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### **Identification and Exploitation of Remaining Reserves Through Integrated 3-D Reservoir Modeling of a Complex Mature Upper Jurassic Reservoir**

The Gyda Field is located in the North Sea Central Trough, offshore Norway. The field started oil production in 1990, and is currently in decline. In an attempt to identify and exploit the remaining reserves, a new detailed reservoir modeling study has been undertaken. The reservoir is of Upper Jurassic age, and represents deposition within a shallow marine synrift setting, with fault movements controlling reservoir thickness and depositional facies architecture. The reservoir lies around 4000m below sea level introducing uncertainty in seismic imaging and also diagenesis.

The integrated 3-D modelling study of reservoir heterogeneity included; i) Detailed seismic interpretation of key horizons and faults, highlighting areas of high uncertainty ii) Integration of biostratigraphy and sedimentology/ichnology to delimit reservoir zones and 3-D property distributions, iii) Fault classification according to confidence, geometry, sealing potential/compartmentalization and control on accommodation space and depositional setting. iv) Utilisation of all available production history to aid in model building. All the above elements were brought together to construct 3-D reservoir models.

A scenario-based modeling approach has been implemented to tackle uncertainty and to match data from production. Uncertainty in seismic interpretation of horizons was approached by implementing both interpolation and geologically-predictive methods in areas of poor seismic.

The integrated approach has led to a better subsurface understanding and quantification of uncertainty. The models provide a tool for efficiently managing the last years of the field's life.