Heavy oil Reservoir Characterization by time-lapse seismic and Basins, rock physics in a cold production reservoir

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Abstract

Time-lapse (4D) seismic technology is a well-known and effective technique for reservoir monitoring. In this approach, 3D seismic acquisition is performed several times during the production period of a reservoir to monitor changes in the elastic properties of the subsurface. The interpreted changes are then attributed to changes in the reservoir, such as saturation and pressure, due to production effects. The acquisition and processing techniques used, along with the calibration processes, should be implemented carefully on the seismic baseline and monitor surveys to optimize and improve the repeatability of non-reservoir effects and consequently enhance the production-related anomalies in the reservoir. Time-lapse seismic inversion can also be applied to derive acoustic and shear impedance volumes. These volumes can be used to extract useful attributes to investigate elastic attribute changes in the heavy oil. Rock physics is a link between the well log and seismic data that can help in the interpretation of the results and also aid in performing pre-stack time-lapse inversion. In this study, all of above techniques are used in a heavy oil field which is produced by cold heavy oil production with the Sands (CHOPS) method.