

Increasing Oil Recovery in a Mature Oilfield Using Joint Seismic Waveform Classification and Neural-Network, Dakwah Field, Indonesia

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ABSTRACT

It is challenging to generate a continuous queue of high-oil cut infill wells in a very-mature water flood. In Dakwah field, most of the produced oil has come from high permeability sand intervals (more than one Darcy). Recovery from moderate to poor quality reservoir intervals (lower than 300 milidarcies) is lower, and thus offers a potential opportunity to target by-passed oil. This work is focused on the upper 212 sand (fining upward sequence), which has proven difficult to understand its characters, behaviors and delineation. Two horizontal wells were drilled in the late 1990s targeting this low-quality reservoir. One of the wells did not produce to expectations due to water coning problems. Look back analysis suggests the lateral section of the well missed low-quality reservoir target. To avoid drilling out of the low-quality section, we aim to optimize placing wells using high definition seismic waveform classification that identifies the uniqueness of a seismic trace feature (phase, amplitude and shape) and Neural Network to generate 3D pseudo log volume, in particular well log character. Using these techniques, we can deliver an initial reservoir characterization and delineation with a simpler and faster way. Starting with an optimization of the parameters selection, definition and compatibility of each parameter will be understandable and then selected. Then, specific well log character will be defined for each of the classification. After the reservoir delineation is made, laterally and vertically, an initial depositional system can be generated with an understanding of every classification characters. Furthermore, this result can be made as one of the supporting data for the next well candidate location. This presentation will give an overview of the workflow that we applied to derive the joint seismic waveform classification and neural network scheme, as well as examples, of potential future well placement.