

BDU 26-7-199  
 1497 FNL 1504 FEL ( SW /4 NE /4 )  
 Sec. 26 T 1S R 99W  
 Rio Blanco County, Colorado  
 Federal Mineral Lease: COC64841

### SURFACE CASING AND CENTRALIZER DESIGN

Proposed Total Depth: 10,000 '  
 Proposed Depth of Surface Casing: 3,000 '  
 Estimated Pressure Gradient: 0.45 psi/ft  
 Bottom Hole Pressure at 10,000 ' = 4,500 psi  
 $0.45 \text{ psi/ft} \times 10,000 ' = 4,500 \text{ psi}$   
 Hydrostatic Head of gas/oil mud: 0.22 psi/ft  
 $0.22 \text{ psi/ft} \times 10,000 ' = 2,200 \text{ psi}$

#### Maximum Design Surface Pressure

Bottom Hole Pressure	–	Hydrostatic Head	=	
( 0.45 psi/ft x 10,000 ' )	–	( 0.22 psi/ft x 10,000 ' )	=	
4,500 psi	–	2,200 psi	=	2,300 psi

#### Casing Strengths      9-5/8" J-55 36# ST&C

Wt.	Tension (lbs)	Burst (psi)	Collapse (psi)
36 #	394,000	3,520	2,020
40 #	452,000	3,950	2,570

#### Safety Factors

Tension (Dry):	1.8	Burst:	1.0	Collapse:	1.125
Tension (Dry):	36 # / ft x 3,000 ' = 108,000 #				
	Safety Factor = $\frac{394,000}{108,000}$			= 3.65	ok
Burst:	Safety Factor = $\frac{3,520 \text{ psi}}{2,300 \text{ psi}}$			= 1.53	ok
Collapse:	Hydrostatic = 0.052 x 9.0 ppg x 3,000 ' = 1,404 psi				
	Safety Factor = $\frac{2,020 \text{ psi}}{1,404 \text{ psi}}$			= 1.44	ok

Use 3,000 ' 9-5/8" J-55 36# ST&C

Use 3,000 psi minimum casinghead and BOP's

#### Centralizers

8 Total  
 1 near surface at 160'  
 3 -1 each at middle of bottom joint, second joint, third joint  
 4 -1 each at every other joint ±80' spacing  
 Total centralized ± 600 ' ( 2,400 ' – 3,000 ' )

Note that field experience indicates that additional centralizers greatly increase the chance of "sticking" the surface casing prior to reaching surface casing total depth.