



Certification Boulevard

Test Your Knowledge of Operations & Utility Management Topics answer key

1. Given the following data, what is the cost of polymer used, in \$ per dry ton processed, in this Gravity Belt Thickener (GBT)?
- Total sludge feed to the GBT is 76,750 gpd
 - Feed sludge concentration is 0.75%
 - Total neat polymer used is 10 gpd
 - Polymer specific gravity (S.G.) is 1.03
 - Polymer cost is \$1.02 per pound
- A. \$45.24 / dt
B. \$15.50 / dt
C. **\$36.51 / dt**
D. \$33.54 / dt

Formula: $\frac{\text{Total Cost of Polymer Used, \$}}{\text{Total Dry Tons of Sludge Processed, dt}}$

$$\begin{aligned} \text{Cost of Polymer} &= 10 \text{ gpd} \times 8.34 \text{ lbs/gal} \times 1.03 \text{ S.G.} \\ &= 85.90 \text{ lbs polymer used} \\ &= 85.90 \text{ lbs polymer} \times \$1.02 \text{ per lb polymer} \\ &= \$87.62 \text{ polymer used} \end{aligned}$$

$$\begin{aligned} \text{Dry Tons Processed} &= 0.076750 \text{ mgd} \times 7,500 \text{ mg/L} \times 8.34 \text{ lbs/gal} \\ &= 4,801 \text{ lbs dry solids divided by } 2,000 \text{ lbs/ton} \\ &= 2.4 \text{ dry tons processed} \end{aligned}$$

$$\begin{aligned} \text{Total Cost of Polymer Used} &= \$87.62 \\ \text{Total Dry Tons of Sludge Processed} &= 2.4 \text{ dt} \end{aligned}$$

$$= \$36.51 \text{ per dt processed}$$

2. Given the data from question No.1, is this an acceptable cost of polymer usage for a Gravity Belt Thickener (GBT)?
- A. Yes, very reasonable
B. **No, it is way too high**
C. There is not enough data to calculate this parameter

An acceptable cost of polymer used per dry ton processed in a GBT is about \$10 per dt.

3. Given the following data, what is the annual budget for lime in this plant?
- Lime dose rate is 6.25% of the wet weight of the sludge processed
 - Sludge volume is 21 dry tons per day
 - Sludge cake concentration is 18% TS
 - Lime cost is \$115.00 per ton delivered

· Sludge is processed 7 days per week

- A. **\$305,998**
- B. \$214,667
- C. \$4,897,083
- D. \$30,606

$$\begin{aligned} \text{Total wet tons of sludge per day} &= 21 \text{ dry tons divided by } 18\% \\ &= 21 \text{ divided by } 0.18 \\ &= 116.7 \text{ wtpd} \end{aligned}$$

$$\begin{aligned} \text{Lime used per day} &= 116.7 \text{ wtpd sludge} \times 0.0625 \\ &= 7.29 \text{ tons per day lime used} \end{aligned}$$

$$\begin{aligned} \text{Cost per day lime used} &= 7.29 \text{ tons per day} \times \$115.00 \text{ per ton} \\ &= \$838.35 \text{ per day lime used} \end{aligned}$$

$$\begin{aligned} \text{Cost per year lime used} &= \$838.35 \text{ per day} \times 365 \text{ days per year} \\ &= \$305,998 \text{ lime per year} \end{aligned}$$

4. Given the following data, what is the annual chlorine budget at this plant?

- Plant Flow = 7.25 mgd
- Preliminary Treatment Chlorine Dosage = 3.5 mg/L
- Effluent Filtration Chlorine Dosage = 2.0 mg/L
- Effluent Chlorine Dosage = 4.9 mg/L
- Effluent Chlorine Residual = 1.5 mg/L
- Chlorine Cost = \$0.17 per Pound

- A. \$25,564
- B. \$35,245
- C. \$14,789
- D. **\$39,018**

$$\begin{aligned} \text{Total Chlorine Dosage} &= 3.5 \text{ mg/L} + 2.0 \text{ mg/L} + 4.9 \text{ mg/L} \\ &= 10.4 \text{ mg/L} \end{aligned}$$

$$\begin{aligned} \text{Total lbs/day Chlorine used} &= 7.25 \text{ mgd} \times 10.4 \text{ mg/L} \times 8.34 \text{ lbs/gal} \\ &= 628.8 \text{ lbs/day chlorine used} \end{aligned}$$

$$\begin{aligned} \text{Cost per day Chlorine used} &= 628.8 \text{ lbs/day} \times \$0.17 \text{ per lb} \\ &= \$106.90 \text{ per day} \end{aligned}$$

$$\begin{aligned} \text{Cost per year Chlorine used} &= \$106.90 \text{ per day} \times 365 \text{ days/year} \\ &= \$39,018 \text{ per year chlorine used} \end{aligned}$$

5. What is the main purpose for a comprehensive maintenance program?

- A. To give the mechanics something to do
 - B. To operate all of the plant equipment
 - C. **To allow the plant to operate at its peak performance**
 - D. To repair equipment after breakage
6. What should management do if they see a large increase in the facility monthly power bill?
- A. Yell at the operators and tell them to use less electricity
 - B. Evaluate the practice of starting high horsepower equipment
 - C. Call the power company and complain
 - D. Meet with the power company and discuss the options of alternate billing methods
 - E. **Both "b & d"**
7. What is the system called that requires proper documentation associated with the person who collects samples, the person who receives the samples in the lab, and the lab technician who performs the tests?
- A. Sample performance
 - B. **Chain of custody**
 - C. Mapping
 - D. Sample journal
8. What are the responsibilities of plant management?
- A. To ensure Operations and Maintenance staff members are trained
 - B. To develop performance data records and reports
 - C. To evaluate and appraise employees
 - D. To develop and control budgets
 - E. To maintain public relations
 - F. **All of the above**
9. Which practices are *never* appropriate when working in a laboratory?
- A. Add acid to water
 - B. Hold glassware in your bare hands while heating it
 - C. Pipette samples by mouth
 - D. Use lab glassware to serve food
 - E. All of the above
 - F. **"b, c, & d"**
10. What procedure should be performed before entering a manhole that has been classified as a permit confined space?
- A. Wear a body harness
 - B. Test the air with a gas detector
 - C. Complete a confined space entry permit
 - D. Have a trained attendant with you
 - E. Use a tripod for fall protection
 - F. Use a tripod for retrieval purposes
 - G. **All of the above**

Please forward your comments and sample questions for publication to:

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