

RG Federal 2G-34D

Surface: 232' FSL 1,236' FEL (SE /4 SE /4)
 Sec. 34 T 1S R 98W

BHL: ±1,003' FSL ±952' FEL Sec. 34 T1S R98W SE/4 SE/4
 within 50' radius

Rio Blanco County, Colorado

Federal Mineral Lease: COC64831

SURFACE CASING AND CENTRALIZER DESIGN

Proposed Total Depth: 11,784 ' TVD
 Proposed Depth of Surface Casing: 2,800 '
 Estimated Pressure Gradient: 0.48 psi/ft
 Bottom Hole Pressure at 11,784 '
 0.48 psi/ft x 11,784 ' = 5,656 psi
 Hydrostatic Head of gas/oil mud: 0.22 psi/ft
 0.22 psi/ft x 11,784 ' = 2,592 psi

Maximum Design Surface Pressure

Bottom Hole Pressure - Hydrostatic Head =
 (0.48 psi/ft x 11,784 ') - (0.22 psi/ft x 11,784 ') =
 5,656 psi - 2,592 psi = 3,064 psi

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

<u>Wt.</u>	<u>Tension (lbs)</u>	<u>Burst (psi)</u>	<u>Collapse (psi)</u>
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 2,800 ' = 100,800 #
 Safety Factor = $\frac{394,000}{100,800}$ = 3.91 ok
 Burst: Safety Factor = $\frac{3,520 \text{ psi}}{3,064 \text{ psi}}$ = 1.15 ok
 Collapse: Hydrostatic = 0.052 x 9.0 ppg x 2,800 ' = 1,310 psi
 Safety Factor = $\frac{2,020 \text{ psi}}{1,310 \text{ psi}}$ = 1.54 ok

Use 2,800 ' 9-5/8" J-55 36# ST&C

Use 5,000 psi minimum casinghead and BOP's

Centralizers

10 Total
 1 near surface at 160'
 3 -1 each at middle of bottom joint, second joint, third joint
 6 -1 each at every other joint ±80' spacing

Total centralized ± 760 ' (2,040 ' - 2,800 ')

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