Abstract

The efficient development of Abu Dhabi’s giant stacked reservoirs is challenging due to the significant number of wells needed to produce these reservoirs through common surface production facilities. Historically the development planning was carried out based on individual, single reservoir, numerical simulation models that have been managed by applying independent boundary conditions such as rate and pressure constraints. With time this solution became inefficient due to other considerations such as production facilities size and cost, surface congestion affecting the area available to drill wells and lay down transfer lines, drilling and rigless operations.

Recent advances in numerical simulation, such as the simultaneous implicit solution of pressure and other properties in an asset model which includes both surface facilities and the subsurface reservoir, provide users with the ability to understand the flow of oil from the pore space of the reservoir through the surface network to the ultimate point of sale. The Nexus simulator extends this capability to multiple reservoirs with a shared surface network, while keeping the implicit solutions throughout the entire multi-reservoir complex. Reservoir engineers can now build field development plans based upon the results of simulations which address the entire complex, rather than assembling the results of separate simulations of individual fields and independent network models. Modelling the integrated asset allows the engineer to synchronize well phasing and planning, optimize production rates, and maximize surface facility utilization.

This case study discusses and ADCO onshore field development plan combining several stacked reservoirs within a sequence of 18 stacked, independent reservoirs in the same field. All developed reservoirs within the sequence share common surface facilities. The integrated model construction is presented including gridding, fluid properties, surface network configuration and constraints. The economic value of different production and injection and injection scenarios and their impact on shared facilities is also discussed which led to optimizing the well phasing, plateau rate and length of the combined developments.