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Continuing Education Course #279
Fundamentals of Clarifier
Performance Monitoring and Control

1. What is the most important function of primary clarifiers?
- a. To collect screenings collected at the plant headworks
- b. To aerate the plant influent
- c. To remove all soluble organic substances from the plant influent
- d. To remove as much settleable and floatable material as possible

2. Which of the following is a key function of secondary clarifiers in wastewater treatment plants?
- a. To remove biological flocs from the liquid stream which exits the secondary treatment process.
- b. To retain grit contained in the plant influent
- c. To treat sludge from the primary clarifiers
- d. To aerate the secondary effluent

3. Which of the following is not a key factor that impacts clarifier performance?
- a. Wind and wave action
- b. Surface overflow rate
- c. Salinity of the plant influent
- d. Clarifier depth

4. Clarifier sludge concentration has a significant impact on the capacity and performance of the downstream solids handling facilities – true or false?
- a. True
- b. False

5. Primary clarifier performance is not typically monitored for removal efficiency of what?
- a. Pathogenic bacteria and viruses
- b. Biological Oxygen Demand (BOD)
- c. Phosphorus
- d. Total suspended solids (TSS)

6. If primary sludge is retained in the clarifiers for an excessively long time the sludge could turn septic – True or False?
- a. True
- b. False

7. Shallow primary clarifiers have sidewater depth of:
- a. 15 to 20 feet
- b. less than 12 feet
- c. less than 5 feet
- d. not more than 1 foot

8. The sludge blanket retention time is calculated by dividing the solids mass in the clarifier by the total clarifier volume – True or False?

- a. True
- b. False

9. What is the optimum primary sludge concentration expressed as percent of solids:

- a. 0.5 to 1.5%
- b. 1.5 to 2.5%
- c. 7 to 8%
- d. 3 to 6%

10. Clarifier sludge concentration and sludge blanket depth are most commonly monitored by:

- a. sludge concentration analyzers
- b. manual sample collection and analysis
- c. blanket level detectors
- d. sludge density meters

11. The amount of solids retained in the clarifiers can be monitored by frequent measurements of the sludge blanket depth and waste activated sludge (WAS)/return activated sludge (RAS) solids concentration – True or False?

- a. True
- b. False

12. Which of the following parameters is not used for monitoring of secondary clarifier performance?

- a. Sludge settleability
- b. Sludge solids inventory
- c. Content of total nitrogen in the sludge
- d. Sludge volume index (SVI)

13. What is the purpose of the instrumentation for monitoring of clarifier drive unit operation?

- a. To prevent sludge septicity
- b. To improve clarifier total suspended solids removal efficiency
- c. To provide protection of the clarifier gear box
- d. To monitor the concentration of the sludge blanket

14. Clarifier drive power monitors cannot be used to control the clarifier sludge pump withdrawal rate – True or False?

- a. True
- b. False

15. Sludge density meters can measure sludge with solids concentrations?

- a. between 0.001 an 0.01%
- b. between 0.1 and 6%
- c. higher than 10%
- d. less than 0.1%

16. Optical analyzers can measure sludge with higher solids concentration than ultrasonic analyzers – True or False?

- a. True
- b. False

17. What is the measurement accuracy of nuclear analyzers, expressed as a percentage of full instrument span?

- a. 0.5 to 1.0%
- b. +/- 5%

○ c. 2 to 5%
○ d. +/- 0.5%

18. Optical analyzers cannot be used for measurement of the solids concentration of thickened sludge – True or False?
○ a. True
○ b. False

19. What is the maximum sludge concentration that can be measured using nuclear density analyzers?
○ a. 10%
○ b. 5%
○ c. 15%
○ d. 2%

20. In-line ultrasonic analyzers are suitable for installation on pipelines with diameter of?
○ a. 16 to 60 inches
○ b. 100 to 500 inches
○ c. 4 to 12 inches
○ d. 200 inches or more

21. Turbidimeters are ultrasonic analyzers – True or False?
○ a. True
○ b. False

22. The “sludge judge” is used for measurement of?
○ a. return activated sludge (RAS) concentration
○ b. sludge blanket level
○ c. sludge density
○ d. clarifier drive motor power

23. Which of the following clarifier performance monitoring equipment can be used to develop a profile of the sludge concentration throughout the clarifier?
○ a. turbidimeters
○ b. nuclear density analyzers
○ c. optical sludge density meters
○ d. Optical sludge blanket level detectors