Predicting Reservoir Facies Distribution in the Subsurface using an Artificial Neural Network: Hodgeman County, Kansas

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ABSTRACT

Bindley Field located in Hodgeman County, Kansas produces from Lower Meramecian carbonates from a combination structural-stratigraphic trap. Many other fields in the area produce from the same Bryozoan Dolomite facies, however, a lack of a depositional model makes predicting the distribution of the Bryozoan-rich reservoir facies problematic. This study relates wire-line data (Neutron/Density, Gamma Ray, Sonic, Induction, CMB) to depositional facies based upon petrologic description of cores within Bindley Field from previous work (Johnson 1994) to train a supervised Artificial Neural Network (ANN) to more accurately predict where the producing interval occurs within Bindley Field. The resulting ANN model was examined for accuracy by comparison to a blind well within Bindley Field which was not used to train the ANN. The validated ANN was applied to wells outside of Bindley Field for lithofacies prediction where core samples are not available. Facies distribution maps were prepared using these data, resulting in prediction of reservoir quality facies for data poor areas. Facies prediction based upon ANN software provides an exploration tool in areas where the stratigraphic distribution of reservoir facies is a control on hydrocarbon production.