WellSharp Subsea Baker #1

<table>
<thead>
<tr>
<th>Hole Dimensions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (MD/TVD)</td>
<td>11,090 feet</td>
</tr>
<tr>
<td>9 5/8” Casing shoe</td>
<td>7,800 feet</td>
</tr>
<tr>
<td>Hole size</td>
<td>8 ½ inch</td>
</tr>
<tr>
<td>Current mud weight</td>
<td>13.5 ppg</td>
</tr>
<tr>
<td>Air gap</td>
<td>80 feet</td>
</tr>
<tr>
<td>Water depth</td>
<td>740 feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal Capacities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 ½” Drill collars (length 900 feet)</td>
<td>0.00768 bbl/foot</td>
</tr>
<tr>
<td>5” Drill pipe - capacity</td>
<td>0.01776 bbl/foot</td>
</tr>
<tr>
<td>5” Drill pipe - metal displacement</td>
<td>0.00650 bbl/foot</td>
</tr>
<tr>
<td>5” Drill pipe- closed end displacement</td>
<td>0.02426 bbl/foot</td>
</tr>
<tr>
<td>Choke line</td>
<td>0.006 bbl/foot</td>
</tr>
<tr>
<td>Marine riser</td>
<td>0.39 bbl/foot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annular Capacities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Open hole / Drill collar</td>
<td>0.0292 bbl/foot</td>
</tr>
<tr>
<td>Open hole / Drill pipe</td>
<td>0.0459 bbl/foot</td>
</tr>
<tr>
<td>Casing / Drill pipe</td>
<td>0.0505 bbl/foot</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoe test mud weight</td>
<td>12 ppg</td>
</tr>
<tr>
<td>Leak off pressure</td>
<td>2725 psi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump output</td>
<td>0.109 bbl/stk</td>
</tr>
<tr>
<td>SCR pressure up Riser at 40 SPM</td>
<td>550 psi</td>
</tr>
<tr>
<td>Choke line friction at 40 SPM</td>
<td>300 psi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shut in data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SIDPP</td>
<td>200 psi</td>
</tr>
<tr>
<td>SICP</td>
<td>600 psi</td>
</tr>
<tr>
<td>Pit gain</td>
<td>12 bbls</td>
</tr>
</tbody>
</table>

Note: If Riser or Choke Line length are not given, then their length will be Air Gap + Water Depth.
**Subsea Baker #1**

**Well Info:**
- **Hole TVD:** 11090
- **Current MW ppg:** 13.5
- **Slow Pump Pressure:** 550
- **Slow Pump SPM:** 40

**Kick Info:**
- **(SIDP):** 200
- **(SICP):** 600
- **Pit Gain bbls:** 12

**Well Kill Sheet**

1. **KWM** = (SIWP ÷ 0.052 ÷ TVD) + Current Mud Weight
   - (200 ÷ 0.052 ÷ 11090) + 13.5 = 13.9

2. **ICP** = Slow Pump Pressure + SIDP
   - 550 + 200 = 750

3. **FCP** = KWM ÷ CMW x Slow Pump Pressure
   - 13.9 ÷ 13.5 x 550 = 567

4. **Strokes to Bit:** 172

5. **Strokes** | **Pressure**
   - 0 | 750
   - 172 | 732
   - 344 | 714
   - 516 | 696
   - 688 | 678
   - 860 | 660
   - 1032 | 642
   - 1204 | 624
   - 1376 | 606
   - 1548 | 588
   - 1723 | 567

6. **Shoe Pressures:**
   - **H. Shoe TVD:** 7800
   - **LOT Pressure:** 2725
   - **Test MW:** 12.0

7. **Frac. Gradient**
   - **Or**
     - **(K)** ÷ 0.052 =

8. **Round down MAMW**
   - 18.7

9. **MASP before kick with Current MW**
   - (18.7 - 13.5 x 0.052 x 7800) = 2109

10. **MASP after kill with Kill MW**
    - (18.7 - 13.9 x 0.052 x 7800) = 1946
### Volume Info:

- **Hole MD**: 11090
- **Shoe MD**: 7800
- **Pump Output (bbls/stk)**: 0.109
- **Choke Line Length**: 820
- **Riser Length**: 820
- **DC Length**: 900

### Drillstring Volume (surface to bit)

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Internal Capacity</th>
<th>Total Drillstring Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>10190</td>
<td>0.01776</td>
<td>180.97</td>
</tr>
<tr>
<td>900</td>
<td>0.00768</td>
<td>6.91</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Drillstring Volume Surface to Bit = \( \frac{187.88}{0.109} = 1724 \)

### Miscellaneous Calculations:

- **Pressure drop per step (one-tenth of strokes to bit):** 
  \((ICP - FCP) ÷ 10 = 18\)
- **Pressure drop per 100 strokes to bit:** 
  \((ICP - FCP) × 100 + Strokes to Bit = 10\)
- **Dynamic (adjusted) casing pressure after pump start-up:** 
  \((SICP - CLF) = 300\)

### Annular Volumes and Strokes

- **Subsea only**
  - **Choke Line Capacity**: 
    \(820 \times 0.006 = 4.92 \div 0.109 = 45\)
  - **DP/HW x Casing**: 
    \(6980 \times 0.0505 = 352.49 \div 0.109 = 3234\)
  - **Strokes to displace Choke line**: 
    \((g) + (h) = 4572\)

### Strokes from bit to surface through choke line:

- **Surface Only**
  - **Strokes from bit to surface**: 
    \((h) + (i) = \text{Blank}\)

### Bit to Shoe Strokes

- **Bit to Shoe Volume**: 
  \(135.98 \div 0.109 = 1248\)
1) **Maximum allowable mud weight before the kick**
   
   \[
   \text{MAMW} = \left(\text{LOT pressure} \div 0.052 \div \text{Casing Shoe TVD}\right) + \text{Test Mud Weight}
   \]
   
   \[
   \left(\frac{2725}{0.052} \div 7800\right) + 12.0 = 18.7 \text{ ppg}
   \]

2) **MAASP before kick**
   
   \[
   \text{MAASP} = (\text{MAMW ppg} - \text{Current MW ppg}) \times 0.052 \times \text{Casing Shoe TVD}
   \]
   
   \[
   (18.7 - 13.5) \times 0.052 \times 7800 = 2109 \text{ psi}
   \]

3) **Kill mud Weight**
   
   13.9 ppg

4) **Initial Circulating Pressure**
   
   750 psi

5) **Final Circulating Pressure**
   
   567 psi

6) **MAASP after well has been killed**
   
   \[
   \text{MAASP} = (\text{MAMW ppg} - \text{KMW ppg}) \times 0.052 \times \text{Casing Shoe TVD}
   \]
   
   \[
   (18.7 - 13.9) \times 0.052 \times 7800 = 1946 \text{ psi}
   \]

7) **Dynamic (adjusted) casing pressure after pump start-up**
   
   \[
   \text{SICP} - \text{Chokeline Friction Pressure}
   \]
   
   \[
   600 - 300 = 300 \text{ psi}
   \]
8) Pressure drop per step (one-tenth of strokes to Bit)
   18 psi

9) Pressure drop per 100 strokes from surface to Bit
   (ICP – FCP) x 100 ÷ Strokes from surface to Bit
   (750 – 567) x 100 ÷ 1724 = 10.6 (round down to 10 psi)

10) Strokes from surface to Bit
    1723 strokes

11) Strokes to displace choke line
    (Chokeline Length x Chokeline Capacity) ÷ Pump Output
    (820 x 0.006) ÷ 0.109 = 45 strokes

12) Strokes from bit to surface through choke line
    4527 strokes

13) Strokes from bit to shoe
    Open Hole Annular Volume ÷ Pump Output
    (109.7 + 26.28) ÷ 0.109 = 1248 strokes
## Subsea Baker #2

### Hole Dimensions

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (MD/TVD)</td>
<td>10800 feet</td>
</tr>
<tr>
<td>9 5/8&quot; Casing shoe</td>
<td>8950 feet</td>
</tr>
<tr>
<td>Hole size</td>
<td>8 1/2 inch</td>
</tr>
<tr>
<td>Current mud weight</td>
<td>11.3 ppg</td>
</tr>
<tr>
<td>Air gap</td>
<td>70 feet</td>
</tr>
<tr>
<td>Water depth</td>
<td>400 feet</td>
</tr>
</tbody>
</table>

### Internal Capacities

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 1/2&quot; Drill collars (length 600 feet)</td>
<td>0.00768 bbl/foot</td>
</tr>
<tr>
<td>5&quot; Drill pipe - capacity</td>
<td>0.01776 bbl/foot</td>
</tr>
<tr>
<td>5&quot; Drill pipe - metal displacement</td>
<td>0.00650 bbl/foot</td>
</tr>
<tr>
<td>5&quot; Drill pipe- closed end displacement</td>
<td>0.02426 bbl/foot</td>
</tr>
<tr>
<td>Choke line</td>
<td>0.006 bbl/foot</td>
</tr>
<tr>
<td>Marine riser</td>
<td>0.39 bbl/foot</td>
</tr>
</tbody>
</table>

### Annular Capacities

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Open hole / Drill collar</td>
<td>0.0292 bbl/foot</td>
</tr>
<tr>
<td>Open hole / Drill pipe</td>
<td>0.0459 bbl/foot</td>
</tr>
<tr>
<td>Casing / Drill pipe</td>
<td>0.0505 bbl/foot</td>
</tr>
<tr>
<td>Riser / Drill pipe</td>
<td>0.3657 bbl/foot</td>
</tr>
</tbody>
</table>

### LOT

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoe test mud weight</td>
<td>10.5 ppg</td>
</tr>
<tr>
<td>Leak off pressure</td>
<td>1950 psi</td>
</tr>
</tbody>
</table>

### Pump Details

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump output</td>
<td>0.109 bbl/stk</td>
</tr>
<tr>
<td>SCR pressure up Riser at 40 SPM</td>
<td>450 psi</td>
</tr>
<tr>
<td>Choke line friction at 40 SPM</td>
<td>150 psi</td>
</tr>
</tbody>
</table>

### Shut in data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIDPP</td>
<td>500 psi</td>
</tr>
<tr>
<td>SICP</td>
<td>700 psi</td>
</tr>
<tr>
<td>Pit gain</td>
<td>15 bbls</td>
</tr>
</tbody>
</table>
**Vertical Kill Sheet**

**Well Name:** Subsea Baker #2

**Date:**

### Well Info:
- **Hole TVD:** 10800
- **Current MW ppg:** 11.3
- **Slow Pump Pressure:** 450
- **Slow Pump SPM:** 40

### Kick Info:
- **(SIDP):** 500
- **(SICP):** 700
- **Pit Gain bbls:** 15

---

**KWM = (SIDP ÷ 0.052 ÷ TVD) + Current Mud Weight**

\[
\text{KWM} = \left( \frac{500}{0.052} \div \frac{10800}{(A)} \right) + (B) = \frac{12.2}{(E)}
\]

**Round up KWM**

**ICP = Slow Pump Pressure + SIDP**

\[
\text{ICP} = \frac{450}{(C)} + \frac{500}{(E)} = \frac{950}{(D)}
\]

**FCP = KWM ÷ CMW x Slow Pump Pressure**

\[
\text{FCP} = \frac{12.2}{(KWM)} \div \frac{11.3}{(B)} \times \frac{450}{(C)} = \frac{486}{(E)}
\]

**Shoe Pressures:**

**H.**

\[
\text{LOT Pressure} \quad \text{Test MW} \quad \frac{(1950}{(I)} \div \frac{0.052}{(J)} \div \frac{8950}{(H)} + \frac{10.5}{(J)} = \frac{14.6}{(K)}
\]

**Round down MAMW**

\[
\text{Or} \quad \frac{(14.6}{(MAMW)} - \frac{11.3}{(B)} \times 0.052 \times \frac{8950}{(H)} = \frac{1535}{(J)} = \text{MASP before kick with Current MW}
\]

\[
\text{Or} \quad \frac{(14.6}{(MAMW)} - \frac{12.2}{(KWM)} \times 0.052 \times \frac{8950}{(H)} = \frac{1116}{(J)} = \text{MASP after kill with Kill MW}
\]

---

**Sticks to Bit:**

\[
\frac{170}{\text{Sticks to Bit} ÷ 10} = \frac{1704}{(10)}
\]

**ICP**

\[
\text{ICP} = \frac{950}{(950)} + 46
\]

**FCP**

\[
\text{FCP} = 950 + 486
\]
### Volume Info:

<table>
<thead>
<tr>
<th>Hole MD</th>
<th>10800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoe MD</td>
<td>8950</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump Output (bbls/stk)</th>
<th>0.109</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choke Line Length</td>
<td>470</td>
</tr>
<tr>
<td>Riser Length</td>
<td>470</td>
</tr>
<tr>
<td>DC Length</td>
<td>600</td>
</tr>
</tbody>
</table>

### Drillstring Volume (surface to bit)

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Internal Capacity</th>
<th>Total Drillstring Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>10200</td>
<td>0.01776</td>
<td>185.76</td>
</tr>
<tr>
<td>600</td>
<td>0.00768</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total = 185.76</td>
</tr>
</tbody>
</table>

Strokes Surface to Bit

\[
185.76 \div 0.109 = 1704
\]

### Miscellaneous Calculations:

Pressure drop per step (one-tenth of strokes to bit):

\[
\text{Pressure drop per 100 strokes to bit:} \quad \frac{\text{ICP} - \text{FCP}}{10} = 46
\]

Dynamic (adjusted) casing pressure after pump start-up:

\[
\text{(SICP - CLF)} = 550
\]

### Annular Volumes and Strokes

**Choke Line Capacity**

\[
470 \times 0.006 = 2.82 \div 0.109 = 26
\]

**Volume**

\[
8480 \times 0.0505 = 428.24 \div 0.109 = 3929
\]

**Volumes from bit to surface through choke line**

\[
4642 = 4642
\]

**Volumes from bit to surface**

\[
3929 + 57.38 = 4642
\]

**Bit to Shoe Strokes**

\[
74.9 \div 0.109 = 687
\]
1) **Maximum allowable mud weight before the kick**

MAMW = (LOT pressure ÷ 0.052 ÷ Casing Shoe TVD) + Test Mud Weight

\[(1950 \div 0.052 \div 8950) + 10.5 = 14.6 \text{ ppg}\]

2) **MAASP before kick**

MAASP = (MAMW ppg – Current MW ppg) x 0.052 x Casing Shoe TVD

\[(14.6 – 11.3) \times 0.052 \times 8950 = 1535 \text{ psi}\]

3) **Kill mud Weight**

12.2 ppg

4) **Initial Circulating Pressure**

950 psi

5) **Final Circulating Pressure**

486 psi

6) **MAASP after well has been killed**

MAASP = (MAMW ppg – KMW ppg) x 0.052 x Casing Shoe TVD

\[(14.6 – 12.2) \times 0.052 \times 8950 = 1116 \text{ psi}\]

7) **Dynamic (adjusted) casing pressure after pump start-up**

SICP – Chokeline Friction Pressure

\[700 – 150 = 550 \text{ psi}\]
8) **Pressure drop per step (one-tenth of strokes to Bit)**

27 psi

9) **Pressure drop per 100 strokes from surface to Bit**

\[(\text{ICP} - \text{FCP}) \times 100 \div \text{Strokes from surface to Bit}\]

\[(950 - 486) \times 100 \div 1704 = 27 \text{ psi}\]

10) **Strokes from surface to Bit**

1704 strokes

11) **Strokes to displace chokeline**

\[(\text{Chokeline Length} \times \text{Chokeline Capacity}) \div \text{Pump Output}\]

\[(470 \times 0.006) \div 0.109 = 26 \text{ strokes}\]

12) **Strokes from bit to surface through chokeline**

4642 strokes

13) **Strokes from bit to shoe**

**Open Hole Annular Volume \div \text{Pump Output}**

\[(57.38 + 17.52) \div 0.109 = 687 \text{ strokes}\]