New Development Opportunity Of A Fractured Mature Gas Oil Gravity Drainage Field Using An Integrated Analytical Approach

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Abstract

Objectives/Scope: Field A is one of the largest oil fields in Oman and has highly fractured carbonates. The reservoir of interest consists of stacked cretaceous carbonates, and the dynamic behavior of oil production is influenced by fractures and faults. The field has been under production since 1967 and has undergone multiple phases of production. GOGD proved to be the most efficient development mechanism for the highly fractured carbonates. A new development opportunity was identified targeting secondary GOGD intervals thereby increasing oil production by xxx and enhancing GOGD, thus reducing the gap to top quartile recovery.

Methods, Procedures, Process: Over 50 years of production, gas cap is building in fracture and matrix, unfortunately reservoir heterogeneity results in GOGD process having variable efficacy across the field.

Historical GOGD development strategy involved placing horizontal wells at the fractured oil rim across various stacked reservoirs. The wells shallower in the structure were found to be prone to early gas breakthrough and the wells drilled below the fractured oil rim had a high risk of high BSW. This paper outlines the integrated analytical approach that was utilized to identify & target secondary GOGD and thus placing wells in untapped intervals where the risk of shallow gas and high BSW were minimal. The dominant approach was to review and visualise existing data: production data, fluid contact information, surveillance data etc. across the field production history at a microscale in subsurface. This resulted in planning wells above the oil rim but deeper than the shallow wells that are producing with high gas. Avoiding open fractures in well planning is considered to avoid early gas breakthrough.

Results, Observations, Conclusions: It is particularly challenging to collate such a vast volume of data in a complex reservoir system and integrate this information 1D into 4D throughout the field. The approach used includes field division into sectors and flow units as well as use of data analytics to illustrate the gas displacing oil. initial batch (x out of xx wells) of these opportunities were identified, planned and drilled in 2022.planned away from open fractures to reduce early gas breakthrough likelihood. Production data for the last XX months indicates that nearly all these wells outperform the high case forecast. This confirms long term sustainability of this strategy and producibility via secondary GOGD.
**Novel/Additive Information:** The success of this approach provides evidence of the transition zone's sustained capacity to produce oil above the modeled oil rim position, which supports the acceleration of the GOGD process in terms of draining the oil into the desired oil rim. The concept of targeting shallower transition zone or secondary GOGD can now be used to expand development of similar zones in similar fields in Sultanate of Oman.