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Abstract

The Arabian Plate has a relatively quiescent tectonic history that facilitates the occurrence of a diverse array of stratigraphic play concepts. This case study focuses on procedures for determining optimal well placement in stratigraphic reservoir truncation plays with limited well control and sparse seismic data to identify and reduce the associated reservoir uncertainty in frontier regions.

The presence of reservoir risk associated with stratigraphic truncation plays is often considered the greatest. Identifying the optimal well location is crucial in reducing the overall prospect risk and increasing the success of encountering the targeted reservoir at a sufficient reservoir thickness. In this case study, limited offset well data was available. To overcome the lack of data, a regional geological model was developed to define a play fairway. This was achieved by integrating available geological data, both locally and regionally including an analysis of successful play type analogues, and incorporating all data into a geological model.

In addition to limited availability of well data, seismic data was sparse and of different acquisition times, acquisition parameters and shot for deeper objectives, which provided interpretation challenges. Most of the identified truncation play types are located where only 2D seismic data is available. The preexisting 2D lines are widely separated with limited fold. In some areas 3D seismic data was available with fold greater than 2000 but the targeted reservoir was below seismic resolution. Seismic reprocessing was essential to suppress multiples that are generated by the overlying stratigraphy since they can easily obscure the imaging of the truncation wedge and was also required to tie the available seismic lines of different vintages and quality. After reprocessing, the seismic data was assessed for any evidence of truncation wedges that could be resolvable or detectable.

Incorporating the results from the geological depositional model and the seismic identification of truncations wedges, uncertainty ranges of the truncation position were identified. This was accomplished by estimating the sub-regional scale reservoir truncation line from the geological model. Fine-tuning of the reservoir truncation line using reprocessed seismic data was then completed, reducing the uncertainty of the reservoir truncation position over targeted locations. A well location analysis was then completed to determine a viable location to encounter a sufficient reservoir thickness.

This case study demonstrates how an integrated approach has helped to mitigate the risk in identifying optimum well locations, in areas with limited data when exploring for stratigraphic reservoir truncation plays by incorporating all available data, seismic and well, along with an understanding of regional geology.