

Rahab Subsurface Project Execution Plan - The Bridge between a Development Concept and Effective Field Development Execution

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ABSTRACT

Rahab Field is located in the west of the RTQ area in the South of Oman, 20 km southwest of the Marmul field and 5 km west of Thuleilat field. It contains five stacked clastic reservoirs in the Gharif and Al Khlata formations separated by thick continuous shale layers. The Upper Gharif (UG), Middle Gharif (MG) and Lower Gharif 1 (LG1) reservoirs are under waterflood through a 400 m inverted 5-spot pattern. The Lower Gharif 2 (LG2) and Al Khlata (AK) reservoirs are under primary development with varying levels of aquifer support. The previous FDP is from 2006 and has been fully executed. With a significant remaining gap to Top Quartile recovery of 25% it was identified that a further development plan for the Rahab field had to be identified and a project was set up in the Field Development Centre in PDO. Early in the study it was recognized that the extensive commingling of production and injection in the field was one of the reasons for poor sweep efficiency due to poor conformance. The mobility contrast mainly due to viscosity variation and variable aquifer strength across the reservoir units has resulted in poor recovery. These needed to be addressed in a Phase 2 development plan for the field.

To obtain more detail on the reservoir performance issues in the field the study team jointly with the team from the producing Asset looked in great detail into the historic field performance of the field. This resulted in an improved understanding of the communication paths in the reservoirs by integrating production data, pressure data, and an improved understanding of the sand distribution in the reservoirs.

Based on this a development plan was prepared and is now being executed that included a denser infill drilling of the field, a clear strategy to improve conformance control in the field and an improved reservoir management plan for the field based on more accurate data becoming available by the implementation of the development. The Phase 2 Development of Rahab was kept economically competitive by challenging existing well designs (with Wellex making up 80% of the project costs). De-commingling of waterflood has been achieved via dual zone completion designs in single injector wells, and slimming down of producer wells has reduced overall Capex.

The collaboration between Study and Asset team continued post DG3 to ensure effective Project Execution Planning. A detailed Project Execution plan was generated to ensure the FDP conceptual development could be implemented in reality. This included conversion of FDP forecast to a detailed well conduit based forecast linked to a detailed execution plan to minimize deferment and deliver a reliable production forecast. The above approach to the Rahab field has served as a front runner for updated field development plans for the neighbouring fields in the RTQ area of the Marmul-RTQ Cluster, including the Thuleilat, Qaharir, and Qata fields. The developments result in a significant contribution to the oil promise and define the drilling sequence for the next ten years.