Learning Objectives

Quality Assurance / Quality Control

- Explain the difference between quality assurance and quality control.
- List the different types of quality control samples and the information gained from each.
- Know where to find QA/QC requirements for different test methods.

Chlorine Residual by DPD

- Understand the different types of residuals.
- Explain why it is possible to get the same total chlorine result at three different points on the breakpoint chlorination curve.
- Analyze samples for free or total chlorine using the DPD test method.
- List the required QA/QC samples and the information gained by analyzing each type.

Hardness, Alkalinity, and pH

- Define pH, alkalinity, and hardness.
- Explain why alkalinity and hardness are both expressed as mg/L of calcium carbonate.
- Conduct pH, alkalinity, and hardness tests on water and wastewater samples.
- List the required QA/QC samples for each test method.

Total Suspended Solids

- Compare and contrast three methods for measuring total suspended solids: gravimetric analysis, TSS meter, and centrifuge spins. Comment on the relative accuracy of each method.
- Correctly set up and execute the gravimetric total suspended solids procedure for analysis of wastewater samples including required QA/QC.
- Calculate total suspended solids concentrations from raw laboratory data. Interprete QA/QC sample results and take corrective action.

Sampling and Subsampling

- Explain what makes a sample representative and the assumptions behind sample collection. Determine whether to collect grab or composite samples based on data quality objectives.
- Evaluate sampling locations to determine whether they are suitable for obtaining representative samples.
- Utilize correct sampling protocol when collecting field samples to ensure they are representative and to avoid contamination. Select the correct sampling container and preservation method for each analysis.
- Correctly install and operate composite autosamplers. Evaluate influent wastewater analysis results as a way to determine if sampling results are typical for domestic wastewater.
- Identify critical data quality objectives for taking different types of samples based on information desired and the level of QA/QC required.

Biochemical Oxygen Demand

- Understand the historical and theoretical basis for the BOD test
- Understand why some BOD samples must be seeded.

- Correctly set up testing for biochemical oxygen demand including all required and recommended quality assurance and quality control samples.
- Calculate BOD results from raw analytical data and evaluate results from QA/QC samples.
- Explain why each step of the procedure is necessary.

Process Control Tests

- Perform a settleability test to assess clarifier performance.
- Conduct a sludge settleability test using a Mallory settleometer and
- Interpret results from regular settleometer, diluted settleometer, and supernatant comparison tests.
- Determine if effluent quality issues are related to sludge quality or a deficiency in the clarifier.
- Correctly perform a gram stain on an activated sludge sample.
- Interpret results from gram staining.

Data Validation

- Understand how typical ratios between components in domestic wastewater can be used to validate results
- Utilize per capita generation rates to determine if influent sampling is likely to be representative or skewed
- Explain how trend charts can be effective tools for process control and distinguish between trends and out-of-limit conditions.