Certification Boulevard

Test Your Knowledge of Operations and Utilities Management Topics

Roy Pelletier

1. Given the following data, what is the annual budget for lime in this plant?
   - Lime dose rate is 28.5 percent of the sludge dry weight processed
   - Sludge volume is 149 wet tons per day
   - Sludge cake concentration is 17.5 percent total solids
   - Lime cost is $201.50 per ton delivered
   - Sludge is processed 6 days per week, 16 hours per day

   A. $305,998 B. $467,108
   C. $548,594 D. $281,060

2. Given the following data, what is the annual budget for sulfur dioxide at this plant?
   - Plant flow = 25.6 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
   - SO_2 feed to CL_2 residual ratio is 1.25:1
   - Complete dechlorination
   - Sulfur dioxide cost = $0.22 per lb

   A. $25717 B. $24,840
   C. $37,589 D. $32,146

3. Given the following data, what is the cost of polymer used, in dollars per dry ton processed, in this belt filter press?
   - Total sludge feed to the press is 144,500 gpd
   - Feed sludge concentration is 2.75 percent
   - Total neat polymer used is 25 gpd
   - Polymer specific gravity (S.G.) is 1.02
   - Polymer cost is $1.18 per lb

   A. $25.24 per dry ton
   B. $11.50 per dry ton
   C. $15.14 per dry ton
   D. $33.54 per dry ton

4. Given the data and correct answer from question 3, is this an acceptable cost of polymer usage for a belt filter press?
   A. No, it is way too high.
   B. Yes, it is very efficient.
   C. There is not enough data to calculate this parameter.

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 is the system called that requires proper documentation associated with the person who collects samples, the person who receives the samples in the laboratory, and the laboratory technician who performs the tests?
   A. Sample performance
   B. Chain of custody
   C. Mapping
   D. Sample journal

7. What are the responsibilities of plant management?

A. Ensure operations and maintenance staff members are trained
B. Develop performance data records and reports
C. Evaluate and appraise employees
D. Develop and control budgets
E. Maintain public relations
F. All of the above

8. What should be done to protect all personnel when repairs are made to an electrical component?
   A. Inform all personnel in the area that the repairs are being made.
   B. Lockout the equipment controls.
   C. Tag the equipment controls.
   D. Be trained and understand the OSHA requirements for lockout/tagout procedures.
   E. All of the above.

9. Which item of information *would not* be of major importance if you were developing and presenting a report to your organization's council?
   A. Capital improvement program
   B. Major equipment maintenance
   C. Operation and maintenance costs
   D. Facility process performance
   E. Laboratory procedures

10. Who benefits from the development of a facility annual report?
    A. The governing body
    B. The responsible engineer
    C. The health department
    D. The facility management
    E. All of the above

Answers on page 72

LOOKING FOR ANSWERS?

Check the Archives

Are you new to the water and wastewater field? Want to boost your knowledge about topics you'll face each day as a water/wastewater professional?

All past editions of Certification Boulevard through the year 2000 are available on the Florida Water Environment Association's website at www.fwea.org. Click the "Site Map" button on the home page, then scroll down to the Certification Boulevard Archives, located below the Operations Research Committee.

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 email to roy.pelletier@cityoforlando.net, or by mail to:

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Certification Boulevard Answer Key

From page 26

1. **B) $467,108**

Total dry tons of sludge per day
= 149 wet tons x 0.175 (17.5 percent)
= 26.075 dtpd

Lime used per day
= 26.075 dtpd sludge x 0.285 (28.5 percent)
= 7.43 tons per day lime used

Cost per day lime used
= 7.43 tons per day x $201.50 per ton
= $1,497.14 per day lime used

Cost per year lime used
= $1,497.14 per day x 312 days per year
= $467,107.68 lime per year

2. **D) $32,146**

Lbs/Day SO_2 Feed
= 25.6 mgd x (1.5 mg/L x 1.25) x 8.34
= 400.32 lbs/day

Lbs/Year SO_2 Feed
= 400.32 lbs/day x 365 days per year
= 146,116.8 lbs/year

Cost per day for SO_2
= 400.32 lbs/day x $0.22 per lb
= $88.07 per day

Cost per year for SO_2
= $88.07 per day x 365 days/year
= $32,145.55 per year SO_2 budget

3. **C) $15.14 per dry ton**

Formula
= Total Cost of Polymer Used, $ ÷ Total Dry Tons of Sludge Processed, dt

Cost of Polymer
= 25 gpd x 8.34 lbs/gal x 1.02 S.G.
= 212.67 lbs polymer used
= 212.67 lbs polymer x $1.18 per lb polymer
= $250.95 polymer used

Dry Tons Processed
= 0.1445 mgd x 27,500 mg/L x 8.34 lbs/gal
= 33,141 lbs dry solids divided by 2,000 lbs/ton
= 16.57 dry tons processed

Total Cost of Polymer Used ÷ Total Dry Tons of Sludge Processed
= $250.95 polymer ÷ 16.57 dry tons
= $15.14 per dry ton processed

4. **B) Yes, it is very efficient.**

An acceptable cost of polymer used per dry ton processed in a belt filter press depends on several variables, including the type of sludge, the sludge conditioning process, and many others. Typically, with anaerobically digested sludge, acceptable polymer consumption is anything less than about $20 to $25 per dry ton processed.

5. **C) To allow the plant to operate at its peak performance.**

Maintenance of plant processes and equipment components is conducted to ensure the plant is allowed to perform at its peak level.

6. **B) Chain of custody**

Chain of custody refers to the chronological documentation or paper trail, showing the collection (seizure), custody, control, transfer, analysis, and disposition of physical or electronic evidence. In a water or wastewater plant, the physical evidence is the sample transmitted to the laboratory.

7. **F) All of the above.**

Plant managers are typically responsible for overseeing the operation and maintenance of water or wastewater treatment plants, advanced water treatment facilities, and reclaimed water distribution and disposal facilities to ensure the efficient, safe, and economical treatment of wastewater, disposal of sludge and delivery of reclaimed water. All of the items in this question are necessary for successful plant management.

8. **E) All of the above.**

All of the items in this question are necessary to protect personnel when repairs are made to electrical components.

9. **E) Laboratory procedures**

Typically, laboratory procedures are not of much interest to an organization's council.

10. **E) All of the above.**

All parties on this list would benefit from the development of an annual report for a water or wastewater facility.