Reinvigorating a mature production asset through sound application of play analysis: A case study from the Gulf of Thailand

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Much of Southeast Asia has a rich history of oil and gas exploration and there exists a well understood series of prolific hydrocarbon basins which have been producing for some time. Within the Gulf of Thailand, production has been largely from the Cenozoic petroleum system; however, within the Western Basin, an older more elusive petroleum system has proven to be commercially significant.

The Bualuang field which lies within the B8/38 production licence has been on-stream since 2008. Light oil, which is found to be low in asphaltenes and with an anomalously low GOR has been produced from stacked Cenozoic continental fluvial reservoirs and is thought to have originated from a Cretaceous or otherwise Mesozoic source rock system. The field comprises two well-defined 3-way dip closed structures against faults which broadly form over a 'basement' ridge feature.

Motivated by declining production and the indirect yet compelling evidence of a pre-Cenozoic active marine source, there was clear appetite to find and access more oil within the licence. Furthermore, while drilling losses within some wells that penetrated the Palaeozoic section provided encouragement for potential flow zones, others had generally tight reservoir.

To develop prospects in this deep section, robust play fairway analysis and detailed seismic mapping was undertaken, including the review and integration of all relevant well penetrations. While the presence of potential carbonate reservoir was readily demonstrated, the prediction of potentially productive intervals remained challenging. As such an integrated play-based approach using all available data was imperative, the key findings from which were that: 1) there needs to be an element of structuration or otherwise combination of chemical and structural alteration to enhance generally poor carbonate host rocks; 2) seismic data was critical in predicting where reservoir had the highest chance of being effective; and 3) presence of effective top seal was the critical risk. Subsequent high quality lead generation work was able to focus on de-risked areas where the play elements were most likely to combine favourably.

The value-adding approach described above has taken advantage of existing well information and OBN seismic data (acquired in 2015) to work up a largely overlooked play. By utilising this data with an integrated play-based approach and viable geological models in mind, uncertainty has been reduced and several leads identified to provide not only some exciting candidates for future drilling but also the opportunity to open a new play within the region.