

**Workover & Completion Day 4**

1. In a workover operation of a shut in well a Lubricator is being used together with a Wireline BOP / Wireline Valve. Which Barrier is classified as the Primary Barrier?
- A. Tree Lower Master Valve
  - B. Wireline BOP / Wireline Valve
  - C. Lubricator

2. You have just started up the pump at 3 bbls/min and have 875 psi pump pressure.

**Well Data:**

**Brine weight – 10.2 ppg**

**Well depth – 8,000 feet**

**Calculated inside tubing pressure loss – 800 psi**

**Calculated annular pressure loss - 75 psi**

**Calculate the current bottom hole pressure (BHP) with conventional circulation.**

- A. 4243 psi
  - B. 4318 psi
  - C. 5043 psi
  - D. 5918 psi
3. Calculate the Bullheading Max Final surface pressure limit when Kill Weight Fluid reaches the top perforations for a given the following well information.

**Average Fluid Density in Tubing = 7.43 ppg**

**Calculated KWM required: 9.9 ppg**

**Top Perforations = 8500 feet TVD**

**Bottom Perforations = 8750 feet TVD**

**Fracture Gradient = .62 psi/foot**

- A. 4376 psi
  - B. 5270 psi
  - C. 894 psi
  - D. 1926 psi
4. The saturation point is reached when no more salt or other weighting material of a brine can be dissolved into solution.
- A. False
  - B. True
5. A formation at 13,210 ft TVD has a pressure gradient of 0.524 psi/ft. If the well has a shut-in tubing pressure of 2250 psi, what is the average density in ppg of the fluid in the tubing?
- A. 9.2 ppg
  - B. 6.8 ppg
  - C. 5.2 ppg
  - D. 9.6 ppg

6. **A pumper visits a producing well daily and records flowing tubing pressure and verifies annulus pressure is zero. The well is completed with tubing and a packer in the hole. Today he sees rising annulus pressure and attempts to bleed off the pressure, but it continues to rise higher. The flowing tubing pressure is constant. What could be happening?**
- A. Production choke may be plugged, causing the pressure increase
  - B. Tubing has collapsed, be ready to pull the tubing out and replace it
  - C. There is possibly a leak in the tubing or at the packer and a gas influx is migrating and expanding in the annulus as fluid is being bled off the well
  - D. There is a leak in a tubing plug in the NOGO nipple

7. **Bullheading requires annular velocity in the tubing to exceed the gas migration rate. Calculate the minimum required pump speed (SPM) to successfully bullhead down the tubing in this well.**

**Tubing capacity: 2 3/8", 4.7 lbs/foot, N80, 0.00378 bbls/foot**  
**Migration rate of gas: 3400 feet/hour**  
**Pump output: 0.0480 bbl/stk**

- A. 9 SPM
  - B. 7 SPM
  - C. 5 SPM
  - D. 3 SPM
8. **What brine weight (with no safety factor) should be mixed on surface to bullhead the well given the following information?**

**SITP = 2300 psi**  
**TVD = 7200 feet**  
**Fluid Density in Tubing = 3.5 ppg**  
**Average Wellbore Temperature (AWBT) = 185 °F**  
**Surface Mixing Temperature = 75 °F**  
**Please use the following density temperature chart.**

Brine weight (ppg)	Weight loss (ppg/°F)
8.4 – 9.0	0.0017
9.1 – 11.0	0.0025
11.1 – 14.5	0.0033
14.6 – 17.0	0.0040
17.1 – 19.2	0.0048

- A. 9.7 ppg
- B. 10.0 ppg
- C. 10.4 ppg
- D. 10.5 ppg

9. **The Volumetric Method is being use to allow gas bubble expansion as the bubble migrates to the surface. When gas reached the surface the well must be shut in and a circulating method of well control performed. Choose the most applicable method for killing a well without tubing.**

- A. Bleed gas and pump mud in calculated steps
- B. Pump mud and bleed gas in calculated steps
- C. Bleed gas from the choke and open the well
- D. Open the well since the gas pressure is almost zero

10. **Based on static conditions before beginning to pump, calculate the Max Initial surface pressure limit for a Bullheading operation.**

**Well Information:**

**SITP = 2400 psi**

**SICP = 0 psi**

**Top Perforation = 9400 feet MD / TVD**

**Bottom Perforation = 9600 feet MD / TVD**

**Formation Fracture Gradient = 0.568 psi/foot**

**Formation Pressure Gradient = 0.344 psi/foot**

- A. 2940 psi
- B. 4506 psi
- C. 2106 psi
- D. 5501 psi

11. **On a production tree the Upper Master Valve should not be used to isolate pressure and shut the well in (for emergency use only). True or False?**

- A. True
- B. False

12. **What happens to brine pumped into a well as its temperature increases downhole?**

- A. The density decreases and the volume increases
- B. The brine saturation point decreases
- C. Brine crystallization can occur
- D. The temperature has no effect on brine volume and density

13. **A well is being abandoned. A cement plug is set at 10,200' TVD and perforations are at 11,000' TVD**

**Pore pressure at the perforations is 9.6 ppg.**

**Formation gas weighing 2.1 ppg is between the plug and the perforations.**

**What is the minimum kill weight mud, with a 150 psi overbalance, that can be used for the hydrostatic pressure above the plug to act as a barrier?**

- A. 11.0 ppg

- B. 9.0 ppg
- C. 9.9 ppg
- D. 10.5 ppg

**14. Calculate the kill weight fluid required to kill a well by bullheading given the following well information.**

**Top Perforations = 9000 feet TVD**  
**Bottom Perforations = 9250 feet TVD**  
**Pore Pressure Gradient = .525 psi/feet**  
**SITP = 1100 psi**  
**SICP = 0 psi**

- A. 9.9 ppg
- B. 10.7 ppg
- C. 10.8 ppg
- D. 10.1 ppg

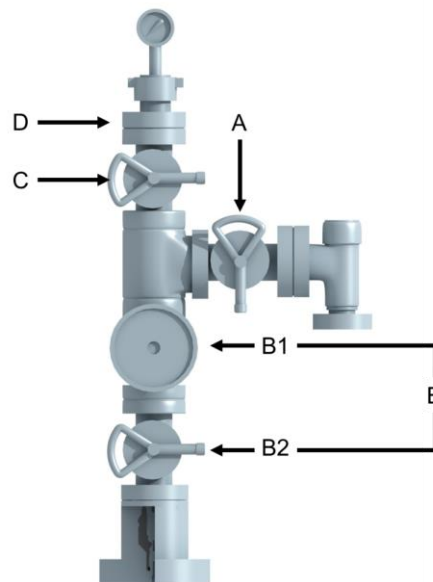
**15. What two devices in the well can be used to isolate the tubing string from the casing in a producing well?**

**(Two Answers)**

- A. Subsurface safety valve
- B. A Sliding Sleeve above the packer
- C. Back pressure Valve
- D. Packer

**16. Identify the components of the production tree using the Answer Bank below.**

- A \_\_\_\_\_
- B1 \_\_\_\_\_
- B2 \_\_\_\_\_
- C \_\_\_\_\_
- D \_\_\_\_\_



ANSWER BANK	
Upper Master Valve	Crown/ Swab Valve
Tree Cap	Lower Master Valve
Wing Valve	

- 17. During Bullheading operations the Kill Weight Fluid is calculated using TVD of the Top Perforations and Volume to Pump is calculated using Lower Perforations MD.**
- A. True
  - B. False
- 18. What is the function of a surface controlled subsurface safety valve (SCSSV)?**
- A. Shut the well in to remove the wireline lubricator
  - B. To allow communication between tubing and casing
  - C. To isolate the tubing and casing annulus
  - D. Shut in the flowing well during an emergency
- 19. What are the main calculations required before beginning bullheading operations?**
- A. Total tubing volume, kill fluid, maximum pressures
  - B. Total tubing volume, maximum pressures
  - C. Total volume from the surface to lower perforations; kill fluid weight in ppg, and maximum pressures.
  - D. Kill fluid, maximum pressures
- 20. Why are brines commonly used as workover and completion fluids?**
- A. They are solids free, relatively stable, and the least damaging to formations
  - B. To reduce the likelihood of casing and tubing erosion
  - C. To reduce formation fracture
  - D. Inexpensive (low cost)

### Answer Key

- 1. C
- 2. B
- 3. C
- 4. B
- 5. B
- 6. C
- 7. C
- 8. B
- 9. B
- 10. B
- 11. B
- 12. A

- 13. D
- 14. D
- 15. B, D
- 16. A Wing Valve
  - B1 Upper Master Valve
  - B2 Lower Master Valve
  - C Crown/ Swab Valve
  - D Tree Cap
- 17. A
- 18. D
- 19. C
- 20. A