

Porosity and Permeability Study of the Mundu Formation Limestone Unit as a Potential Reservoir Rock in Gunung Pegat Area, Bojonegoro East Java

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Abstract

This research was conducted in the Gunung Pegat area, Babat District, Bojonegoro Regency, East Java. The geographical coordinates of the research location are from 7°7'31" to 7°8'11" South Latitude and 112°9'46" to 112°8'54" East Longitude. Geologically, it is part of the North East Java Basin and is composed of the Mundu Limestone Formation. The research location is one of the sites that shows an outcrop of the Mundu Formation, with limestone lithology that has the potential to be a target for hydrocarbon reservoir rock. The objective of the research is to study the porosity and permeability characteristics and to evaluate the potential of the limestone as a reservoir rock. The methods used include geological mapping, rock sampling, calcimetry analysis, petrographic analysis, and determination of porosity and permeability values. The results show that the geomorphological units of the research area are divided into anthropogenic, karstic, and fluvial landforms. The rock units at the research location are divided into a limestone unit and a fluvial unit; specifically, the limestone is classified as packstone and wackestone based on calcimetry and petrographic analysis. The stratigraphic sequence from the oldest to the youngest is the Miocene-aged Mundu Limestone Unit and the Holocene-aged Alluvial Unit. The average porosity value of the research area is 30.38%, which falls into the 'excellent' category, and the permeability value is 236.70 mD, which is classified as 'very good,' indicating that the research area has potential as a reservoir.

Keywords: porosity, permeability, reservoir, Mt. Pegat.

Abstrak.

Penelitian ini dilakukan di daerah Gunung Pegat, Kecamatan Babat, Kabupaten Bojonegoro, Jawa Timur. Koordinat lokasi penelitian secara geografis berada pada 7°7'31" hingga 7°8'11" LS dan 112°9'46" hingga 112°8'54" BT. Secara geologi termasuk ke dalam Cekungan Jawa Timur Utara dan tersusun oleh Satuan Batugamping Formasi Mundu. Lokasi penelitian merupakan salah satu lokasi yang menunjukkan singkapan Formasi Mundu dengan litologi batugamping sebagai target batuan reservoir hidrokarbon. Tujuan penelitian untuk mengkaji karakteristik porositas dan permeabilitas serta mengevaluasi potensi batugamping tersebut sebagai batuan reservoir. Metode yang digunakan meliputi pemetaan geologi, sampling batuan, analisis kalsimetri, analisis petrografi, dan nilai porositas dan permeabilitas. Hasil penelitian menunjukkan bahwa satuan geomorfologi daerah penelitian dibagi menjadi bentuk lahan antropogenik, karst, dan fluvial. Satuan batuan pada lokasi penelitian dibagi menjadi satuan batugamping dan satuan fluvial yang secara spesifik batugamping diklasifikasikan menjadi packstone, dan wackestone berdasarkan analisis kalsimetri dan petrografi. Susunan stratigrafi dari yang paling tua ke yang paling muda yaitu Satuan Batugamping Mundu yang berumur Miosen dan Satuan Aluvial yang berumur Holosen. Nilai porositas rata-rata daerah penelitian 30.38% yang termasuk kedalam kategori istimewa dan nilai permeabilitas 236.70mD yang masuk dalam klasifikasi sangat baik menunjukkan daerah penelitian memiliki potensi sebagai reservoir hidrokarbon.

Kata kunci: porositas, permeabilitas, reservoir, G.Pegat.