**Spotting Pills Calculations**

Calculations Required for Spotting Pills

The following will be determined :

a. Barrels of spotting fluid (pill) required  
b. Pump strokes required to spot the pill

**Step l**

Determine the annular capacity (bbl/ft) for drill pipe and drill collars in the annulus:

**Step 2**

Determine the volume of pill required in the annulus :

*Volume (bbl) = annular cap.(bbl/ft) x section length (ft) x washout factor*

**Step 3**

Determine total volume (bbl) of spotting fluid (pill) required :

Barrels = Barrels required in annulus plus barrels to be left in drill

string

**Step 4**

Determine drill string capacity (bbl):

*Barrels = drill pipe/drill collar capacity (bbl/ft) x length (ft)*

**Step 5**

Determine strokes required to pump pill :

*Strokes = vol or pill (bbl) ÷ pump output (bbl/stk)*

**Step 6**

Determine number of barrels required to chase pill :

*Barrels = drill string vol (bbl) – vol left in drill string (bbl)*

**Step 7**

Determine strokes required to chase pill :

**Step 8**

Total strokes required to spot the pill :

Sample Case : Drill collars are differentially stuck. Use the following

data to spot an oil based pill around the drill collars plus

200 ft (optional) above the collars. Leave 24 bbl in the

drill string :

Data : Well depth = 10,000 ft  
 Hole diameter = 8-1/2 inch  
 Washout factor = 20%  
 Drill pipe = 5.0 inch — 19.5 lb/ft  
 Capacity = 0.01776 bbl/ft  
 Length = 9400 ft  
 Drill collars = 6-1/2 inch OD x 2-1/2 inch ID  
 Capacity = 0.0061 bbl/ft  
 Length = 600 ft  
 Pump output = 0.117 bbl/stk

Strokes required to displace surface system from suction tank to the drill pipe = 80 stk

**Step 1**

Annular capacity around drill pipe and drill collars :

a. Annular capacity around drill collars :

b. Annu1ar capacity around drill pipe :

**Step 2**

Determine total volume of pill required in annulus :

a. Volume opposite drill collars :

Volume (bbl) = 0.02914 bbl/ft x 600 ft x 1.20

= 21.0 bbl

b. Volume opposite drill pipe :

Volume (bbl) = 0.0459 bbl/ft x 200 ft x 1.20

= l1.0 bbl

c. Total volume (bbl) required in annulus:

Volume (bbl) = 21.0 bbl + 11.0 bbl

= 32.0 bbl

**Step 3**

Total bbl of spotting fluid (pill) required :

Barrels = 32.0 bbl (annulus) + 24.0 bbl (drill pipe)

= 56.0 bbl

**Step 4**

Determine drill string capacity :

a. Drill collar capacity (bbl):

Capacity (bbl) = 0.0062 bbl/ft x 600 ft

= 3.72 bbl

b. Drill pipe capacity (bbl):

Capacity (bbl) = 0.01776 bbl/ft x 9400 ft

= 166.94 bbl

c. Total drill string capacity (bbl):

Capacity (bbl) = 3.72 bbl + 166.94 bbl

= 170.6 bbl

**Step 5**

Determine strokes required to pump pill :

Strokes = 56 bbl ÷ 0.117 bbl/stk

= 479

**Step 6**

Determine bbl required to chase pill :

Barrels = 170.6 bbl — 24 bbl

= 146.6

**Step 7**

Determine strokes required to chase pill :

Strokes = 146.6 bbl : 0.117 bbl/stk + 80 stk

= 1333

**Step 8**

Determine strokes required to spot the pill :

Total strokes = 479 + 1333

= 1812