

Interpretation of 3D Seismic Data for Thin Coal Seam for Underground Coal Gasification – A Case Study from Mehsana, India

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During hydrocarbon exploration in north Gujarat, India ONGC discovered huge reserves of coal at various depths ranging from 700 to 1700 m within hydrocarbon bearing formations. Since, these coal seams cannot be exploited by conventional mining methods, underground coal gasification was considered. To predict the extension and structure of the coal seams encountered in information well U-1, suitable for gasification 3D seismic data were acquired and processed by ONGC in the Mehsana city area post stack migrated output was interpreted during the late eighties.

This paper deals with interpretation of the 3-D seismic data, the maiden in-house 3-D seismic data interpretation by ONGC in India. The Eocene coal seams, S-I and S-III were identified on the 3-D seismic data through VSP data at U-1. Tops of these coal seams were correlated through vertical sections and times slices. TWT maps were prepared and converted to depth maps using VSP velocity function at well, U-1.

The top of S-I is identified and mapped accurately. The bottom could not mapped as the thickness is below resolution ($\lambda/4$ is 12.5) of the data set. An approximate thickness of S-I was prepared using amplitude attribute. S-III being too thin (6.25 m at U-1), its top could not be resolved by seismic data set. Therefore a horizon close to top of S-III was mapped using seismic data and subsequently corrected by incorporating well data for preparing depth map of SIII top

3-D seismic maps of coal seams S-I and S-III led to shifting of earlier proposed location (U-2) from disturbed zone to a suitable location (U-3) in the western part, where coal seams are also sufficiently thick. The depths and thickness of target coal seams predicted by 3-D seismic interpretation are close to those encountered in the well U-3, drilled subsequently.

This case study highlights the successful use of 3-D seismic in the selection of an appropriate area for UCG pilot project.