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Non-Intrusive Technologies for Prudent Brown Field Redevelopment – An Operator's Experience

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Abstract

In the oil and gas industry, operators strive to minimize loss time and production while keeping its facilities and operations safe. Over the past few decades, technological innovation has equipped the industry with the equipment and practices necessary to make the exploration and production more efficient, safe and environmental friendly. This paper discusses successful implementation of several non-intrusive technologies by the operator for redevelopment of maturing oilfield in offshore East Malaysia.

The field was discovered in 1967 and oil has been produced since 1972 from the major hydrocarbon accumulation in 8 producing reservoirs, sandwiched between shallow gas-bearing reservoirs and deeper gas/condensate-bearing reservoirs. Enhanced Oil Recovery (EOR) redevelopment project in the field began in 2018, targeting the major oil reservoirs and Non-Associated Gas (NAG) reservoirs. Crestal gas injection and flank water injection will be implemented to further develop the oil rims of A and B reservoir while Immiscible Water-Alternate-Gas (IWAG) injection will be implemented in the C reservoir. The EOR scheme will include infill drilling of new wells and workover of existing wells to deliver targeted incremental oil recovery.

The journey towards EOR redevelopment project consistently requires integrated contributions from multiple disciplines such as Petroleum Engineering, Production, Well Services, Facilities and Process Engineering, which has been facilitated effectively through Reservoir, Well and Facility Management (RWFM). This holistic work process involves creating critical strategy for EOR redevelopment activities, optimization decisions and asset management, ensuring the delivery of remaining reserves and longterm production maximization. By implementing RWFM collaboration and support, several non-intrusive technologies have been evaluated & implemented to solve long overdue problems such as online acoustic sand monitoring system, non-intrusive acoustic valve inspection device and active sonar meter.

Overall, this paper highlights the working principles, actual field results and lessons learnt from the application of non-intrusive technologies through RWFM collaboration that deliver significant cost and efficiency benefits as well as safety for prudent brown field EOR redevelopment.
