



Abbreviations

Abbreviation	Term
bbbl	barrels (US)
bbbl/ft	barrels (US) per foot
bbbl/min	barrels (US) per minute
cm	centimetre
ft	feet
ID	inside diameter
lbs	pounds
MD	measured depth
OD	outside diameter
P	pressure
ppg	pounds per gallon
psi	pounds per square inch
psi/ft	pounds per square inch per foot
SICHP	shut-in casing head pressure
SITHP	shut-in tubing head pressure
TVD	true vertical depth
V	volume

Constant factors	
Constant factor pressure	0.052
Constant factor capacity	1029.4

Formulas

1. Pressure gradient (psi/ft)

$$\text{fluid density (ppg)} \times 0.052$$

2. Fluid density (ppg)

$$\text{hydrostatic pressure (psi)} \div \text{TVD (ft)} \div 0.052$$

or

$$\frac{\text{hydrostatic pressure (psi)}}{\text{TVD (ft)} \times 0.052}$$

3. Hydrostatic pressure (psi)

$$\text{fluid density (ppg)} \times 0.052 \times \text{TVD (ft)} \quad \text{or} \quad \text{pressure gradient (psi/ft)} \times \text{TVD (ft)}$$

4. Formation pressure (psi)

$$\text{SITHP (psi)} + \text{hydrostatic column pressure to the top perforation (psi)}$$



5. Kill weight gradient (psi/ft)

$$\frac{(\text{well fluid gradient (psi/ft)} \times \text{TVD to point of circulation (ft)}) + \text{SITHP (psi)} + \text{overbalance* (psi)}}{\text{TVD to point of circulation (ft)}}$$

*overbalance is variable and will be stated

6. Tubing capacity (bbl/ft)

$$\frac{\text{tubing ID}^2 \text{ (inches)}}{1029.4}$$

7. Annulus capacity (bbl/ft)

$$\frac{\text{casing ID}^2 \text{ (inches)} - \text{tubing OD}^2 \text{ (inches)}}{1029.4}$$

8. Volume (bbl)

$$\text{capacity (bbl/ft)} \times \text{MD (ft)}$$

9. Time to pump/displace (minutes)

$$\frac{\text{capacity (bbl/ft)} \times \text{MD (ft)}}{\text{pump rate (bbl/min)}} \quad \text{or} \quad \frac{\text{volume (bbl)}}{\text{pump rate (bbl/min)}}$$

10. Area of a circle (inches²)

$$0.785 \times \text{diameter}^2 \text{ (inches)}$$

11. Force (lbs force)

$$\text{area (inches}^2\text{)} \times \text{applied pressure (psi)}$$

12. New pump/circulating pressure (psi)

$$\text{pump pressure (psi)} \times \left(\frac{\text{new pump rate (bbl/min)}}{\text{old pump rate (bbl/min)}} \right)^2$$

13. Basic gas law

$$P_1 \times V_1 = P_2 \times V_2 \qquad P_2 = \frac{P_1 \times V_1}{V_2} \qquad V_2 = \frac{P_1 \times V_1}{P_2}$$