

# **Extending the Life Cycle of Ageing Fields with NFE Exploration and Taking Advantage of Existing Facilities**

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## **Abstract**

A study of several mature fields in Central Oman which are at the tail end of their economic life cycle were assessed as part of identifying near field exploration (NFE) opportunities in other stratigraphic intervals other than the producing reservoir interval and therefore extending the potential of the area. As per the process of well abandonment, the Asset has identified several wells that will be shut in. Exploration has completed a study in this area, and the focus of this type of opportunities considers that facilities are available. Applying the principles of Play Based Exploration (PBE) and detailed Petrophysical analysis of missed-pay opportunities has allowed the identification of new play fairways and rejuvenated areas that otherwise would have been abandoned. This integrated data-driven evaluation includes results from biostratigraphy, sedimentology, fluid geochemistry, petrophysics and detailed seismic interpretation. The Petrophysical evaluation includes log re-evaluation of intervals over existing fields that do have hydrocarbon shows observed from the mud logs but have not been completed and are within structural closure. Using the most recent reprocessed seismic data, detailed seismic interpretation was used to update horizons and faults and confirm structural maps. A comprehensive review and re-evaluation of the existing well tops database for the Central Oman study area (built up over many years of regional and field scale studies in PDO) has led to an enhanced and more consistent stratigraphic interpretation. This updated stratigraphic dataset provided the framework for a new seismic interpretation focused on key reservoir intervals, and lead to the revision of the subsurface model. Reservoir Gross Depositional environment maps and seal distribution maps were created using all available sub-surface data, which included rock samples (cuttings and sidewall sample), log data and seismic derived thicknesses. Several plays were identified: Natih A/B, Natih E, Kharaib, Hanifa, Tuwaiq Mountain, Mafraq, Khuff and Ghudun. These plays show favorable reservoir- seal fairways within the study area. An Integrated Petroleum System analysis was also completed to understand charge in the area and predict the fluid properties. Legacy oil and rock samples analysis for the fields within the study area were investigated from the Permian Gharif to Cretaceous Natih Formations. The analysis confirmed that charge is not an issue; however, the observed fluid properties are influenced by reservoir temperature, fluid residence time in the reservoir and fresh re-charge pulse. Several promising opportunities resulted from this detailed integration, and they will be tested this year providing early oil and increasing oil production in a success case scenario.