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Evaluating the Performance of an Oil Reservoir Under Water-Drive: A Case Study

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Reservoir engineers play a vital role in evaluating the performance of hydrocarbon reservoirs, including estimating reserves and understanding driving mechanisms over time. This responsibility becomes more complex for water-drive reservoirs due to the difficulties in comprehending their characteristics, given the uncertainty related to aquifer properties such as rock properties and aquifer geometry.

This study evaluated the aquifer models of X reservoir in SABA field using MBAL software, and identified the best model based on material balance concepts. It also investigated possible conductivity between the X, Y, and Z reservoirs, estimated the original oil in-place using MBE and Monte Carlo concepts, and predicted reservoir performance from 2021 to 2031.

The study concluded that the small pot aquifer model had the lowest RMSE of 2.306568. The MBE and Monte Carlo P50 methods estimated OOIP to be 23.371 MM Sm3 and 23.4051 MM Sm3, respectively, while the volumetric method's estimate was 22.199 MM Sm3. The XY and YZ faults were impermeable due to low transmissibility values, and could be neglected. Figure 1 shows the results of OOIP statistical distributions from Monta Carlo technique in MBAL software.

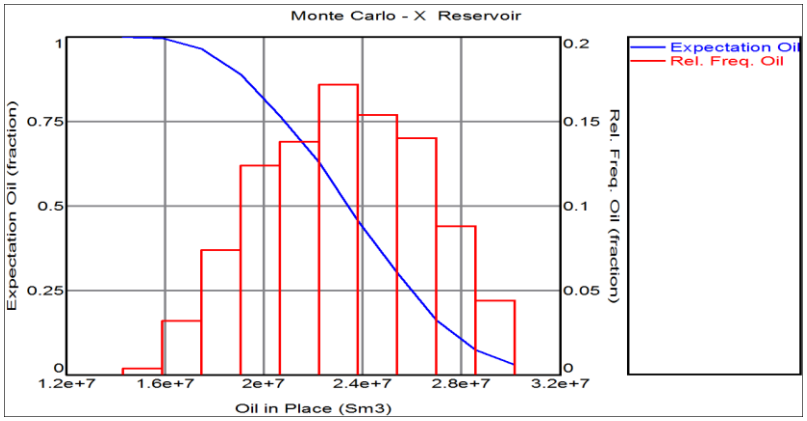

Figure 1. Monte Carlo Volumetric Reserve Probability Distribution

Based on the results of this work, the commutative oil production for the next ten years (2021-2031) was predicted to be 0.119 MM Sm3. Figure 2 shows Cumulative oil production and reservoir pressure versus date.

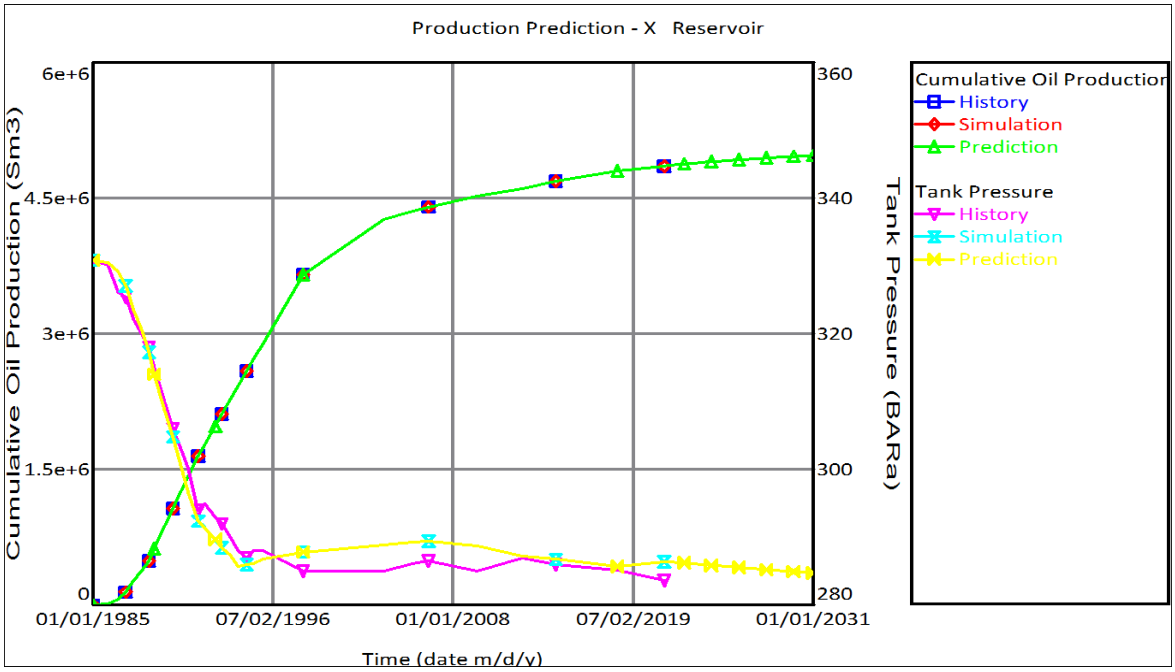

Figure 2. Cumulative oil production and reservoir pressure versus date