

2015 DW Module 1: General Overview – VOLUME III  
**Answer Key**

Unit 1



Unit 1 Exercise

- 1) Coliform bacteria make good indicator organisms because:
  - a) They are always present when pathogens are present.
  - b) The testing method for detection is easy and reliable.
  - c) Both (a) and (b)**
  - d) When they are absent, we can't assume that pathogens are also absent.
  
- 2) Baffling in tanks provides:
  - a) A way to reduce short-circuiting
  - b) Decreased detention time
  - c) Increased detention time
  - d) Both (a) and (c)**

For questions 3 and 4, underline the correct answer within the parentheses.

- 3) Disinfection of water with free chlorine will be **more efficient** at temperatures (lower/higher) than 60°F.
- 4) Disinfection of water with free chlorine will be **more efficient** at values (lower/higher) than 7.0.
  
- 5) List one advantage of using sodium or calcium hypochlorite versus gas chlorination.

**It is safer to handle than gas chlorine.**  
**Hypochlorite is easy to use and apply and does not require special training for handling.**

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Unit 2 &3



Unit 2 & 3 Exercise

1. List good plant safety maintenance practices:

ANS:

- a. Using lockout-tagout procedures.
- b. Always replace safety guards.
- c. Before disconnecting power leads, mark the configuration.
- d. Follow confined space procedures.
- e. Perform good housekeeping procedures.

2. What can cause excessive vibration in a pump?

ANS:

Such things as worn bearings, worn housings, loose bolts, and misalignment can cause excessive vibration in a pump. Misalignment can occur within a pump or between a motor and a pump which causes excessive vibration.

3. List 3 general considerations for metering pump repairs:

ANS:

- Be sure that replacement parts are appropriate for the system.
- all leaks must be identified and repaired promptly.
- make repairs to piping with the fewest joints and simplest runs.
- keep gearboxes at proper oil levels.
- ensure that mountings are tight in order to prevent vibration that can be transmitted to the piping.
- keep intake strainers clean.
- ensure that check valves operate.
- observe strokes per minute, and compare the results to the pump capacity chart, and
- be proactive.

4. An air gap on the (discharge/**suction**) side of a positive discharge pump could be harmful.

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**Unit 4**

**Practice Problem:** A pressure gauge at the bottom of an 80 foot tall, 16 foot diameter tank reads 28.2 psi. How many feet of water are in the tank?

$$?ft = \frac{2.31 \text{ ft}}{1 \text{ psi}} \times 28.2 \text{ psi} = 65 \text{ ft}$$

Note: Remember pressure is not affected by volume, only height.

**Practice Problem:** In one month a water system produced 5,500,000 gallons of water. Of the total water, 4,500,000 gallons were billed, 250,000 were used for fire protection and 200,000 gallons were used for flushing. What is the total unaccounted for water loss percentage for this month?

**Step 1: Add total gallons accounted for (billed, fire protection and flushing)**

Gallons Accounted for = Sum of billed, fire protection and flushing

$$4,500,000 \text{ (billed)} + 250,000 \text{ (fire protection)} + 200,000 \text{ (flushing)} = 4,950,000$$

**Step 2: Subtract "accounted for" from total produced to find "Unaccounted for"**

$$\text{Total Produced} = 5,500,000 - 4,950,000 \text{ (Step 1 Accounted for)} = 550,000 \text{ (Unaccounted for)}$$

**Step 3: Divide "Unaccounted for" by total produced and multiply by 100 to equal the % unaccounted for**

$$\frac{550,000 \text{ (Step 2 Unaccounted For)}}{5,500,000 \text{ (Total Produced)}} = 0.1 \times 100 = 10 \% \text{ Unaccounted for}$$



### Unit 4 Exercise

1. Circle those items that are components of a distribution network.

**ANS: a. Pumps, c. Storage Facilities, f. Pipes, g. Hydrants, h. Valves, and j. Meters**

2. How many feet of water are in a water tank that is 35 feet tall with a 50 foot diameter when the pressure gauge at the bottom of the tank reads 10.8 psi?

**ANS:  $10.8 \times 2.31 = 25$  psi**

3. What is the unaccounted for water loss percentage for one month if a water system:

Produced:	8,500,000 gallons
Billed:	7,400,000 gallons
Fire Protection	275,000 gallons
Flushing	100,000 gallons

**ANS:**

**Total Accounted For =  $7,400,000 + 275,000 + 100,000 = 7,775,000$**

**Unaccounted = Produced – Accounted –  $8,500,000 - 7,775,000 = 725,000$  gallons**

**Percent Loss =  $\frac{\text{unaccounted}}{\text{Produced}} \times 100 = \frac{725,000 \text{ gallons}}{8,500,000} \times 100 = 8.5\%$**

**Produced 8,500,000**

4. Proper sampling technique is the most critical factor in water sampling.

- a. **True**
- b. False

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### Unit 5

**Q.** Do you use lockout/tag out procedures at your plant?

**Pages 5-3 through 5-6 provide useful information about lockout/tag out procedures if you don't already use them at your plant.**

## Noise Reduction and Hearing Protection



### Calculation

A motor produces a sound level of 93 dBA and you have been provided with earplugs with an NRR of 25. What would the effective noise reduction from the earplugs be?

ANS:

$$25 \text{ (NRR)} - 7\text{dBA} = 18 \text{ dBA (NRR)}$$

$$93 \text{ dBA} - 18 \text{ dBA} = 75 \text{ dBA effective NRR}$$

- We get the answer by taking the noise reduction provided by the earplugs, which is 25 NRR, and subtract 7 dBA from it. This gives us 18 dBA. Next, we take this number and subtract it from the measured noise exposure, which is 93 dBA, and we get an effective noise reduction of 75dBA.
- Remember that reducing your noise exposure is important not only to prevent permanent hearing loss but also to ensure that you can hear desired sounds such as speech and warning signals.

### Fire



There are also some less obvious consequences of fire. What do you think some of those consequences are?

ANS: Loss of production, destruction of business records, costs of reconstruction or clean-up, direct costs for losses not covered by insurance, increased insurance premiums and water and smoke damage to equipment and property.



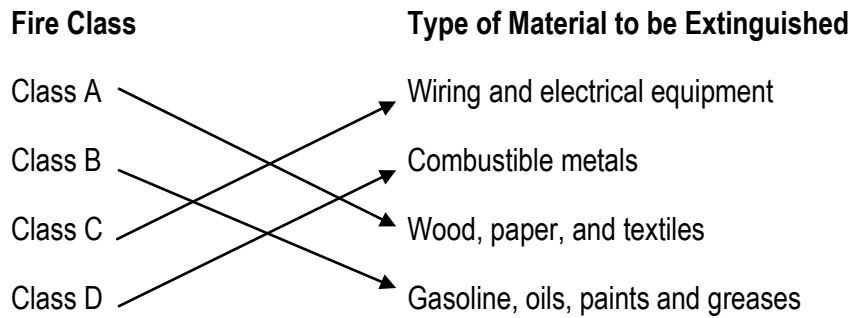
Unit 5 Exercise

1. Electrical hazards can be controlled by:

- a) Insulation
- b) Guarding
- c) Grounding
- d) Ground-Fault Circuit Devices

e) **All of the above**

2. Draw a line to match the fire class with the appropriate type of material to be extinguished.



3. Guarding is not necessary for rotating shafts, drive belts, and couplings.

- a. True
- b. **False**

4. In general if you have to shout or cannot hear someone talking in a normal voice then the noise level can be assumed to be excessive.

- a. **True**
- b. False

5. To help reduce the risk of back injury when lifting:

- a. Bend at your knees, not your back to pick-up the load.
- b. Gradually lift with your legs not your back.
- c. Keep the load close to your body.
- d. Never twist while lifting.
- e. **All of the above**