The Influence of Geophysical Modeling for Vertical, Directional and Horizontal Drilling in Carbonate Gas Reservoirs of Batu Raja Formation, South Sumatra, Indonesia

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Recently, geophysical modeling becomes crucial aspect which may influence the vertical, directional and horizontal delineation drilling techniques in heterogeneity carbonate reservoir of Batu Raja Formation (BRF) South Sumatra. The carbonate reservoir is commonly characterized by two onlaping landward prograding facies on top of the sunda platform that distribute from west to east of the north south potential closure.

Geological and Inversion modeling approach is applied to characterize the reservoir in determining potential drilling location. External and internal geometry of Baturaja carbonate can be identified by detailed geological model using seismic interpretation. It is constraining the Inversion Modeling process which honour seismic and well data. Two different facies can be predicted from acoustic impedance anomaly within the reservoir which known as reefal facies at the upper part and platform facies at the lower part of BRF.

The heterogeneity of reservoir has about 4,675.23 acres of area, average thickness from 50 to 200 meter with range of permeability from 2 mD â€“ 30 mD, porosity of 20 â€“ 28 % and gas hydrocarbon contain dominantly. Lateral correlation using logging, Vertical Seismic Profiling (VSP) and Versatile Seismic Imaging (VSI) tie to seismic data indicate that carbonate reservoir has highly potential changing of its lateral and vertical distribution.

Considering to such reservoir condition, several optional drilling techniques are applied to optimize the sweeping area coverage, the possible reservoir interval perforation and reduce the total operational cost.

As the result, most of the current 15 drilling wells (7 vertical, 6 directional, 2 horizontal) show satisfactory production rate in expected well head pressure; although they are perforate within similar interval of 12 meter each well. By applying these different drilling techniques, the total operation cost project may save significantly in which reducing 8 drilling location out of the primarily plan.