

CARSON #2

DETERMINATION OF Q_{mvi}: (INITIAL MESAVERDE MONTHLY PRODUCTION)

$$\underline{Q_{mvi} = Q_t(1) \times Q_{mv}(p) / \{Q_{mv}(p) + Q_{nb}(p)\}}$$

WHERE:

Q_t(1) = FIRST MONTH TOTAL PRODUCTION (MCF)

Q_{nb}(p) = FINAL NIOBARA FLOW TEST (MCFPD)

Q_{mv}(p) = FINAL MESAVERDE FLOW TEST (MCFPD)

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EXAMPLE DETERMINATION OF:	(a) $N_p(mv)$	MV EUR
	(b) Q_{mvi}	INITIAL MV MONTHLY FLOW RATE
	(c) D_{mv}	MV MONTHLY DECLINE RATE

(a) DETERMINATION OF $N_p(mv)$

$$N_p(mv) = 0.93(\text{MMCF})\text{PSI} \times P^*(\text{PSI}) \times R_f$$

$$P^* = 1132 \text{ (FROM SIBHP)}$$

$$N_p(mv) = 0.93 \text{ MMCF/PSI} \times 1132 \text{ PSI} \times 0.95$$

$$\underline{N_p(mv) = 1000 \text{ MMCF}}$$

(b) DETERMINATION OF Q_{mvi}

$$Q_{mvi} = Q_t(1) \times \{Q_{mv(p)} / (Q_{mv(p)} + Q_{nb(p)})\}$$

$Q_t(1)=$	9,500 MCF	1st MONTH TOTAL PRODUCTION
$Q_{mv(p)}=$	200 MCF/D	MV FLOW TEST
$Q_{nb(p)}=$	100 MCF/D	NB FLOW TEST

$$Q_{mvi} = 9,500 \text{ MCF/M} \times \{200 \text{ MCF/D} / (200 \text{ MCF/D} + 100 \text{ MCF/D})\}$$

$$Q_{mvi} = 6,333 \text{ MCF/M}$$

(c) DETERMINATION OF D_{mv}

$$D_{mv} = (Q_{mvi} - Q_{mvabd}) / N_{mv}$$

$$Q_{mvabd} = 300 \text{ MCF/M}$$

$$D_{mv} = (6,333 \text{ MCF/M} - 300 \text{ MCF/M}) / (1,000,000 \text{ MCF})$$

$$D_{mv} = 0.006/\text{M}$$

$$\text{THUS: } Q_{nb} = Q_t(\text{MCF/M}) - 1,000,000 (\text{MCF/M}) \times e^{\{-(0.010(1/\text{M})) \times t(\text{M})\}}$$

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Monthly Gas Production Allocation Formula

General Equation

$$Q_t = Q_{nb} + Q_{mv}$$

WHERE: Q_t = TOTAL MONTHLY PRODUCTION (MCF/MONTH)

Q_{nb} = NIOBARA (nb) MONTHLY PRODUCTION

Q_{mv} = MESAVERDE (mv) MONTHLY PRODUCTION (MCF/MONTH)

MESAVERDE (MV) FORMATION PRODUCTION FORMULA IS:

$$Q_{mv} = Q_{mvi} \times e^{\{-(D_{mv}) \times (t)\}}$$

WHERE: Q_{mvi} = INITIAL MV MONTHLY FLOW RATE (CALCULATED FROM FLOW TEST)

D_{mv} = PICTURED CLIFFS MONTHLY DECLINE RATE CALCULATED FROM:

$$D_{mv} = (Q_{mvi} - Q_{mvabd}) / N_p(mv)$$

See Determination of Q_{mvi} and MV Estimated Ultimate Recovery ($N_p(mv)$) $Q_{mvabd} = 300$ MCF/M

WHERE: $N_p(mv)$ = MESAVERDE ESTIMATED ULTIMATE RECOVERY (EUR)

$$N_p(mv) = P \times 0.93 \text{ MMCF/PSI}^{**} \times RF$$

P^* = INITIAL RESERVOIR PRESSURE (SIBHP)

RF = RECOVERY (FIELD ANALOGY: = .95

$**$ DETERMINED FROM MATERIAL BALANCE (FIELD ANALOGY) AND VOLUMETRIC RESERVES (LOG ANALYSIS)

By calculating $N_p(mv)$ from SIBHP and determining Q_{mvi} , D_{mv} can then be calculated utilizing the previously described parameters. See derivation of D_{mv} , item (c) on page 4.

THUS: $Q_{nb} = Q_t - Q_{mvi} \times e^{\{-(D_{mv}) \times (t)\}}$

WHERE: (t) IS IN MONTHS

REFERENCE: Thompson, R.S., and Wright, J.D., "Oil Property Evaluation", Pages 5-2, 5-3, 5-4.