

Seismic attributes analysis of deep reservoir in Erb West field

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A seismic attribute analysis of deep reservoir in Erb West field was carried out to re-evaluate and determine its prospectiveness. The 3D seismic attributes, well data and facies maps were incorporated to develop a geologic framework for predicting the reservoir properties. The study contributed also to the delineation of the reservoir within the complex fault zone in the southwest region of the field. The database included 3D seismic data volume, interpreted seismic horizons, well logs, log correlations and various well and seismic reports.

3D Seismic Attributes Extraction and Analysis were first applied on the shallower proven reservoirs M4, N2 and N7. A deeper reservoir was then identified based on a sequence stratigraphic study conducted by PRSS. The potential reservoir was called the P reservoir. A similar 3D Seismic Attributes Analysis was later applied to the P reservoir. The geologic depositional model derived from the sequence stratigraphic study developed by PRSS was correlated with the seismic expressions. Several seismic attributes, such as RMS Amplitudes and Mean Amplitudes, were extracted and analysed for the respective fluid and facies responses in comparison with the conventional seismic amplitudes. The more generalized Energy Half Time seismic amplitude was found useful to delineate sequence stratigraphic facies distribution within the field and hence formed the basis of the seismic attribute interpretation.

The seismic attribute map for the P reservoir basically describes the sequence stratigraphic configuration where strong-continuous-high-amplitude features were observed in the South-Southeastern zone where shorelines are interpreted. Strong features indicate sediment deposition direction to the North-Northwest. A channel feature can be seen flowing through the high-amplitude event and ends in a zone of discontinuous-medium-to-high-amplitude-anomalies interpreted as deltaic facies. These facies are spread out over the western part of the field encompassing the southwestern complex fault zone.

A relationships between reservoir properties and seismic amplitudes were derived for all the main reservoirs which generally shows a trend of high net sand and porosity values with high RMS amplitudes. These relationship of the reservoir property to the RMS amplitude were used for predicting the deeper P reservoir's properties. Potential leads are interpreted to be within these delta sands and relative sand quality can also be inferred from the reservoir properties and seismic amplitudes relationships developed.