**Volumes & Strokes**

Drill string volume, barrels

Annular volume, barrels

Strokes to displace : drill string, annulus, and total circulation from

kelly to shale shaker

Strokes = barrels ÷ pump output (bbl/stk)

Sample Case : Determine volumes and strokes for the following :

Drill pipe — 5.0 inch — 19.5 lb/ft  
Inside diameter = 4.276 inch  
Length = 9400 ft

Drill collars — OD = 8.0 inch  
Inside diameter = 3.0 inch  
Length = 600 ft

Casing — 13-3/8 inch — 54.5 lb/ft  
Inside diameter = 12.615 inch  
Setting depth = 4500 ft

Pump data — 7 inch by 12 inch triplex  
Efficiency = 95%  
Pump output = 0.136 @ 95%

Hole size = 12-1/4 inch

**Drill string volume**

a. Drill pipe volume (bbl) :

b. Drill collar volume (bbl) :

c. Total drill string volume :

Total drill string volume (bbl) = 166.94 bbl + 5.24 b11

= 172.18 bbl

**Annular volume**

a. Drill collar / open hole :

b. Drill pipe / open hole :

c. Drill pipe / cased hole :

d. Total annular volume :

Total annular volume = 50.16 + 595.3 + 586.38

= 1231.84 barrels

**Strokes**

a. Surface to bit strokes :

*Strokes = drill string volume (bbl) ÷ pump output (bbl/stk)*

Surface to bit strokes = 172.16 bbl ÷ 0.136 bbl/stk

= 1266

b. Bit to surface (or bottoms-up strokes):

*Strokes = annular volume (bbl) ÷ pump output (bbl/stk)*

Bit to surface strokes = 1231.84 bbl ÷ 0.136 bbl/stk

= 9058

c. Total strokes required to pump from the kelly to the shale shaker :

*Strokes = drill string volume (bbl) + annular volume (bbl) ÷ pump output*

*(bbl/stk)*

Total strokes = (172.16 + 1231.84) ÷ 0.136

= 1404 ÷ 0.136

= 10,324