POROSITY PREDICTION TOOL USING 3D SEISMIC ACOUSTIC IMPEDANCE KADANWARI GAS FIELD, PAKISTAN

Nasir Ahmad[1], Giacomo Spadini[2], Arshad Palekar[1], and M. Asim Subhani[1]
[1]*Eni Pakistan, 5th Floor, The Forum, G-20, Block 9, Khayaban-e-Jami, Clifton, 75600, Karachi, Pakistan*
[2]*Eni Petroleum, Suite # 3500, 1201 Louisiana Street, Houston, TX 77002, USA*

In the western part of the Kadanwari field a gas-bearing stratigraphic trap was identified in the G-sand of the Lower Goru Formation by drilling an 'X' well. However, due to poor reservoir properties the well was not commercial. Thus, the challenge was to locate and quantitatively evaluate a drilling target in the sand body, which would have porosity values beyond the known producible threshold in the area. With this aim, 250 km2 of 3D seismic data was acquired in the area. The data was processed to pre-stack time migration, and acoustic impedance inversion was performed. This inverted data was used to generate a pseudo porosity volume to locate a "sweet spot" for porosity in the area. A linear relationship between Porosity and Acoustic Impedance was established based on the wireline and CPI logs of the well X. The equation was obtained as a regression line for the clean G-sand porosity and acoustic impedance. The equation was applied to the available AIMP volume to obtain a pseudo-porosity volume. The inversion-derived pseudo-porosity was compared with the CPI porosity at well X. As expected, the pseudoporosity obtained from inversion provided a result with frequency content similar to that of seismic data. It is for this reason the calculated porosity was not able to describe the details of internal variations of the 'G' Sand but capable to catch the bulk character of the target sand only. Using this pseudo-porosity volume, a pseudoporosity map was generated. On the basis of this work, the successful well 'Y' was drilled. However due to complex mineralogy the effective porosity of well Y is still in question, however the sonic based porosity was very close to the predicted porosity of 17-18%. On account of this success the Kadanwari Joint Venture has decided to acquire 3D seismic over the entire area with an objective, to apply the same technique in order to fully evaluate the remaining potential. As per authors knowledge, this technique has not been used previously in the area for porosity prediction.