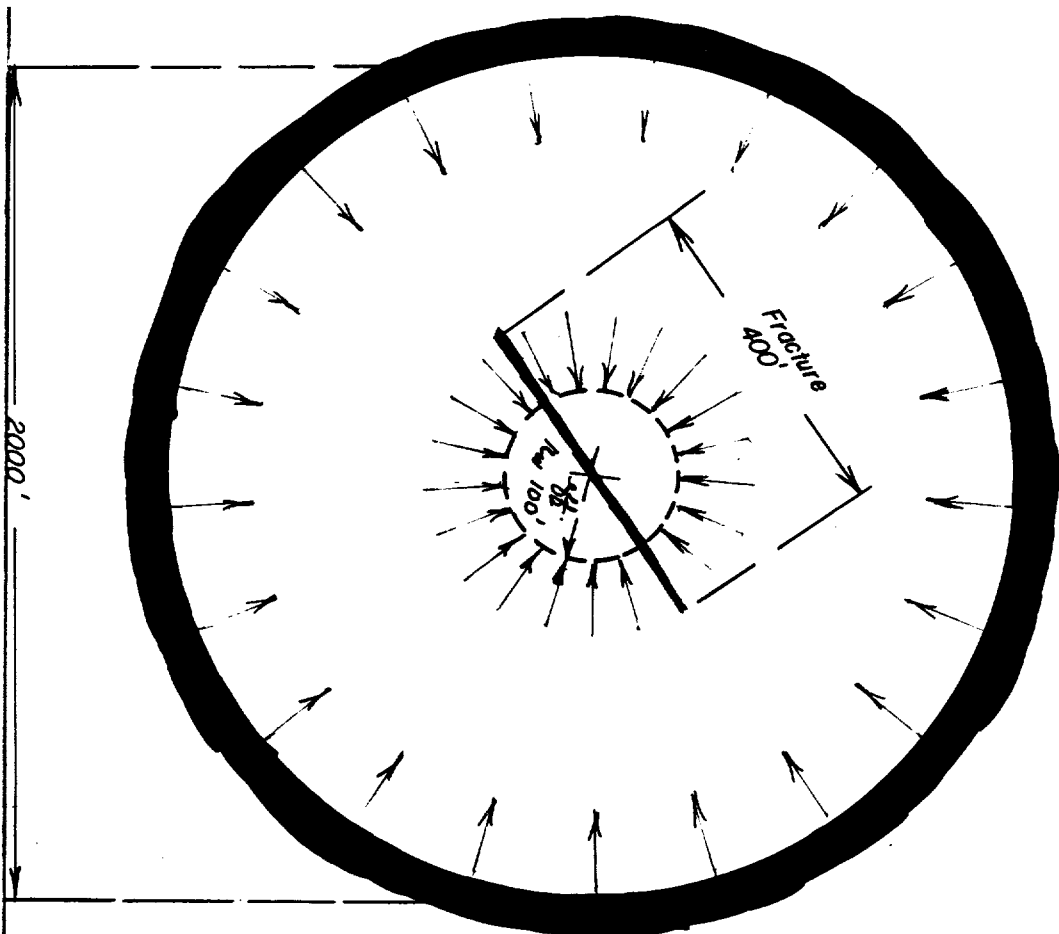


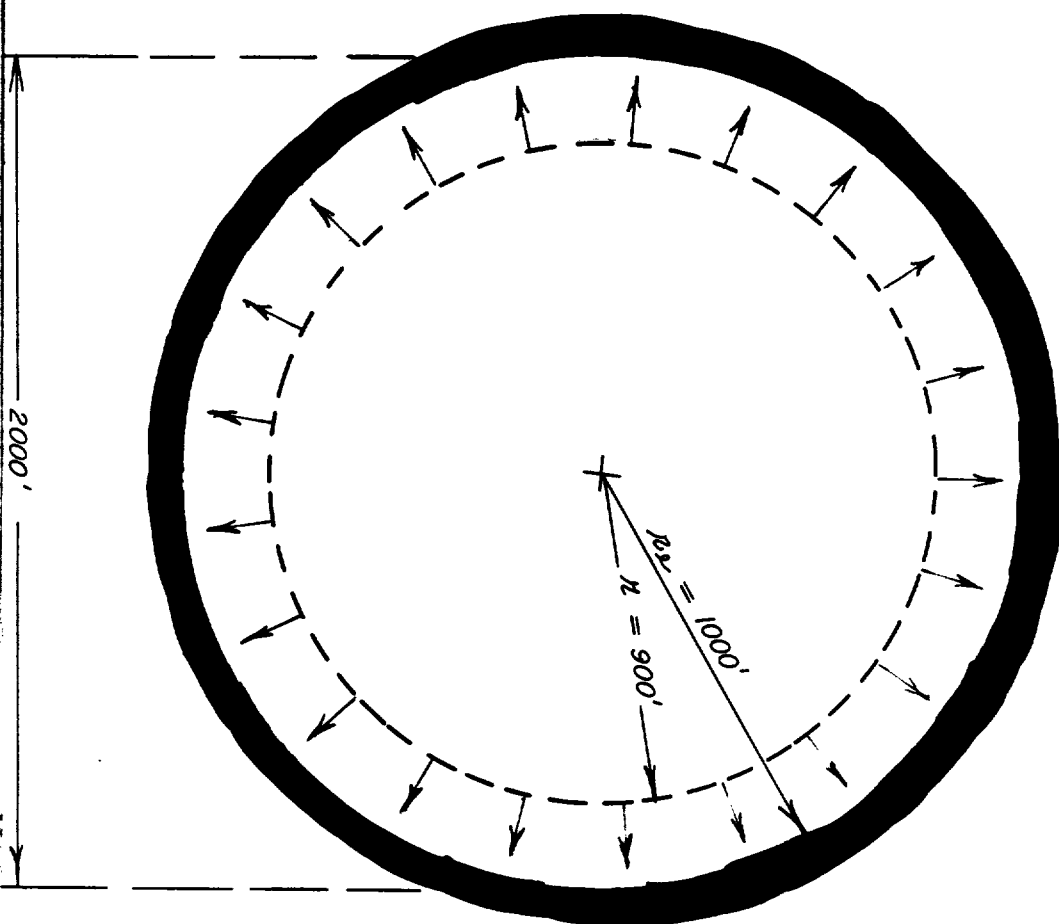
TIGHT BLOCK DRAINED  
BY  
INTERNAL WELL

(Not To Scale)



TIGHT BLOCK DRAINED  
BY  
HIGH CAPACITY FRACTURE SYSTEM

(Not To Scale)



TIGHT BLOCK DRAINED BY  
CENTRALLY LOCATED WELL  
Initial Production Rate  
 (flow system steady state)

For:

$$\begin{aligned} r_{fe} &= 1000' \\ \text{eff. } r_w &= 100' \text{ (1/4 of 400' fracture)} \\ \Delta P &= 1500 \# \\ \mu &= .68 \text{ cp} \\ \beta &= 1.29 \\ K_o/K &= .3 \\ K_h &= .0635 \text{ darcy feet} \end{aligned}$$

$$Q = \frac{(3.07)(kh)(\Delta P)}{\mu \beta \log_{10}(r_{fe}/r_w)} \times (K_o/K)$$

$$= 100 \text{ BOPD}$$

TIGHT BLOCK DRAINED BY  
HIGH CAPACITY FRACTURE SYSTEM  
 (FLOW SYSTEM UNSTEADY STATE)

Instantaneous initial flow rate from 900' to 1000' radius  
 (per steady state relation)

A. for same pressure drawdown as for centrally located well (1500#)  
 and  $K_o/K = .3$

$$Q = \frac{(3.07)(.0635)(1500)(.3)}{(.68)(1.29)(\log_{10} 1000/900)}$$

$$= 2200 \text{ BOPD}$$

(7300 BOPD for  $K_o/K = 1$ )

B. Pressure differential required to allow 100 BOPD at  $K_o/K = 1$

$$= \frac{(100)(.68)(1.29)(\log_{10} 1000/900)}{(3.07)(.0635)(1)}$$

$$= 20 \#$$

MAXIMUM TIME REQUIRED TO REACH STEADY STATE CONDITIONS  
 FOR TIGHT BLOCK DRAINED BY HIGH CAPACITY FRACTURE SYSTEM

For  $K/\phi = 1$  (probable minimum value for fractured formation)

(Ref. Exhibit I Case 3455 November 16, 1966 and Case 6997 August 6, 1980)

1. At pressures just above the bubble point

$$\begin{aligned} (C_e &= \pm 40 \times 10^{-6}) \\ n &= \frac{(6.328)(K)}{C_e \mu \phi} \\ &= \frac{(6.328)(1)}{(40 \times 10^{-6})(.68)} = 2.3 \times 10^5 \\ t &= \frac{r_w^2}{4\eta} = \frac{(1000)^2}{(4)(2.3 \times 10^5)} \\ &= 1.1 \text{ days} \end{aligned}$$

2. At pressure just below the bubble point

$$\begin{aligned} (C_e &= \pm 400 \times 10^{-6}) \\ n &= 10 \times \text{above} \\ t &= 10 \times \text{above} = \pm 11 \text{ days} \end{aligned}$$

SCHEMATIC FRACTURE SYSTEM  
Fracture Blocks  $\pm$  80 Ac. & 160 Ac.

