



ANNULAR VELOCITY MULTIPLIERS

		BIT SIZE															
		5-5/8	6	6-1/8	6-1/4	6-3/4	7-5/8	7-7/8	8-5/8	8-3/4	9	9-7/8	11	12-1/4	13-3/4	15	17-1/2
PIPE SIZE	2-7/8	1.05	.883	8.45	.798	.652	.493	.457	.371	.356	.338						
	3-1/2	1.27	1.03	.976	.910	.738	.536	.493	.395	.381	.357	.258	.226	.179			
	4-1/2				1.30	.967	.648	.588	.452	.436	.405	.317	.243	.188	.145	.119	.086
	5								.500	.476	.438	.338	.255	.195	.150	.124	.088
	5-1/2									.531	.483	.364	.271	.205	.155	.126	.091

CIRCULATING TIME

$$\text{Bottoms up time, min.} = \frac{\text{Annular Volume (Gal)}}{\text{Pump Output, Gal./ Min.}}$$

$$\text{Total Circulating Time, min.} = \frac{\text{Total Mud Volume (Gal.)}}{\text{Pump Output, Gal./ Min.}}$$

$$\text{Circulating Time, Kelly to flowline, min.} = \frac{\text{Hole Volume (Gal.)} - \text{Drill Pipe Displacement (Gal.)}}{\text{Pump Output (Gal./ Min.)}}$$

ANNULAR VELOCITY

By Multiplier:

$$\text{A.V., Ft./Min.} = \text{Pump Output (Gal/Min.)} \times (\text{Annular Velocity Multiplier})$$

$$= 336 \times (.436)$$

$$= 146 \text{ ft./min.}$$

Calculate the A.V.: Pump Output = 336 Gal./min.

Drill Pipe Size = 4 1/2"

Hole Size = 8 3/4"

By Formula:

$$\text{A.V., Ft./Min.} = \text{Pump Output, Gal/Min.} \times \left[\frac{24.5}{(\text{hole dia.})^2 - (\text{pipe dia.})^2} \right]$$

$$= 336 \times \left[\frac{24.5}{(8\frac{3}{4})^2 - (4\frac{1}{2})^2} \right]$$

$$= 146 \text{ ft./min.}$$