Geological and Geophysical Evaluation of The Gullfaks Field Based on 3D Seismic Interpretation Using Modern Interpretation Tools.

Muhammad Shahid Tamannai and Peter Conn
Geophysicist, TGS Geological Products and Services, United Kingdom.

The detailed 3D seismic interpretation study is carried out to evaluate the Gullfaks field located in block 34/10 along the western flank of the Viking Graben in the Norwegian sector of the North Sea. It is one of the most structurally complex oil fields in the North Sea. On the basis of structure, Gullfaks field is divided into three parts i.e. tilted fault blocks to the west, horst complex to the east and a folded region between them. The evolution of this structure is related to the Mid Jurassic rifting. Generally, the seismic data from the field is not of good quality due to the presence of multiples, noise and the general complexity of the subsurface structure.

The major reservoir in the field is high quality Jurassic Brent group sandstones, several hundred meters thick, having 30 34% porosity and 0.01 3.0D permeability. However, Cook formation and Statfjord formation contains very small amount of total reserves. These reservoirs are charged from upper Jurassic source, Kimmeridge clay formation, having high generation potential. Laterally extensive Cretaceous mudstones cover the reservoirs below acting as efficient seal. Presence of more than one oil water contacts in the field indicates that some of the faults also act as seal for the hydrocarbons. Tilted fault blocks is the major trapping mechanism in the Gullfaks field.

It can be concluded that, the presence of high quality source and reservoir with thick seal and efficient trapping mechanism has constructed an effective petroleum system in the Gullfaks field containing high quantity of hydrocarbon reserves.