

Test Your Knowledge of Stormwater Management and Other Wastewater Treatment Topics



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1. Which program consists of pollution prevention plan, sampling program, periodic inspections, and employee training?
 - A. Process safety management
 - B. Stormwater management
 - C. Asset management
 - D. Facility budget
2. Which of the following items can be considered stormwater?
 - A. Storm runoff
 - B. Snowmelt runoff
 - C. Drainage
 - D. All of the above.
3. Best management practices (BMPs) are those practices oriented toward common industrial activities to reduce and/or eliminate storm water pollutants.
 - A. True
 - B. False
4. What is the minimum velocity in a sanitary sewer pipeline necessary to prevent settling of solids and debris?
 - A. 1 fps
 - B. 0.5 fps
 - C. 2 fps
 - D. 2 fpm
5. What is the detention time in a rectangular tank that is 100 ft long, 25 ft wide, and 13 ft deep, and the influent flow is 5 mgd?
 - A. 2.3 hours
 - B. 1.8 hours
 - C. 1.2 hours
 - D. 3.1 hours
6. Given the following data, what is the surface settling rate (or surface loading rate) of the secondary clarifiers?
 - Two secondary clarifiers
 - Each clarifier has a diameter of 100 ft
 - The plant influent flow is 12 mgd
 - A. 764 gal per day per ft²
 - B. 3,414 gal per day per ft²
 - C. 536 gal per day per ft²
 - D. 159 gal per day per ft²
7. Given the following data, how many gal per day of waste activated sludge (WAS) should be removed if a 10-day solids retention time (SRT) is the desired target?
 - Two aerations tanks
 - Each aeration tank is 140 ft long, 45 ft wide, and 15 ft deep
 - The mixed liquor suspended solids (MLSS) concentration is 3,500 ppm
 - The WAS concentration is 8,500 ppm
 - A. 1.12 mgd
 - B. 158,250 gpd
 - C. 20,790 gpd
 - D. 58,217 gpd
8. What type of chlorine comes in solid or dry form?
 - A. Sodium hypochlorite
 - B. Ferric chloride
 - C. Calcium hypochlorite
 - D. Aluminum sulfate
9. One important component of an effective stormwater management program is ensuring that each facility employee understands the on-site stormwater drainage system.
 - A. True
 - B. False
10. Why are flow measurements important?
 - A. They help to determine dissolved solids.
 - B. They help to determine loading rates.
 - C. They help to determine nitrate levels.
 - D. They help to determine suspended solids removal.

Answers on page 34

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 12

1. **B) Stormwater management**

A stormwater management program is the only topic on the list that includes all of the items listed in the question.

2. **D) All of the above.**

All of these items are considered stormwater; however, there's not much snowmelt runoff in Florida!

3. **True**

Best management practices (BMP) is a term used to describe a type of water pollution control. Historically, the term has referred to auxiliary pollution controls in the fields of industrial wastewater control and municipal sewage control, while in stormwater management (both urban and rural) and wetland management, BMPs may also refer to a principal control or treatment technique.

4. **C) 2 fps**

If the velocity in a sanitary sewer is less than about 2 ft per second (fps), it will typically allow solids to settle.

5. **C) 1.2 hours**

*100 ft long x 25 ft wide x 13 ft deep x 7.48 gal per ft³
x 24 hrs per day ÷ 5,000,000 gal per day
= 1.16 hours*

6. **A) 764 gal per day per ft²**

*Each clarifier surface area in ft²
= 50 x 50 x 3.14
= 7,850 ft² x 2 clarifiers = 15,700 ft²
12,000,000 gal per day ÷ 15,700 ft²
= 764.3 gpd per ft²*

7. **D) 58,217 gpd**

*Lbs in aeration
= 140 ft x 45 ft x 15 ft x 7.48 gal per ft³ x 2 tanks
= 1,413,720 gals
1.41372 MG x 3,500 ppm x 8.34 lbs per gal
= 41,266 lbs MLSS*

*Lbs per day to waste
= 41,266 lbs MLSS ÷ 10 day SRT
= 4,127 lbs per day to waste*

*Gals per day to waste
= 4,127 lbs per day to waste ÷ 8,500 ppm WAS x 8.34
lbs/gal
= 0.058217 mgd
0.058217 mgd x 1,000,000
= 58,217 gpd*

8. **C) Calcium hypochlorite**

High test hypochlorite (HTH) is a solid, dry powder. Calcium hypochlorite is also used in solid tablet form (like the "hockey pucks" used in a swimming pool chlorinator).

9. **True**

Understanding the on-site drainage system allows employees to participate with development, implementation, and continual improvement of the program.

10. **B) They help to determine loading rates.**

Loading rates require knowledge of the particular flow rate entering the facility or a process unit. An accurate flow meter is an integral component in the calculation of plant and process loading rates. Flow measurement is also typically required in many facility operating permits.