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Item 1: Sheets of formulae (pink sheet for oil, yellow sheet for gas)

Type Curves:

* Item 2: Inf. Cond. Frac: Log-Log: Pressure Scale 3 Cycles

Item 3: Inf. Cond. Frac: Log-Log: Pressure Scale 2 Cycles

Item 4: Inf. Cond. Frac: Semi-Log: Pressure Scale 0 to 4.5

Item 5: Inf. Cond. Frac: Semi-Log: Pressure Scale 0 to 2.25

* All graphs show data for constant pressure at boundary. Item 2 also has data for closed reservoir.

For oil:

$$m = \frac{1.151 \Delta P}{P_D}$$

$$P_D = \frac{1.151 \Delta P}{m}$$

$$= \frac{7.08 \Delta P}{q \mu B} Kh$$

$$Kh = \frac{q \mu B}{7.08} \frac{P_D}{\Delta P}$$

$$\frac{Kh}{\mu} = \frac{q B}{7.08} \frac{P_D}{\Delta P}$$

$$\eta = \frac{6.328 K}{c \mu \phi}$$

$$m = \frac{q \mu b}{6.15 Kh}$$

$$q = \text{BOPD}$$

$$\mu = \text{c p}$$

$$B = \text{RB/STB}$$

$$K = \text{darcys}$$

$$h = \text{feet}$$

$$C = \Delta V/V/\text{psi}$$

$$X_f = \text{fracture half-length}$$

$$X_e = \text{distance to outer boundary}$$

$$t = \text{days}$$

For gas:

$$Q = \text{MCF/D at 14.7 psia P.B.}$$

$$\mu = \text{cp}$$

$$K = \text{darcys}$$

$$T = \text{°R}$$

$$h = \text{feet}$$

$$\mu_i = \text{cp at 14.7 psia and reservoir temp.}$$

$$m = \frac{1.151 \Delta P}{P_D}$$

$$P_e = \text{external pressure}$$

$$P_w = \text{well pressure}$$

$$\begin{aligned} Kh &= \frac{1.637 Q \mu_i T}{m} \\ &= \frac{1000 Q \mu_i \left(\frac{T}{610.9} \right)}{m} \end{aligned}$$

$$\text{Where } \Delta P \text{ is: } P_e^2 - P_w^2$$

and P_e and P_w are psia

or pseudo-pressures where pseudo-pressure is:

$$\text{or } \left[2 \int_0^P \left(\frac{P}{z \mu \mu_i} \right) dP \right]^{1/2}$$

$$Kh = \frac{1.637 Q T}{m}$$

if pseudo pressure is $\psi \left(\frac{\text{psia}^2}{\text{cp}} \right)$