Activated Sludge and Nutrient Removal Learning Objectives

1. Understand the relationships between activated sludge process control variables including: sludge age (SRT, MCRT), MLSS concentration, percentage of volatile solids (MLVSS), food to microorganism ratio (F:M), and wasting rate.

2. Select an appropriate sludge age based on sludge settleability, water temperature, and treatment goals.

3. Mitigate operating conditions that contribute to foaming and other sludge settleability issues.

4. Compare and contrast the three most commonly used method for process control: sludge age, constant mass, and F:M ratio.

5. Select a target dissolved oxygen concentration based on operating conditions and treatment goals.

6. Optimize the return activated sludge (RAS) flow rate.

7. List the environmental conditions necessary to support nitrification and denitrification.

8. Predict the amount of denitrification that may be achieved given the BOD:N ratio entering the aeration basin and internal mixed liquor recycle ratio.

9. Explain how biological phosphorus removal works and the conditions required for it to occur.

10. Understand what oxidation-reduction potential (ORP) actually measures and select ORP targets for anaerobic, anoxic, and aerobic conditions.

11. Effectively troubleshoot activated sludge processes for BOD and nutrient removal.