

ROPCO FEDERAL 12 NO. 3 (A) PC (B) FC
MONTHLY GAS PRODUCTION ALLOCATION FORMULA

GENERAL EQUATION

$$Q_t = Q_{ftc} + Q_{pc}$$

Where: Q_t = Total Monthly Production (MCF/MO)

Q_{ftc} = Fruitland Coal Monthly Production

Q_{pc} = Pictured Cliffs Monthly Production

REARRANGING THE EQUATION TO SOLVE FOR Q_{ftc} :

$$Q_{ftc} = Q_t - Q_{pc}$$

ANY PRODUCTION RATE OVER WHAT IS CALCULATED FOR THE PICTURED CLIFFS USING THE APPLIED FORMULA IS FRUITLAND COAL PRODUCTION.

PICTURED CLIFFS FORMATION PRODUCTION FORMULA IS:

$$Q_{pc} = Q_{pci} * e^{-\{(D_{pc}) * (t)\}}$$

Where: Q_{pci} = Initial Pictured Cliffs monthly flow rate (calculated from flow test)

D_{pc} = Pictured Cliffs monthly decline rate calculated from

$$(Q_{pci} - Q_{pcabd}) / N_p$$

See Determination of Q_{pci} and PC Estimated Ultimate Recovery (EUR)

$$Q_{pcabd} = 300 \text{ MCF/mo}$$

Where: N_p = Pictured Cliffs estimated ultimate recovery (EUR)

$$P^* \times 0.84 \text{ MMCF/PSI}^{**} \times R_f$$

P^* = initial reservoir pressure (7 day SIBHP)

R_f = recovery factor (field analogy) = 0.85

****Determined from material balance (field analogy) and volumetric reserves (log analysis)**

By calculating PC EUR from SIBHP and determining PC initial flow rate, D_{pc} can then be estimated utilizing the previously described parameters.

THUS: $Q_{ftc} = Q_t - Q_{pci} * e^{-\{(D_{pc}) * (t)\}}$
WHERE: (t) is in months

BEFORE THE
OIL CONSERVATION DIVISION
Case No. 11247 Exhibit No. 24
Submitted By:
Richardson Operating Company
Hearing Date: April 20, 1995

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DETERMINATION OF Qpci:

(INITIAL PICTURED CLIFFS MONTHLY PRODUCTION)

$$Q_{pci} = Q_t(1) \times Q_{pc}(p) / \{Q_{pc}(p) + Q_{ftc}(p)\}$$

WHERE:

Q_t(1) = First month's total production (MCF)

Q_{pc}(p) = Final Pictured Cliffs Flow Test (MCFD)

Q_{ftc}(p) = Final Fruitland Coal Flow Test (MCFD)

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DETERMINATION OF N_p (PC):

$$N_p \text{ (PC)} = 0.84 \text{ MMCF/PSI} \times P^* \times R_f$$

$$P^* = 241 \text{ PSI}$$

$$N_p \text{ (PC)} = 0.84 \times 241 \times 0.85 = 172.1 \text{ MMCF}$$

DETERMINATION OF Q_{pci} :

$$Q_{pci} = Q_t(1) \times \{Q_{pc}(p)/(Q_{pc}(p) + Q_{ftc}(p))\}$$

$$Q_t(1) = \text{1st month's total production}$$

$$Q_{pc}(p) = 398 \text{ MCFD}$$

$$Q_{ftc}(p) = 50 \text{ MCFD}$$

$$Q_{pci} = Q_t(1) \times 0.89$$

DETERMINATION OF D_{pc} :

$$D_{pc} = (Q_{pci} - Q_{pcabn})/N_{pc}$$

$$D_{pc} = ((Q_t(1) \times 0.89) - 300)/172,100 \text{ MCF}$$

THUS:

$$Q_{ftc} = Q_t \text{ (MCF/mo)} - Q_{pci} \times e^{-\{-(D_{pc} \times t)\}}$$