**Hydraulics Analysis**

This sequence of calculation is designed to quickly and accurate analyze various parameters of exixting bit hydraulics.

1. Annular velocity (ft/min) (AV)

AV =

1. Jet nozzle pressure loss (psi)(Pb)
2. System hydraulic horse power available (Sys HHP)

1. Hydraulic horse power at bit (HHPb)

1. Hydraulic horse power er square inch of diameter

6. Percent pressure loss at bit (% Psib)

7. Jet velocity (ft/sec)(Vn)

8. Impact force, lb at bit (IF)

9. Impact force per sequence of bit (IF/sq in.)

**Nomenclature**

AV = annular velocity (ft/min)

Q = circulate rate (gpm)

Dh = hole diameter (inch)

Dp = pipe or collar OD (inch)

MW = mud weight (ppg)

N1 ; N2 ; N3 = jet nozzle size (32nd in.)

Pb = bit nozzle pressure loss (psi)

HHP = hydraulic horse power at bit

Vn = jet velocity (ft/sec)

IF = impact force (lb)

IF/sq in. = impact force lb/sq in. of bit diameter

Sample Case : Mud weight = 12.0 ppg

Circulate rate = 520 gpm

Nozzle size 1 = 12-32nd/in

Nozzle size 2 = 12-32nd/in

Nozzle size 3 = 12-32nd/in

Hole size = 12-1/4 in.

Drill pipe OD = 5.0 in.

Surface pressure = 3000 psi

1. Annular velocity (ft/min):

2. Jet nozzle pressure loss :

3. System hydraulic horsepower available :

4. Hydraulic horse power at bit :

5. Hydraulic horse power per square inch of bit area :

6. Percent pressure loss at bit :

7. Jet velocity (ft/sec) :

8. Impact force (lb) :

9. Impact force per square inch of bit area :