

Utilization of Wire line logs for investigation of promising reservoir formations in Eastern Potwar, Punjab, Pakistan

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Abstract

The rock units drilled in the Turkwal Deep-01 Eastern Potwar are investigated in terms of reservoir characterization using well logs. The well data for this study was provided by Land Mark Resources (LMKR) with the approval of Directorate General of Petroleum Concessions (DGPC). Total depth of Turkwal deep-01 is 4300 m. The drilled rock units range in age from Pleistocene to Pre Cambrian. The Petrophysical characteristics investigated are Lithology, Volume of shale (Vsh), Density Porosity (Φ_D), Neutron Porosity (Φ_N), Sonic porosity (Φ_s), Effective Porosity (Φ_E), Water Saturation (Sw), Bulk density (ρ_b) and Bulk Volume of Water (BVW). The results of the analysis revealed the presence of different reservoir zones in eastern Potwar. The Chorgalli Formation tends to be possible major reservoir. The total thickness of Chorgalli is 52m. Chorgalli is composed of dolomitic limestone and shale. This formation has two major reservoir zones CH1 and CH2. CH1 is 10m thick with Vsh of 0-4%, Φ_E of 15-17% and Sw is 10-30%. CH2 is 8m thick with Vsh of 0-4%, Φ_E of 13-15% and Sw is 30-40%. BVW is ranging from 0.02-0.04 indicating vuggy to intercrystalline porosity. Sakessar formation is 90 meter thick comprising of limestone with clastic intercalations. It has three proven reservoir zones SK1, SK2 and SK3. SK1 is 3m thick with Vsh of 5-10%, Φ_E of 8-10% and Sw is 10-20%. SK2 is 4m thick with Vsh of 20-27%, Φ_E of 8-10% and Sw is 8-10%. SK3 is 3m thick with Vsh of 5-20%, Φ_E of 8-10% and Sw is 20-30%. BVW is ranging from 0.0-0.01 indicate porosity type which is vuggy to intercrystalline vuggy carbonate porosity. Warchha formation is 50m thick and it has four reservoir zones as follows. WC1 is 4m thick with Vsh of 20-35%, Φ_E of 8-12% and Sw is 30-40%. WC2 is 4m thick with Vsh of 20-35%, Φ_E of 8-12% and Sw is 30-40%. WC3 is 6m thick with Vsh of 20-35%, Φ_E of 9-15% and Sw is 30-45%. WC4 is 5m thick with Vsh of 20-35%, Φ_E of 8-12% and Sw is 30-40%. Dandot Formations is also 50m thick and having four reservoir zones. DN1 is 1m thick with Vsh of 20-32%, Φ_E of 8-10% and Sw is 40-60%. DN2 is 2m thick with Vsh of 30-35%, Φ_E of 13-19% and Sw is 40-50%. DN3 is 1m thick with Vsh of 25-30%, Φ_E of 11-17% and Sw is 30-40%. DN4 is 3m thick with Vsh of 25-35%, Φ_E of 11-17% and Sw is 40-50%.