58. While tripping out of the hole from 12,000 feet TVD the hole does not take the proper amount of fill. With the bit at 9000 feet TVD the well flows and is shut in with 215 psi SICP. A float is in the drill string. Drill collar length is 1200 feet and the average length of each stand is 93 feet. Assume the gas is on bottom and does not migrate.

Drill pipe capacity .01776 bbl/ft
Drill pipe displacement .0076 bbl/ft
Open hole capacity .0702 bbl/ft
DC/Open hole capacity .0291 bbl/ft
DP/Open hole capacity .046 bbl/ft
Pit gain 30 bbl
Gas gradient .12 psi/ft
MW 12.0 ppg

58a. How much volume is required to fill the drill pipe after stripping one stand into the hole?

\[ \text{Capacity bbl = Stand Length ft} \times \text{Drill pipe capacity bbl/ft} \]
\[ 93 \text{ ft} \times .01776 = 1.65 \text{ bbl} \]

58b. Calculate the height of the influx

\[ \text{Height of Influx in open hole ft = Pit Gain bbls} \div \text{Open Hole capacity} \]
\[ 30 \div .0702 = 427.3 \text{ ft} \]

58c. Calculate the volume displaced per stand of drill pipe stripped into the hole

\[ \text{Displacement per stand bbls = Stand Length ft} \times (\text{Drill pipe capacity bbl/ft} + \text{Drill pipe displacement bbl/ft}) \]
\[ 93 \times (.01776 + .0076) = 2.35 \text{ bbls} \]

58d. After stripping to bottom, what is the height of the influx across the BHA

\[ \text{Height of Influx around Drill Collars = Pit Gain bbls} \div \text{Drill Collar capacity bbl/ft} \]
\[ 30 \div .0291 = 1031 \text{ ft} \]

58e. Calculate the SICP once the bit is back on bottom

\[ \text{SICP = Height of Influx x (Mud Grad – Gas Grad)} \]
\[ 1031 \times (0.624 – 0.12) = 519 \text{ psi} \]
59. WELL DATA FOR QUESTION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Depth</td>
<td>12,000 feet</td>
</tr>
<tr>
<td>DC length</td>
<td>1100 feet</td>
</tr>
<tr>
<td>9 5/8&quot; Csg Shoe</td>
<td>8000 feet</td>
</tr>
<tr>
<td>DC capacity</td>
<td>0.00768 bbl/ft</td>
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<tr>
<td>8 3/4&quot; OH capacity</td>
<td>0.0702 bbl/ft</td>
</tr>
<tr>
<td>DC displacement</td>
<td>0.033 bbl/ft</td>
</tr>
<tr>
<td>MW</td>
<td>12 ppg (0.624 psi/ft)</td>
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<tr>
<td>DP capacity</td>
<td>0.01776 bbl/ft</td>
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<tr>
<td>DP displacement</td>
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<tr>
<td>DC/OH capacity</td>
<td>0.0291 bbl/ft</td>
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<tr>
<td>DP/OH capacity</td>
<td>0.0459 bbl/ft</td>
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<tr>
<td>DP/Csg capacity</td>
<td>0.0515 bbl/ft</td>
</tr>
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</table>

After pulling 33 stands the driller checks the hole fill. The well has not taken the correct amount of mud. A flow check is made and the well is flowing.

<table>
<thead>
<tr>
<th>Parameter</th>
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<tbody>
<tr>
<td>Bit depth</td>
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<tr>
<td>SICP</td>
<td>200 psi</td>
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<tr>
<td>Influx volume</td>
<td>30 bbl</td>
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<tr>
<td>Influx gradient (Gi)</td>
<td>0.156 psi/ft</td>
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Assume that the influx occurred from the bottom of the hole and that no gas migration occurs.

59a. Calculate the volume to bleed off per 98 feet of drill pipe stripped back into the hole.

\[
\text{Volume to Bleed} = 98 \times (0.01776 + 0.0076) = \text{2.48 bbl}
\]

59b. What will be the effect on bottom hole pressure of bleeding off too much mud?

Increase _____ Decrease __\_ Stay the same _____

59c. How would casing pressure most likely react as the drill string is stripped into the influx?

Increase __\_\_ Decrease _____ Stay the same _____
60. Problems that occur during a killing operation may affect the parameters you are monitoring at the surface (drill pipe pressure and casing pressure). For each of the following problems state the immediate effect on each of the parameters listed.

For an increase use this symbol \( \uparrow \)

For a decrease use this symbol \( \downarrow \)

For no change use this symbol \( = \)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Drill Pipe Pressure</th>
<th>Casing Pressure</th>
<th>Bottom Hole Pressure</th>
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<tbody>
<tr>
<td>A. Choke washout</td>
<td>( \downarrow )</td>
<td>( \downarrow )</td>
<td>( \downarrow )</td>
</tr>
<tr>
<td>B. Hole in string</td>
<td>( \downarrow )</td>
<td>( = )</td>
<td>( = )</td>
</tr>
<tr>
<td>C. Nozzle blowout</td>
<td>( \downarrow )</td>
<td>( = )</td>
<td>( = )</td>
</tr>
<tr>
<td>D. Choke plugging</td>
<td>( \uparrow )</td>
<td>( \uparrow )</td>
<td>( \uparrow )</td>
</tr>
<tr>
<td>E. Nozzle plugging</td>
<td>( \uparrow )</td>
<td>( = )</td>
<td>( = )</td>
</tr>
</tbody>
</table>
61. During the well kill operation, slowly but regularly you have to reduce the choke size because the drill pipe and casing pressures keep dropping with constant pump strokes. What is the likely cause of this?

A. A bit nozzle is washing out  
B. The choke is washing out (Correct Answer)  
C. You have a washed out pump swab

62. Which of the following parameters can be affected by a string washout during a well killing operation (TWO ANSWERS).

A. Bottom hole pressure (Correct Answer)  
B. Kick tolerance  
C. Formation fracture pressure  
D. Slow circulating pressure (Correct Answer)

63. The choke has to be closed gradually due to a string washout. What effect does the gradual closing of the choke have on bottom hole pressure?

A. Decrease  
B. Increase (Correct Answer)  
C. Stay the same

64. How is a choke washout recognized?

A. Rapid rise in casing pressure with no change in the drill pipe pressure  
B. Increase in drill pipe pressure with no change in casing pressure  
C. Continually having to open the choke to maintain drill pipe and casing pressures  
D. Continually having to close the choke to maintain drill pipe pressure (Correct Answer)

65. A kick is being circulated from the well using the Driller’s Method. Pumping pressure has been established as 1000 psi @ 30 SPM. During the operation pressure suddenly increases to 1350 psi. You are reasonably certain that a nozzle has plugged. What should you do?

A. Reduce the pump pressure to 1000 psi by adjusting the choke  
B. Shut the well in and re-establish the pumping pressure (Correct Answer)  
C. Hold casing pressure constant at the value recorded just before the nozzle plugged  
D. A & B are acceptable courses of action
66. A well is being killed using the Driller's Method. During the first circulation the drill pipe pressure is kept constant at 670 psi and the pump speed @ 30 SPM. Halfway through the first circulation the operator on the choke observes a sudden increase in drill pipe pressure. There is no significant change in choke pressure and the pump speed is still 30 SPM. What could have happened? (THREE ANSWERS)

A. The bit nozzles have partially plugged (Correct Answer)
B. The choke has partially plugged
C. The kick is about to enter the choke
D. A partial blockage in the kelly hose (Correct Answer)
E. Pressure has built up in the mud/gas separator
F. A partial blockage in the drill string has occurred (Correct Answer)

67. During a well killing operation using the Driller's Method, the choke pressure suddenly increases by 150 psi. Shortly thereafter the operator observes the same pressure increase on the drill pipe pressure gauge. What is the most likely cause of this pressure increase?

A. A second influx has entered the well
B. A restriction in the kelly hose
C. A plugged nozzle in the bit
D. The choke is partially plugged (Correct Answer)
E. A washout in the drill string

68. What would be the correct action to take for the problem in question #67

A. Reduce the pump rate to reduce the pressure by 150 psi
B. Open the choke a little until the drill pipe pressure returns to the calculated value (Correct Answer)
C. No action required as this pressure increase has no effect on bottom hole pressure
D. Stop the kill operation, remove the restriction in the kelly hose or change over to a spare kelly hose

69. While displacing the drill pipe with Kill Weight Mud a sudden loss in drill pipe pressure occurs, no change in the choke pressure is seen. The driller continued to pump at the same rate while the supervisor adjusted the choke to follow the drill pipe pressure graph as originally planned. What happens to BHP as a result of this?

A. BHP increases then decreases
B. BHP remains unchanged
C. BHP decreases
D. BHP decrease then increases
E. BHP increases with the choke adjustment (Correct Answer)
70. Which of the following would be applicable, if the pressures did not respond to opening the choke and the pumps were shut down and the well secured?

A. Bit nozzle plugged  
B. Bit nozzle washout  
C. Drill string washout  
D. Pump failure  
**E. Plugged choke (Correct Answer)**  
F. Choke washed out

71. During a kill operation the choke operator notices the drill pipe pressure rises sharply though the casing pressure remains steady. He reacts by opening up the choke to maintain correct pumping pressure. This situation continues with increasing regularity. The choke operator notices that during this operation the choke has been adjusted from ½ to ¾ open. What is the most likely cause of this?

A. Choke plugging  
B. Choke washing out  
C. Pipe washed out  
**D. Bit nozzle plugging (Correct Answer)**

72. In the above question, what effect has the gradual opening of the choke have on bottom hole pressure?

A. **BHP has decreased (Correct Answer)**  
B. BHP has increased  
C. BHP has remain unchanged

73. Lost circulation during a well control operation is usually detected by:

A. Monitoring the return flow with a flowshow  
**B. Monitoring the mud volume in the pits (Correct Answer)**  
C. Monitoring the pump speed  
D. Monitoring the weight indicator
74. While circulating out a kick the choke operator has been continually closing the choke in order to maintain the correct circulating drill pipe pressure. The mud logger has reported that both drill pipe and casing pressures have been increasing.

NOTE: The choke operator’s gauges operate from different sensor than the mud logger. A check of the gauges on the standpipe and choke manifold confirm the mud logger’s report. What is the most likely explanation?

A. The choke is washing out  
B. *The choke operator’s gauges are malfunctioning (Correct Answer)*  
C. The choke is plugging  
D. The mud logger’s gauges are malfunctioning

75. A kick has been taken and it is known that a potential lost circulation zone exists in the open hole. Select *TWO CORRECT ACTIONS* which can be taken to minimize pressure in the annulus during the kill operation.

A. Maintain extra back pressure on the choke for safety  
B. *Use the Wait and Weight Method (Correct Answer)*  
C. *Choose a lower circulating rate (Correct Answer)*  
D. Choose a higher circulating rate

76. Does a kick always occur in the event of total loss of circulation?

A. Yes, losses always occur above any potential kick zone  
B. No, it depends on the drill string weight reduction noted on the weight indicator  
C. *No, it depends on the mud level in the annulus and the formation pressure (Correct Answer)*

77. If total losses occur while drilling with water based mud what would you do?

A. Continue drilling blind  
B. *Stop drilling and fill the annulus with water (Correct Answer)*  
C. Stop drilling, shut in the well and see what happens

78. While circulating out a kick the mud pump fails. What is the first thing to do?

A. *Shut the well in (Correct Answer)*  
B. Fix the pump as soon as possible  
C. Change over to Pump #2  
D. Divert the well
79. If the drill string washed out during a kill operation, providing no action was taken, which of the following would remain constant? (TWO ANSWERS)

A. Bottom hole pressure (Correct Answer)
B. Casing pressure (Correct Answer)
C. Slow circulating pressure
D. Drill pipe pressure

80. Which THREE of the following are proper practices for drilling an anticipated H₂S environment?

A. Use S-135 drill pipe
B. Use X-95 drill pipe (Correct Answer)
C. Use H₂S scavenger (Correct Answer)
D. Use a high pH mud to neutralize the hydrogen sulfide (Correct Answer)
E. Use a low pH mud to neutralize the hydrogen sulfide
F. Always reverse out prior to round trips

81. How would you determine the Initial Circulating Pressure if no slow pump rate pressure were available? Assume the rig is on land, a kick has been taken and the well is shut in.

A. Add 300 psi to the casing pressure and bring the pump up to the kill speed while using the choke to keep casing pressure at (SICP + 300 psi)
B. Bring the pump up to the kill rate while keeping casing pressure constant by choke manipulation (Correct Answer)
C. Circulate at the kill rate holding 200 psi back pressure on the drill pipe side with the choke

82. During a kill operation a pump swab starts leaking. The choke operator knows nothing about the leak and is maintaining the standpipe pressure in accordance with the pressure schedule on the kill sheet. What will be the affect on BHP?

A. BHP stays constant
B. BHP decreases
C. **BHP increases (Correct Answer)**
KILL SHEET EXERCISES

Complete a SURFACE IWCF KILL SHEET using the data given below and answer the questions on the page following the data.

Well Data
- Hole ID: 12 ¾”
- MD: 10,975 feet
- TVD: 10,550 feet
- Csg: Set @ 6250 feet; 12.515” ID

Internal Capacities
- DP: .0174 bbl/ft
- HW: .0088 bbl/ft (465 feet in length)
- DC: .0087 bbl/ft (900 feet in length)
  Volume from mud pumps to rig floor: 7.2 bbl

Annular Capacities
- DC in Open Hole: .0836 bbl/ft
- DP & HW in open hole: .1215 bbl/ft
- DP & HW in cased hole: .1279 bbl/ft

Mud Pumps Output: .11 bbl/stk

Slow Circulating Pump Data
- Pump #1: 30 SPM @ 620 psi  40 SPM @ 1100 psi
- Pump #2: 30 SPM @ 610 psi  40 SPM @ 1080 psi

Active Surface Volume: 525 bbl

Formation Strength Test Data
- Fracture Gradient @ Casing Shoe (6250 feet): .75 psi/ft

Kick Data
- SIDPP: 525 psi
- SICP: 750 psi
- Pit Gain: 18 bbl
- MW at the time of the kick: 11.5 ppg

NOTE: The well will be killed with pump #2 at 40 SPM using the Wait and Weight Method
1. Calculate the MAASP using the mud weight of 11.5 ppg
   
   **942 - 950** psi  
   \[ \text{Equation \#11 - MAMW = (}.75 \times 6250) \div 0.052 \div 6250 = 14.42 \text{ ppg} \]
   \[ \text{Equation \#12 - MAASP = (14.42 - 11.5) x 0.052 x 6250 = 949 psi} \]

2. What mud weight is required to balance formation pressure (round off to 1 decimal)?
   
   **12.5** ppg  
   \[ \text{Equation \#13 - Kill Mud Density = (SIDPP \div 0.052 \div TVD ft) + OMW} \]
   \[ (525 \div 0.052 \div 10550) + 11.5 = 12.45 = 12.5 \text{ ppg} \]

3. Calculate the Initial Circulating Pressure (ICP).
   
   **1605** psi  
   \[ \text{Equation \#14 - ICP = Kill Rate Circulating psi + SIDPP psi} \]
   \[ 1080 + 525 = 1605 \text{ psi} \]

4. Calculate the Final Circulating Pressure (FCP).
   
   **1174** psi  
   \[ \text{Equation \#15 - FCP = \frac{\text{Kill Mud ppg}}{\text{Original Mud ppg}}} \times \text{Kill Rate Circulating psi} \]
   \[ \frac{12.5}{11.5} \times 1080 = 1174 \text{ psi} \]

5. Calculate the pump strokes from surface to bit.
   
   **1613 - 1645** strokes  
   \[ \text{Surface to Bit strokes = Drillstring Volume \div Pump Output} \]
   \[ 179.1 \div .11 = 1628 \text{ strokes} \]

6. Calculate the pump strokes from the mud pump to the bit.
   
   **1675 - 1707** strokes  
   \[ \text{(Drillstring Volume + Surface Lines Volume) \div Pump Output} \]
   \[ (179.1 + 7.2) \div .11 = 1694 \text{ strokes} \]

7. Calculate the time in minutes from surface to the bit.
   
   **40 - 41** minutes  
   \[ \text{Circulating Time = Strokes from surface to bit} \div \text{SPM} \]
   \[ 1628 \div 40 = 40.7 \text{ min} \]

8. Calculate in minutes to pump from the mud pump to the bit.
   
   **42 - 43** minutes  
   \[ \text{Circulating Time = Strokes from mud pump to bit} \div \text{SPM} \]
   \[ 1694 \div 40 = 42.3 \text{ min} \]

9. Calculate the strokes required to pump from the bit to the shoe.
   
   **4860 - 4958** strokes  
   \[ \text{Bit to Shoe strokes = Open Hole Annular Volume \div Pump Output} \]
   \[ 540.2 \div .11 = 4911 \text{ strokes} \]

10. How many minutes are required to circulate the total well system volume at 40 SPM?
    
    **345 - 346** minutes  
    \[ \text{Circulating Time = Surface to Surface strokes} \div 40 \text{ SPM} \]
    \[ 13806 \div 40 = 345.1 \text{ min} \]

11. Calculate the MAASP with KWM in the system.
    
    **617 - 624** psi  
    \[ \text{Equation \#12 - New MAASP = (MAMW - KMW) x 0.052 x Casing Shoe TVD} \]
    \[ (14.42 - 12.5) \times 0.052 \times 6250 = 624 \text{ psi} \]

12. What is the pressure loss per 100 strokes as the KWM is pumped from surface to the bit?
    
    **26 - 27** psi/100 stk  
    \[ \text{Pressure Loss = ICP - FCP = 431 psi} \]
    \[ \text{Pressure Loss \div (Surf to Bit strokes \div 100)} \]
    \[ 431 \div 16.28 = 26.5 \text{ psi/ 100 stk} \]
# International Well Control Forum

## Surface BOP Vertical Well Kill Sheet (API Field Units)

### FORMATION STRENGTH DATA:
- **Surface Leak-off Pressure from Formation Strength Test:** 
  - \((A)\) 1309 psi
  - \((B)\) 11.5 ppg
- **Maximum Allowable Mud Weight:** 
  \(\left(\frac{B}{A}\right) = \left(\frac{11.5}{1309}\right) = 14.97\) ppg
- **Initial M.A.S.P:** 
  \(\left(\frac{C}{C - \text{Current Mud Weight}}\right) \times \text{Shoe T.V. Depth} \times 0.002\) psi
  - \(C = 931\) psi

### CURRENT WELL DATA:
- **Current Drilling Mud:**
  - **Weight:** 12.5 ppg

### CASING SHOE DATA:
- **Size:** 9 5/8 inch
- **M. Depth:** 7250 feet
- **T.V. Depth:** 7250 feet

### HOLE DATA:
- **Size:** 8 1/2 inch
- **M. Depth:** 12950 feet
- **T.V. Depth:** 12575 feet

### PUMP No. 1 DISPL.
- **Rate (SPM):** 30, 40
- **Pump No. 2 DISPL.
- **Rate (SPM):** 620, 1080

### SLOW PUMP RATE DATA:
- **Pump No. 1:**
  - Length: 11585 feet
  - Capacity: 0.0177 bbls/foot
  - Volume: 205.05 barrels
- **Pump No. 2:**
  - Length: 465 feet
  - Capacity: 0.0087 bbls/foot
  - Volume: 4.09 barrels

### Drill String Volume
- **Length:** 900 feet
- **Capacity:** 0.0291 bbls
- **Volume:** 26.19 barrels

### Drilling Fluid Volume
- **Length:** 4800 feet
- **Capacity:** 0.0459 bbls
- **Volume:** 220.32 barrels

### TOTAL ANNULUS VOLUME
- **Volume:** 601.03 barrels

### TOTAL WELL SYSTEM VOLUME
- **Volume:** 818 barrels

### ACTIVE SURFACE VOLUME
- **Volume:** 525 barrels

### TOTAL ACTIVE FLUID SYSTEM
- **Volume:** 1343 barrels

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### International Well Control Forum
#### Surface BOP Kill Sheet - Vertical Well (API Field Units)

<table>
<thead>
<tr>
<th>Kick Data</th>
<th>SIDP</th>
<th>SICP</th>
<th>Pit Gain</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>650</td>
<td>850</td>
<td>22</td>
</tr>
</tbody>
</table>

- **Current Mud Weight**
  - \( \text{KMW} = \frac{\text{SIDP}}{12575 \times 0.062} \)
  - \( 12.5 \times 650 \)
  - 13.5 ppg

- **Initial Circulating Pressure**
  - \( \text{ICP} = \frac{\text{SIDP} - \text{KMW}}{620 - 650} \)
  - 1270 psi

- **Final Circulating Pressure**
  - \( \text{FCP} = \frac{\text{KMW} \times \text{DPL}}{620 - 650} \)
  - 670 psi

- \( K = \frac{\text{ICP} - \text{FCP}}{600} \)
  - \( K \times 100 = \frac{600 \times 100}{2170} \)
  - 27.6 psi

---

#### Strokes Pressure

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Dr No: SV 04/12 (Field Units) 27-05-2009

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Using the kill sheet on the previous pages answer the following questions. The well be killed using the Wait and Weight Method with a pump rate of 30 spm.

1. What mud weight is required to balance the formation pressure?
   \[13.5\text{ ppg}\] (round off to 1 decimal)
   
   \[\text{Equation } #13 - \text{Kill Mud Density} = \frac{\text{SI DPP} \div 0.052 \div \text{TVD ft}}{\text{OMW}} + \text{OMW} \]
   
   \[(650 \div 0.052 \div 12575) + 12.5 = 13.49 = 13.5 \text{ ppg}\]

2. How many strokes will be required to pump from surface to bit?
   \[\text{2170 stks}\]
   
   \[\text{Surface to Bit Strokes} = \frac{\text{Drillstring Volume}}{\text{Pump Output}} \times \frac{1}{0.10} = 2170 \text{ strokes}\]

3. How many strokes are required to pump from the bit to the casing shoe?
   \[\text{2465 stks}\]
   
   \[\text{Bit to Shoe Strokes} = \frac{\text{Open Hole Annular Volume}}{\text{Pump Output}} \times \frac{1}{0.10} = 2465 \text{ strokes}\]

4. What is the MAASP at the time the well is shut in?
   \[\text{931 psi}\]
   
   \[\text{Equation } #12 - \text{MAASP} = \frac{(\text{MAMW ppg} - \text{Current MW ppg})}{0.052} \times \text{Csg Shoe TVD} \]
   
   \[(14.97 - 12.5) \times 0.052 \times 7250 = 931 \text{ psi}\]

5. What is the total annular volume?
   \[\text{601 bbl}\]
   
   \[\text{Annular Volume bbls} = \frac{\text{Open Hole Annular Vol}}{\text{Cased Hole Vol}} + 246.5 + 354.5 = 601 \text{ bbls}\]

6. What is the MAASP once kill mud has been circulated around the well?
   \[\text{554 psi}\]
   
   \[\text{Equation } #12 - \text{New MAASP} = \frac{(\text{MAMW} - \text{KMW})}{0.052} \times \text{Csg Shoe TVD} \]
   
   \[(14.97 - 13.5) \times 0.052 \times 7250 = 554 \text{ psi}\]

7. What is the calculated Final Circulating Pressure?
   \[\text{670 psi}\]
   
   \[\text{Equation } #15 - \text{FCP} = \frac{\text{Kill Mud ppg}}{\text{Original Mud ppg}} \times \text{Kill Rate Circulating psi} \times \frac{13.5}{12.5} \times 620 = 670 \text{ psi}\]

8. What is the calculated Initial Circulating Pressure?
   \[\text{1270 psi}\]
   
   \[\text{Equation } #14 - \text{ICP} = \text{Kill Rate Circulating psi} \times \text{SI DPP psi} \times 620 + 650 = 1270 \psi\]

9. Approximately how much time will it take to completely displace the well with KWM?
   \[\text{272 minutes}\]
   
   \[\text{Circulating Time} = \frac{\text{Surface to Surface strokes}}{30 \text{ SPM}} = 8180 \div 30 = 272.6 \text{ min}\]
GAUGE EXERCISES

Using the completed kill sheet, circle the first action that you would take based on the situations presented. Take note of all parameters before making your decision.

- Pump strokes
- Pump rate
- Drill pipe pressure
- Casing pressure
1. **After 2 minutes this is the situation. What should you do?**
   
   A. Keep opening the choke slowly
   B. Keep closing the choke slowly
   
   **C. Increase the pump rate (Correct Answer)**
   
   D. Decrease the pump rate
   E. Continue, everything is OK
2. Everything is OK….or is it? Should you…..?
   
   A. Continue, everything is OK
   B. Open the choke a little
   C. *Close the choke a little (Correct Answer)*
   D. Adjust the pump rate
   E. Stop pumping and close the choke
3. After about 17 minutes this is what you observe. What action should you take?

A. Open the choke a little
B. Close the choke a little
C. Increase the pump rate
D. Decrease the pump rate

E. Continue, everything is OK (Correct Answer)
4. After 850 strokes this is the situation. What should you do?
   A. Increase the pump speed
   B. Decrease the pump speed
   C. Close the choke slowly (Correct Answer)
   D. Open the choke slowly
   E. Continue, everything is OK
5. Everything seems to be going smoothly until you notice a sudden rise in both pressures. What has caused this problem?

A. The choke is plugging (Correct Answer)
B. The choke is washing out
C. There is a washout in the string
D. A bit nozzle has plugged
E. A bit nozzle has washed out

The problem in the case above has been corrected
6. Based on what you see at right, what action should be taken?
   A. Increase the pump speed
   B. Decrease the pump speed
   C. Close the choke slowly (Correct Answer)
   D. Open the choke slowly
   E. Continue, everything is OK
7. This is the situation after 3000 strokes. What should you do?
   
   A. Increase the pump speed
   B. Decrease the pump speed
   C. Close the choke slowly (Correct Answer)
   D. Open the choke slowly
   E. Continue, everything is OK
8. The pit volume is increasing and casing pressure is rising. Should you.....

A. Increase the pump speed
B. Decrease the pump speed
C. Close the choke slowly

D. **Open the choke slowly (Correct Answer)**

E. Continue, everything is OK
9. This is the situation after 8000 strokes. The pit level is now dropping. You could have loss of circulation. What are you going to do?

A. Increase the pump speed
B. Decrease the pump speed
C. Close the choke slowly
D. Open the choke slowly

E. Continue, everything is OK (Correct Answer)
10. The choke is now fully open but it is difficult to determine whether there is any pressure on the casing. What should you do?

A. Increase the pump speed
B. Decrease the pump speed
C. Close the choke a little
D. **Stop pumping and close in the well (Correct Answer)**
E. Continue pumping at 30 spm