MATERIAL BALANCE APPLICATION(S)

Note Title 9/12/2018

To give the relationship $\boxed{p_R(Q_p)}$ || $p_R(Q_p, Q_{ij})$

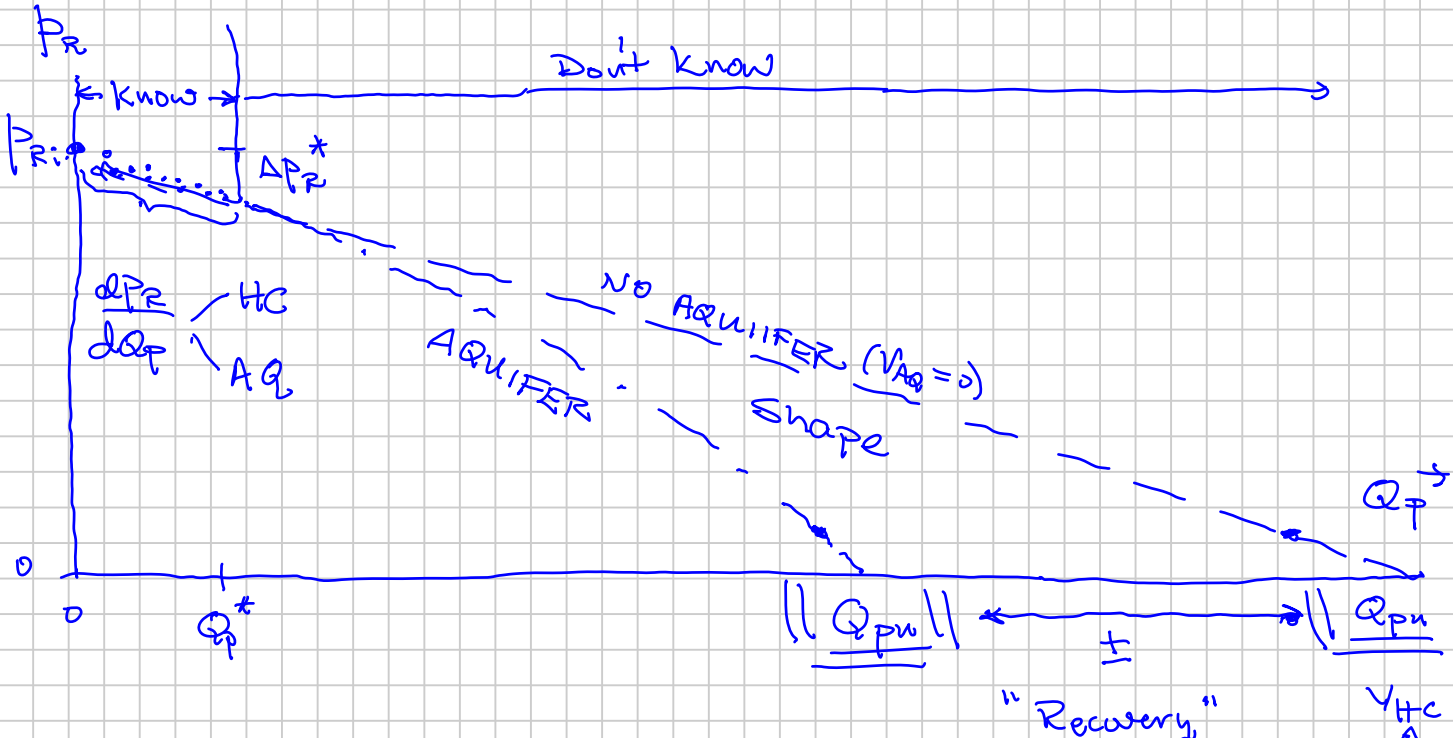
when this relationship is not known from field measurements.

$$p_R(Q_p) \rightarrow q_f(Q_p) \rightarrow q_f(t) \rightarrow Q_p(t)$$

IPR

Rate Eq.

$$\frac{dQ_p}{dt} = q_f$$

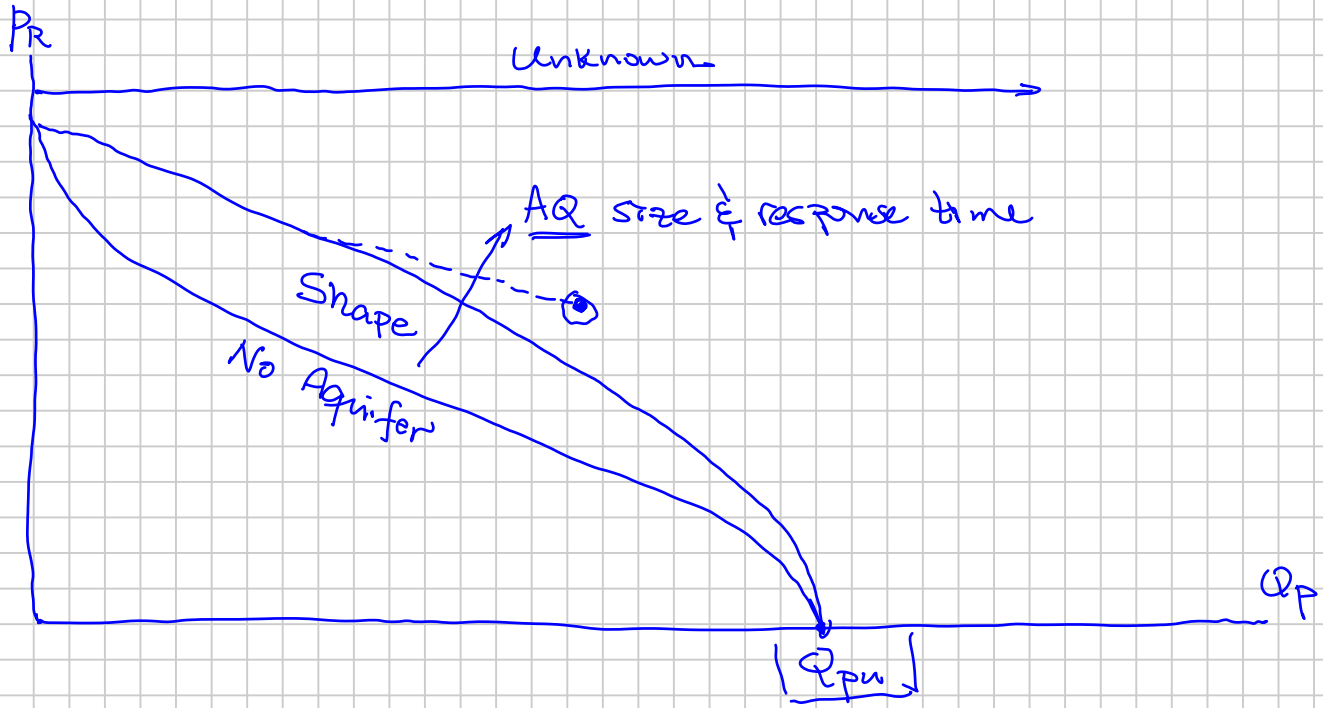


Q_{pu} = Theoretical Estimated Ultimate Reserve

$p_R \rightarrow 0$ EUR

For a given $\frac{dp_R}{dQ_p}$, and given production Q_p, there are two components contributing to dp_R/dQ_p

$$\overline{V_{HC} C_{HC} dp} + \overline{V_{AQ} C_{AQ} dp} \Rightarrow \frac{dp_R}{dQ_p} \text{ measured} \quad || \quad C_{HC} > C_{AQ}$$



Engineer the shape & Q_{pu} $\quad$ $P_R(Q_p)$

Parameters (w/ Uncertainty) Affect Shape & Q_{pu}

10–100%

$$Q_{pu} = \boxed{Q_i} \cdot RF_u \qquad P_R \to 0$$

Q_i: 10% N, 90% G

$$Q_i = \underbrace{A \cdot \bar{h}}_{\text{G2 \& G}} \cdot \underbrace{\bar{\phi} \cdot (1 - \bar{S}_w)}_{\text{Petrophysical}} / \underbrace{B_i}_{\text{PVT}} \qquad \bar{S}_w = S_{wc}$$

50→100%, RG

10%–50% RO

SGD 20–35% RP

$$RF_u = f(\text{PVT}, \text{RP}, \text{Depl/EOR}, \#\text{Wells}, \text{Well Placement}, \text{AL})$$

((AQ: Size / Response Time))

(1) Oil Reservoirs

(2) Gas Reservoirs