

Variance in Reservoir Quality Due to Diagenesis: A Study from Tidal Deposits, Nyalau Formation, Sarawak, East Malaysia

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Prediction of reservoir quality become more challenging in terms of micro distribution of pore geometry. Here diagenesis play important role in determining the reservoir quality with better understanding. The main objective of this work is to study the diagenetic alteration in tidal sandstone deposits in Nyalau formation, Sarawak, East Malaysia. This has been done with traditional field sedimentology i.e macroscopic to microscopic (thin-section) with grain size analysis and porosity-permeability determination for 26 samples taken from the outcrops. Air

permeability tester was carried out for quantitative and qualitative analysis of permeability at different bedding. The flow rate and pressure were monitored as the results of the experiment. From the readings obtained by the TinyPerm2 machine convert to permeability by using formula as;

$$T = (-0.8206) \times \log_{10}K + 12.8737$$

where T = TinyPerm2 readings, K = Permeability

Represented outcrops from the study area show sedimentary features such as herringbone, cross-bedding, flaser, wavy and bioturbidite structures (Figure 1). The grain size of the outcrop mainly very fine to fine. In terms of petrography the porosity ranges from 15% to 35% where it proofs that the reservoir quality of the outcrop is good to very good and permeability of the sandstone facies is high ranges from 46.77 to 19136.69 mD (Figure 2). Petrography analysis of the samples showing the sorting of the grains are very poor to fair depending on type of the facies and a lot of quartz overgrowth indicating the diagenesis alteration affecting the reservoir quality. By integrating the results of these analysis it has been concluded from the tidal sandstone in Nyalau Formation is a good quality sandstone reservoir.

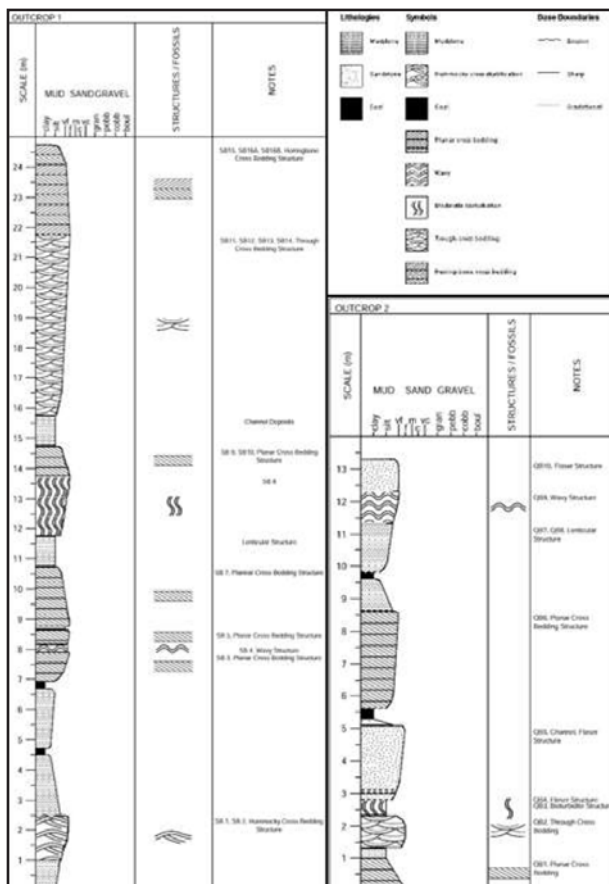


Figure 1: Sedimentary Log of Nyalau Formation (outcrop 1) with its sedimentary structures and grain size distribution.

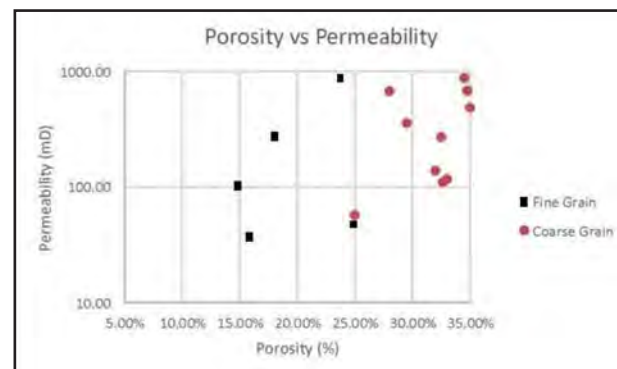


Figure 2: Porosity-permeability cross plot representing the fine grain and coarse grain distribution.