

ATTACHMENT "D"
Desert Rose Federal #1 (27I-23S-23E)
Worksheet For Minimum Gas Flow For Liquids Removal Calculation

PARAMETER	SYMBOL/EQUATION	UNITS	TUBULAR	ANNULAR
1 Specific Gravity of Well Fluid	G	Air=1.000	0.621	0.621
2 Percent Carbon Dioxide	%CO2	Decimal	0.66	0.66
3 Percent Nitrogen	%N2	Decimal	0.20	0.20
4 Percent Hydrogen Sulfide	%H2S	Decimal	0.00	0.00
5 Critical Pressure	Pcr	PSIA	674	674
6 Critical Temperature	Tcr	Degrees R	363	363
7 Inside Diameter	d	Inches	1.995	4.000
8 Outside Diameter	do	Inches	N/A	2.375
9 Flow Area	A	Ft^2	0.087	0.226
10 Wellhead Temperature	Tw	Degrees R	520	520
11 Compressibility Factor	Z	Dimensionless	0.890	0.890
12 Flowing Tubing Pressure	Pt	PSIA	846	846
13 Minimum Gas Velocity (Water)	vg(water)	Feet/Second	9.8	9.8
14 Minimum Gas Velocity (Condensate)	vg(condensate)	Feet/Second	6.3	6.3
15 Minimum Gas Flow Rate (Water)	Qg(water)	MCFD	4.8	12.4
16 Minimum Gas Flow Rate (Condensate)	Qg(Condensate)	MCFD	3.1	8.0

$$vg(water) = \frac{5.62 * (67 - 0.0031 * Pt)^{0.25}}{(0.0031 * Pt)^{0.50}}$$

$$vg(condensate) = \frac{4.02 * (45 - 0.0031 * Pt)^{0.25}}{(0.0031 * Pt)^{0.50}}$$

$$Qg(water) = \frac{3.06 * Pt * vg(water) * A}{Tw * Z}$$

$$Qg(water) = \frac{3.06 * Pt * vg(condensate) * A}{Tw * Z}$$