

Reservoir Fairway Analysis of a Barail Interval of Deohal Area in Upper Assam Basin Using High Resolution Sequence Stratigraphy and Seismic Attributes

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The heterogeneity of Oligocene Barail 3 reservoir in Deohal area of Upper Assam is a challenge for delineation and optimum development for oil and gas. The effective porosity varies between 6% and 23%, and, net to gross fraction varies from 0.15 to 0.97 in the reservoir. One well on the northern part of the area was abandoned because of the absence of this reservoir. An integrated analytical approach is undertaken for understanding of the reservoir heterogeneity and sand body architecture using high resolution stratigraphy based on 3D seismic and well data.

The gross thickness of Barail 1/3 (Upper Barail) is about 160-180m in Deohal area. Barail 3 is the bottommost and thickest reservoir of the sequence. The log motifs for the Barail 1/3 interval indicate a fining and thinning upward trend on both larger and smaller scale. High resolution stratigraphic correlation across wells has helped in understanding the sand body stacking pattern and juxtaposition.

Integrated seismic amplitude which is physically related to logarithm of acoustic impedance contrasts have been extracted from the zone of interest in the Deohal area. Analysis of integrated seismic attribute revealed prominent channel belts. Cross-plots of integrated seismic amplitude vs. reservoir properties from drilled wells indicate fairly positive correlation ($R^2=0.5739$ to 0.7478). Spectral decomposition analysis of 3D seismic data has further enhanced the channel belt geometry in 18, 24 and 30 Hz frequency cubes. The absence of Barail 3 in the abandoned well may be correlated to its location beyond limit of the observed channel belt.

Two major channel belts have been identified around the area. The observed braided pattern in the channel belts is possibly the result of composite seismic response of multi-storeyed channels. In regional context it appears that the channel belts may be part of a distributary channel system. The widths of the channels were estimated from the seismic attribute maps. The width/thickness (W/T) ratios of the individual channel bodies in the Deohal area range between 8 and 32. For composite channel belt W/T ratio ranges between 68 and 84. These channels may be classified as broad ribbons and narrow sheets.

Guided reservoir property maps and depositional model generated based on the integrated analysis is expected to optimise placement of delineation and development wells in the area.