

Test Your Knowledge of Conservation and Reuse



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1. What is a typical permit requirement for chlorine residual maintenance of reuse water that is applied to a Rapid Infiltration Basin in Florida?
 - A. No greater than 1.0 mg/L Total Chlorine Residual.
 - B. No less than 0.5 mg/L Total Chlorine Residual.
 - C. No less than 1.0 mg/L Total Chlorine Residual.
 - D. No greater than 0.5 mg/L Total Chlorine Residual.
2. What are the units of this formula?
Filter Inlet Flow ÷ Filter Surface Area
 - A. gpd/ft³
 - B. lbs/day/ft²
 - C. gpm/ft²
 - D. lbs/minute/ft²
3. Given the following data, what is the total suspended solids (TSS) concentration of this reuse grab sample, and does it meet the Florida Department of Environmental Protection (FDEP) requirements for reclaimed water TSS standards:
 - 100 ml of sample
 - Tare weight of filter is 11.8873 grams
 - Final weight of filter after drying is 11.8879 grams
 - A. 10 mg/L - No
 - B. 4 mg/L - No
 - C. 6 mg/L - No
 - D. 4 mg/L - Yes
4. Given the following information, does this reuse water quality satisfy the FDEP requirements for fecal coliform standards?
 - 60 percent of the sample is below the detection limits per 100 ml of sample.
 - The highest day of the month was 24 per 100 ml of sample.
 - A. Yes, this meets typical requirements in Florida for reuse water fecal coliform.
 - B. No, this fails to meet typical requirements in Florida for reuse water fecal coliform.
5. What is a typical permit requirement for chlorine residual maximum of effluent disposal in an open body of water, other than the ocean?
 - A. No greater than 0.01 mg/L Total Chlorine Residual.
 - B. No less than 0.5 mg/L Total Chlorine Residual.
 - C. No greater than 1.0 mg/L Free Chlorine Residual.
 - D. No less than 0.1 mg/L Total Chlorine Residual.
6. What is the final effluent TSS value if the plant influent TSS is 225 mg/l, and the TSS percent removal is 98.5 percent?
 - A. 7.65 mg/l
 - B. 2.34 mg/l
 - C. 3.37 mg/l
 - D. 4.37 mg/l
7. Other than sand, what is a typical media used in rapid gravity filters?
 - A. Rocks greater than 2-inch diameter
 - B. Anthracite coal
 - C. Clay
 - D. Talcum powder
8. If one cell of an effluent filter is taken out of service, what is the effect on the remaining cells?
 - A. The hydraulic loading rate will not be affected.
 - B. The hydraulic loading rate will be increased.
 - C. The hydraulic loading rate will be decreased.
 - D. All filter cells must remain in service regardless of the flow rate.
9. What is the basic purpose for filtration of secondary effluent?
 - A. To make up for poor secondary treatment.
 - B. To remove ammonia.
 - C. To remove NO₂.
 - D. To remove TSS and viruses.
10. Why should a sample of spent washwater be collected during a backwash of an effluent filter?
 - A. To check for turbidity.
 - B. To check for chlorine residual.
 - C. To check for lost media.
 - D. To place into final effluent sampler.

Answers on page 69

SEND US YOUR QUESTIONS

Readers are welcome to submit questions or exercises on water or wastewater treatment plant operations for publication in Certification Boulevard. Send your question (with the answer) or your exercise (with the solution) by e-mail to roy.pelletier@cityoforlando.net, or by mail to:

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Certification Boulevard Answer Key

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1. **B) No less than 0.5 mg/L Total Chlorine Residual.**

2. **C) gpm/ft²**

The influent flow is gallons per minute, and the filter surface area is square feet. This (gpm per sq. ft.) is typically referred to as hydraulic loading rate for effluent filtration.

3. **C) 6 mg/L - No**

TSS, mg/L
= (final wt., gm – tare wt., gm) x 10,000
= (11.8879 gm – 11.8873 gm) x 10,000
= 6 mg/L

No, this does not meet the FDEP standard; the FDEP standard for reclaimed water TSS is no greater than 5.0 mg/L.

4. **B. No, this fails to meet typical requirements in Florida for reuse water fecal coliform.**

The rule for fecal coliform in reuse water states: "Over a 30 day period, 75percent of the fecal coliform values (the 75 percent percentile value) shall be below detection limits. Any one sample shall not exceed 25 fecal coliform values per 100 ml of sample."

5. **A) No greater than 0.01 mg/L Total Chlorine Residual.**

6. **C) 3.37 mg/L**

*Influent TSS of 225 mg/L x 0.015
= Effluent TSS of 3.37 mg/L
(100 percent - 98.5 percent
= 1.5 percent)*

7. **B) Anthracite coal**

8. **The hydraulic loading rate will be increased.**

The hydraulic loading rate for effluent filtration is typically measured in gallons per minute per square foot of surface area. When you remove a filter cell from service, the overall filtration surface area is reduced (reduced square feet of media). This, in turn, increases the revised hydraulic loading rate because the same amount of flow is now being applied to fewer square feet of filter media.

9. **D) To remove TSS and viruses.**

Some filters use chemical conditioning to enhance TSS and virus removal, possibly with chlorine, polymer, and/or Alum.

10. **C) To check for lost media.**

If media is lost, it will typically leave the filter with the spent washwater during the backwash cycle.