether the upstream biological process should or can be improved to lessen the burden on the disinfection process.

Methodology

Review existing plant data for process variations that point to a need for process changes. Meet with operating staff, as a team-building effort, to discuss past and current operating guidelines that have been used both successfully and unsuccessfully. Discuss possible changes to the operating guidelines and implement what as a team are felt to be the best testing concepts with the best opportunity for success.

Principle Findings and Significance

The chlorine disinfection process by itself would be inadequate without secondary process improvements.

Control guidance in the past has usually been either mixed liquor suspended solids concentration or mean cell residence time (days). In this effort a somewhat newer approach called total mass (total pounds of suspended solids in the secondary process) was used.

Through experimenting with the process it was found that a far lower than normal dissolved oxygen (0.20 to 0.30 mg/l) was used very successfully, resulting in single-digit effluent total suspended solids (TSS) that has allowed the chlorine disinfection process to meet the disinfection requirements.

In March 2003, we altered the process mode to incorporate an anoxic zone in the first third of each aeration basin, while maintaining the dissolved oxygen (DO) between 0.5 and 1.0 mg/l. The change in DO is in response to increases or decreases in the sludge settling characteristics. The mode has been the most stable used so far, usually generating low single-digit TSS.