

BDU 25-1-199
 884' FNL 362' FEL (NE /4 NE /4)
 Sec. 25 T 1S R 99W
 Rio Blanco County, Colorado
 Federal Mineral Lease: COC64841

SURFACE CASING AND CENTRALIZER DESIGN

Proposed Total Depth: 10,700 '
 Proposed Depth of Surface Casing: 2,500 '
 Estimated Pressure Gradient: 0.45 psi/ft
 Bottom Hole Pressure at 10,700 '
 0.45 psi/ft x 10,700 ' = 4,815 psi
 Hydrostatic Head of gas/oil mud: 0.22 psi/ft
 0.22 psi/ft x 10,700 ' = 2,354 psi

Maximum Design Surface Pressure

Bottom Hole Pressure	–	Hydrostatic Head	=	
(0.45 psi/ft x 10,700 ')	–	(0.22 psi/ft x 10,700 ')	=	
4,815 psi	–	2,354 psi	=	2,461 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 2,500 ' = 90,000 #				
Safety Factor =	$\frac{394,000}{90,000}$	=	4.38		ok
Burst:	Safety Factor = $\frac{3,520 \text{ psi}}{2,461 \text{ psi}}$	=	1.43		ok
Collapse:	Hydrostatic = 0.052 x 9.0 ppg x 2,500 ' = 1,170 psi				
Safety Factor =	$\frac{2,020 \text{ psi}}{1,170 \text{ psi}}$	=	1.73		ok

Use 2,500 ' 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 ' (1,900 ' – 2,500 ')

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