Subsurface structural interpretation of seismic profiles of Tajjal Gas Field of Lower Indus Basin Pakistan: A case study

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Abstract

Geographically Tajjal Gas field is located about 120 Kms south east of Sukkur in Sindh Province of Pakistan. Geologically Tajjal Gas Field (Gambat Block) lies in Lower Indus Basin -a proven Geological Province in the Islamic Republic of Pakistan. The field was discovered by OMV Pakistan in 1995 and is one of the productive fields having latitude 26^0 52' 50'' N and longitude 68^0 55' 60'' E. It is bounded by the nearby Gas fields i.e., Miano, Kadanwari and Sawan. The area is bounded by Pannu Aqil sub Basin in the north, Kirthar Sub Basin in the south, Indian Shield in the east and Kirthar Fold Belt in the West. This research pertains to the Interpretation of 60 Fold seismic data acquired by ENI Pakistan in November 1989 was used in SEG-Y format for Structural and Stratigraphical Interpretation. Since the study area is part of the Lower Indus Basin which is an extensional regime resulting extensive Horst and Graben Geometry that may be considered as probable hydrocarbon bearing zones. The area is known for the existence of stratigraphic, structural and combination of both traps. The organic rich shales within the Sembar Formation are the essential hydrocarbon generating source rock of this region including other parts of the Indus Basin. Sandstones of Lower Goru Formations are the primary reservoirs. Other reservoirs are Eocene to Paleocene carbonates and sandstone. The seismic data used for this research confirmed successfully the geological and stratigraphic set up. On the basis of regional stratigraphical set up, available data of nearby fields and following the continuity of seismic reflections results three main Horizons were marked and named as Possible Sui Main Limestone (at 1.1 sec), Upper Goru (1.2 sec) and Lower Goru (1.65 sec) Formations. Migration path for hydrocarbons with structural and stratigraphical traps have been identified on the seismic sections successfully. Continuous faults passing from different lithologies and formation provide traps for the accumulation of hydrocarbons. The lower Goru formation is the main proven reservoir rock in the study area. Goru sands have typical parallel package of sand beds on the seismic section. The range of two way time contours is from 1521 ms to 1627 ms. The contour mapping of 5 ms contour interval shows a closure of 500 m^2 at shot point # 260 of two horst structures with approximately 10 ms vertical throw on the east west trending seismic section TJ89-520 and in terms of depth it's approximately 15 meters. A small lead is also present at shot point 380 – 390 of closure 400 m^2 bounded by fault towards western side of the lower Goru level. These could be the locations for new prospects in the study area.