Activated Sludge and Nutrient Removal Course Description

The objective of this class is to give activated sludge front-line supervisors and operators, and process control operators and engineers, a more in-depth understanding of the activated sludge process. Lecture is supplemented with open discussion and an activated sludge process simulator. The simulator contains 30 different troubleshooting scenarios that must be solved by applying knowledge gained throughout the day.

Activated sludge process control requires operators to exercise their professional judgment to select the right sludge age, F:M, MLSS concentration, RAS rate, WAS rate, DO concentrations, ORP targets, and internal mixed liquor recycle rates. Many training classes and articles discuss the basics of what each of these variables are and what they do, but very few give guidance on how an operator should decide what the target setpoints should be for each of these variables in their own facilities. As a result, operators are forced to use a trial and error approach. Attendees will learn how to select an appropriate sludge age for their facility based on treatment goals, water temperature, and sludge quality. They will learn how to recognize the interdependence of many of these process variables and why it is impossible to simultaneously control more than one at a time.

More and more facilities are facing more stringent limits on nitrogen and phosphorus in their discharge permits. This two-hour presentation walks attendees through the various process variables that impact nitrification and denitrification. Numerous case studies are used to illustrate the effect of each variable. Specifically:

* Stoichiometry;

* Organisms Involved;

* Selecting a target MCRT or SRT;

* Temperature Effects;

* Dissolved Oxygen Effects;

* Alkalinity and pH;

* COD to Nitrogen ratios required for denitrification;

* Different Process Configurations for Total Nitrogen Removal;

* Selecting an internal MLSS recycle ratio;

*Setting targets for DO and ORP; and

* Controlling filamentous foaming

Phosphorus removal discusses the organisms responsible for biological phosphorus removal, the importance of cycling between anaerobic and anoxic/aerobic conditions, causes of secondary phosphorus release, the importance of influent wastewater characteristics, predicting Bio-P success, competitor glycogen accumulating organisms and the conditions that foster growth, the influence of side-streams, and troubleshooting.

The second half of phosphorus removal focuses on chemical phosphorus removal & includes discussion of the metal equivalent to P ratio, impact on overall sludge production depending on where coagulant is added, type of coagulant selected, and treatment goals, the importance of tertiary filtration, and the impact on other treatment processes of adding inert coagulants such as metal salts to the activated sludge process.