Certification Boulevard

Test Your Knowledge of Conservation and Reuse – Answer Key

1. Given the following data, calculate the annual cost for chlorine and sulfur dioxide:

   - Plant flow is 26.5 mgd
   - Chlorine demand is 5.4 mg/L
   - Chlorine residual before dechlorination is 1.75 mg/L
   - SO_2 to CL_2 ratio is 1.2:1
   - Dechlorinate to zero CL_2 residual
   - Chlorine cost is $280.00 per ton
   - Sulfur dioxide cost is $0.21 per pound

   A. $145,351
   B. $226,099
   C. $80,748
   D. <u>$116,322</u>

lbs/day chlorine = 26.5 mgd x (5.4 mg/L + 1.75 mg/L) x 8.34 lbs/gal = 1,580.2 lbs/day CL_2
lbs/day sulfur dioxide = 26.5 mgd x 1.75 mg/L CL_2 x 1.2 ratio of SO_2 to CL_2 = 464.1 lbs/day SO_2

cost/day CL_2 = ($280 per ton ÷ 2,000 lbs/ton) x 1,580.2 lbs/day CL_2 = $221.23/day CL_2
cost/day SO_2 = 464.1 lbs/day SO_2 x $0.21/lb = $97.46/day SO_2

cost/year CL_2 plus SO_2 = ($221.23/day CL_2 + $97.46/day SO_2) x 365 days/year = $116,321.85

2. What is a typical permit requirement for chlorine residual maintenance of reuse water that is being applied to a Rapid Infiltration Basin in Florida?

   A. No greater than 1.0 mg/L Total Chlorine Residual
   B. <u>No less than 0.5 mg/L Total Chlorine Residual</u>
   C. No greater than 1.0 mg/L Free Chlorine Residual
   D. No less than 0.1 mg/L Total Chlorine Residual

3. What is a typical permit requirement for chlorine residual maximum of effluent disposal in an open body of water in Florida (other than the ocean)?

   A. <u>No greater than 0.01 mg/L Total Chlorine Residual</u>
   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

4. Given the following data, what is the total gpd delivered by this reuse water pump station?

   - 1 pump delivers 250 gpm from midnight to 6 am
   - 2 pumps deliver 375 gpm each from 6 am until 6 pm
   - 3 pumps deliver 300 gpm each from 6 pm to 9 pm
   - 2 pumps deliver 250 gpm each from 9 pm to midnight

A. 792,000 gpd
B. 1,422,000 gpd
C. 882,000 gpd
D. 225,600 gpd

1 pump x 250 gpm x (6 hrs x 60 min/hr) = 90,000 gals
2 pumps x 375 gpm x (12 hrs x 60 min/hr) = 540,000 gals
3 pumps x 300 gpm x (3 hrs x 60 min/hr) = 162,000 gals
2 pumps x 250 gpm x (3 hrs x 60 min/hr) = 90,000 gals

Total = 90,000 + 540,000 + 162,000 + 90,000 = 882,000 gpd

5. Given the following information, does this reuse water satisfy the FDEP requirements for fecal coliform standards?

- 75% of the sample are below the detection limits per 100 mL of sample
- The highest day of the month was 5 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

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

6. Which DEP rule governs water reuse in Florida?

A. 62-900
B. 62-720
C. 62-503
D. 62-610

7. Which statement best describes typical analytical requirements for effluent to be applied as reuse water in Florida?

A. $CBOD_5$ = 3-5 mg/L · TSS = 10 to 20 mg/L · TP = 1.0 mg/L · TN = 3 mg/L
B. $CBOD_5$ = 20 - 30 mg/L · TSS = 1 to 2 mg/L · TP = 0.5 mg/L · NO_3 = 15 mg/L
C. $CBOD_5$ = 10 - 20 mg/L · TSS = 5 mg/L · TP = 0.5 mg/L · TN = 15 mg/L
D. $CBOD_5$ = 10 - 20 mg/L · TSS = 5 mg/L · TP = no limit · NO_3 = 10 - 12 mg/L

8. Given the following data, what is the volume of this reuse water storage tank?

- The flow entering is 1 mgd
- The detention time is 3.5 hours

A. 583,000 gals
B. 285,714 gals
C. 145,833 gals
D. 312,500 gals

Volume, mg = D.T., hrs ÷ (24 hr/day x Flow, mgd)
Volume, mg = 3.5 hrs ÷ (24 hr/day x 1 mgd) = 0.145833 mg = 145,833 gals

9. Given the following data, what is the TSS concentration of a reuse grab sample:

- 100 ml of sample
- Tare weight of filter is 11.8873 grams
- Final weight of filter after drying is 11.8877 grams

A. 10 mg/L
B. 4 mg/L
C. 2 mg/L
D. 8 mg/L

TSS, mg/L = (final wt., gm – tare wt., gm) x 10,000
TSS, mg/L =   (11.8877 gm – 11.8873 gm) x 10,000 = 4 mg/L

10. Which statement is the most accurate?

A. A percolation pond usually does not have an overflow
B. A rapid infiltration basin usually does have an overflow
C. A percolation pond usually has a solid bottom liner
D. A rapid infiltration basin usually does not have an overflow

Please forward your comments and sample questions for publication to:

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