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A New Technique to Combine Structural and Basin Modeling to Assess Reservoir Presence and Charge Risk—Offshore Norway Exploration Target

We present a new technique to assess the risk of reservoir presence and hydrocarbon charge potential. The methodology uses a combined approach of hydrocarbon migration and reservoir extent analysis using paleo-shapes derived from a structurally-validated 3-D model.

The technique is shown in the context of an investigation of an offshore Norway prospect, near a number of producing fields. The eastern extent of the potential reservoir, the Heimdal sandstones, is unconstrained and the charge potential needs to be assessed. The local traps were charged from late Oligocene times to the present day.

A three dimensional model of the area was built using seismic interpretations of the horizons and then populated with decompaction attributes. The model was backstripped by sequential decompaction and unfolding. The top sand marker, from the well data, was then projected onto the Top Cretaceous paleo-surface to define the potential easterly extent of the Heimdal sands. The modeled potential reservoir extent correlates favourably with seismic attribute data indicating sand-prone facies.

The charge modelling was carried out using restored models from three restoration steps and the appropriate transformation ratio data to define the lateral extent of the hydrocarbon kitchen. A number of different model scenarios were used to understand the charge risk. Local producing fields were shown to be charged, however the prospect was identified as high charge risk.