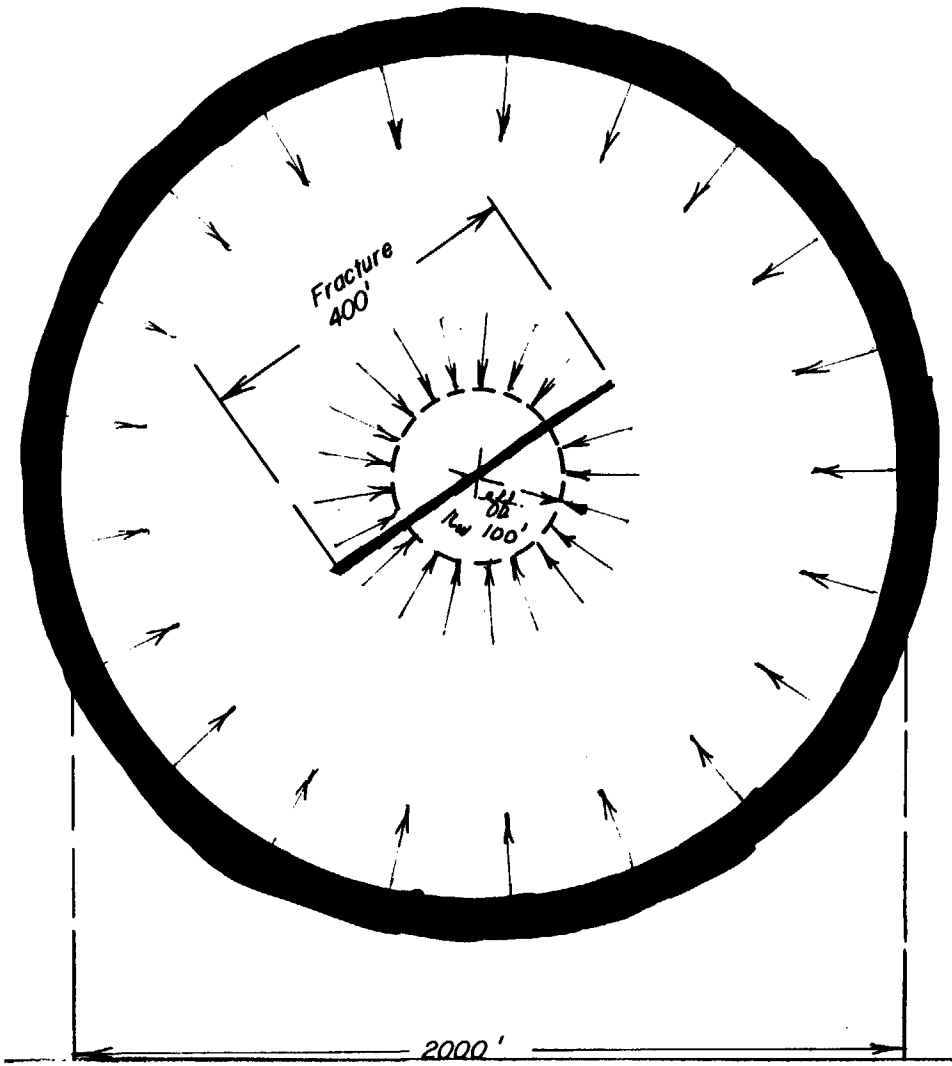
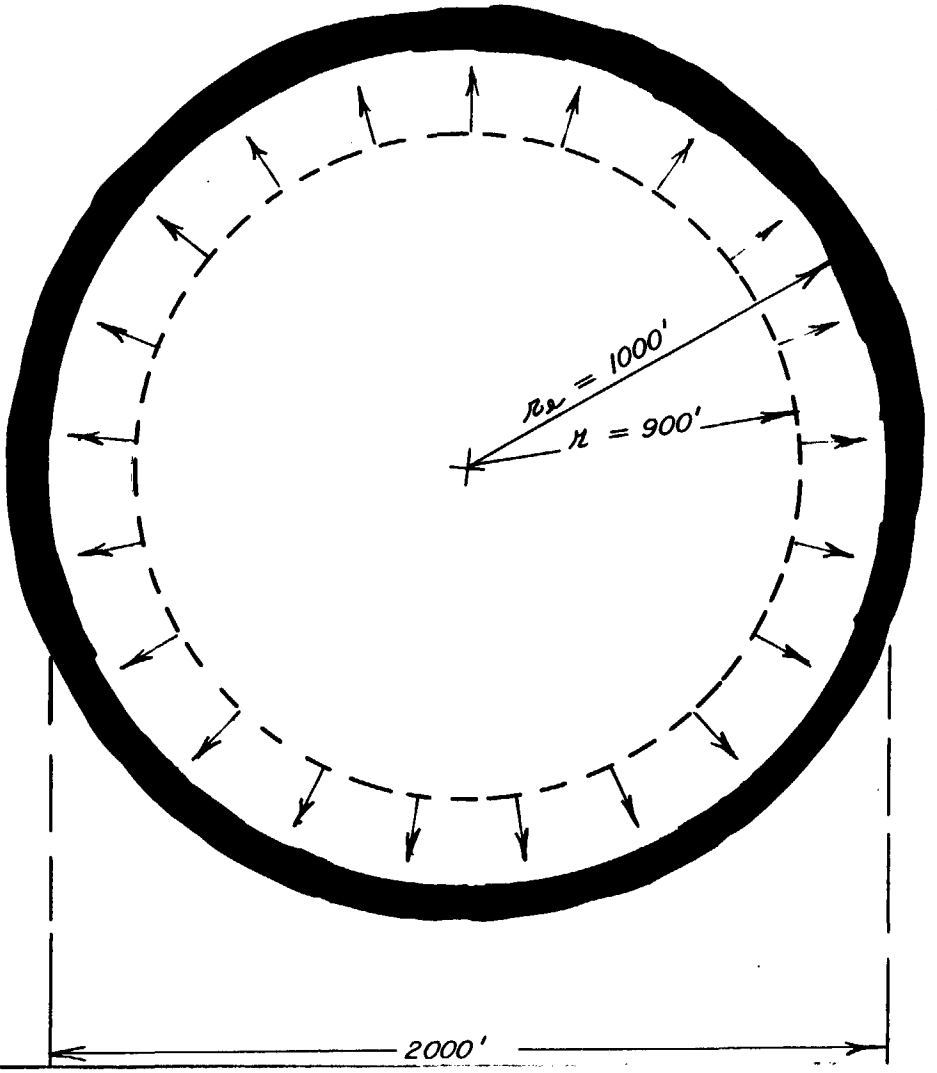
TIGHT BLOCK DRAINED
BY
INTERNAL WELL

(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:

r_e = 1000'

eff. r_w = 100' (1/4 of 400' fracture)

ΔP = 1500#

μ = .68 cp

β = 1.29

K_o/K = .3

Kh = .0635 darcy feet

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

= 100 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 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/ϕ = 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

($C_e = \pm 40 \times 10^{-6}$)

$$\eta = \frac{(6.328)(K)}{C_e \mu \phi}$$

$$= \frac{(6.325)(1)}{(40 \times 10^{-6})(.68)} = 2.3 \times 10^5$$

$$t = \frac{r^2}{4\eta} = \frac{(1000)^2}{(4)(2.3 \times 10^5)}$$

= 1.1 days

2. At pressure just below the bubble point

($C_e = \pm 400 \times 10^{-6}$)

η = 10 x above

t = 10 x above = ±11 days

SCHEMATIC FRACTURE SYSTEM
Fracture Blocks ± 80 Ac. & 160 Ac.