Paper B17

Well Architecture and Design Criteria for Complex Reservoirs in Mature Fields

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In the quest of reducing the field development and production cost in Malaysia in the complex multi stacked compartmentalized mature fields, a new initiative is to couple the reservoir dynamic simulation with reservoir geo-mechanical modeling. Reservoir rock properties, stress regime, wellbore stability, fault sealing behavior, reservoir connectivity and communication can be significantly changed during the long time production and injection history in mature fields. Any successful field rejuvenation plan should carefully take into account of these changes. The objective is to plan, drill and complete cost effective wells having high productivity, high recovery per well, and high borehole stability during production life in mature fields.

This "Well Architecture" initiative involves studies for optimal well placement, maximizing reservoir reserve contact, evaluating potential drilling risks, determining optimum sequential hole-sizes before reaching reservoir targets, simplifying well trajectory, and minimizing well count. A starting point is to construct a mobile oil productivity (MOP) 3D map and super-imposed with a well-bore stability critical drawdown pressure (CDP) 3D map constructed by the geo-mechanical modeling. In addition, this approach which entails studies of rock mechanical stress change in the reservoir during production and injection can also yield the optimal well orientation, well inclination, and perforation orientation, selecting the most effective well type, simplifying the well completion for achieving optimal well productivity and ensuring expected oil and gas recovery.

In this paper, suggested workflow and key tasks with the desired results are to be presented and demonstrated with a few selected field case studies for examples. The applications of new and smart technologies to optimize furthermore the well completion in thin oil-rim, multiple-stacked, and compartmentalized reservoirs are illustrated.

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