

EXHIBIT NO. 20

FIVE LAKES CANYON TIGHT GAS AREA
PICTURED CLIFF FORMATION

Calculation of Formation Permeability Using Darcy's Law

$$\text{Darcy's Law: } Q_g = .703 kh \frac{(P_e^2 - P_{wf}^2)}{U_g T Z \ln (.61 r_e/r_w)}$$

$$\text{or } k = \frac{Q_g U_g T Z \ln (.61 r_e/r_w)}{.703 h (P_e^2 - P_{wf}^2)}$$

where:

- k = permeability of formation - millidarcies
- Q_g = gas flowrate, scf/day - average of 16,500 scf/day for 6 natural production tests
- U_g = average gas viscosity - calculated to be 0.011 centipoise
- T = bottom hole temperature - 100°F - 560°R
- Z = average gas compressibility factor - calculated to be 0.927
- r_e = drainage radius for 160 acre spacing - 1489 feet
- r_w = wellbore radius - 0.20 feet
- h = net pay height - average of 41 feet for the 6 natural production test wells in the tight gas area
- P_e = bottom hole pressure at drainage radius r_e - average of 797 psi for all wells in the tight gas area
- P_{wf} = flowing bottom hole pressure - assumed equal to atmospheric pressure for maximum flowrate - 12.2 psi surface, 13.0 psi bottomhole
- G_g = gas gravity - .7 - used for calculations of U_g and Z
- P_c = pseudo critical pressure - 688 psi used for calculation of U_g and Z
- T_c = pseudo critical temperature - 392°R used for calculation of U_g and Z

$$k = \frac{(16,500) (0.011) (560) (0.927) \ln (.61 \ 1489/0.20)}{.703 (41) (797^2 - 13.0^2)}$$

k = 0.04 millidarcy