**Drill String Design (Limitations)**

The following will be determined :

Length of bottom hole assemblý (BHA) necessary for a desired weight on bit (WOB).  
Feet of drill pipe that can be used with a specific bottom hole assembly (BHA).

**1. Length of bottom hole assembly necessary for a desired weight on bit :**

Where ;

WOB = desired weight to be used while drilling  
 f = Safety factor to place neutral point in drill collars  
 Wdc = drill collar weight (lb/ft)  
 BF = buoyancy factor

Sample Case : Desired WOB while drilling = 50,000 lb  
 Safety factor = 15%  
 Mud weight = 12.0 ppg  
 Drill collar weight = 147 lb/ft  
 8 inch OD — 3 inch ID

Solution :

a. Buoyancy factor (BF):

b. Length of bottom hole assembly necessary :

**2. Feet of drill pipe that can be used with a specific bottom hole  
 assembly (BHA)**

NOTE : Obtain tensile strength for new pipe from cementing handbook or

other source.

a. Determine buoyancy factor

b. Determine maximum length of drill pipe that can be run into the hole

with a specific bottom hole assembly

Where ;

T = tensi1e strength (lb) for new pipe  
 f = safety factor to corrrect new pipe to no.2 pipe  
 MOP = margin of overpull  
 Wbha = BHA weight in air (lb/ft)  
 Wdp = drill pipe weight in air (lb/ft)  
 BF = buoyancy factor

c. Determine total depth that can be reached with a specific bottom hole

assembly :

Total depth (ft) = 1engthmax + BHA length

Sample Case : Drill pipe (5.0 inch) = 19.5 lb/ft – Grade G

Tensile strength = 554,000 lb  
 BHA weight in air = 50,000 lb  
 BHA length = 500 ft  
 Desired overpull = 100,000 lb  
 Mud weight = 13.5 ppg  
 Safety factor = 10%

a. Buoyancy factor

b. Maximum length of dril pipe that can be run into the hole :

c. Total depth that can be reached with this BHA and this drill pipe:

Total depth (ft) = 14,192 ft + 500 ft

= 14,692 ft