

ABSTRAK

IDENTIFIKASI POTENSI ZONA PROSPEK HIDROKARBON BERDASARKAN ANALISIS PETROFISIKA PADA LAPANGAN “ZA”, FORMASI NGIMBANG KLASTIK, CEKUNGAN JAWA TIMUR UTARA

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Formasi Ngimbang Klastik berumur Eosen Akhir di Cekungan Jawa Timur Utara, tersusun atas batupasir, batulempung, dan batubara yang berperan sebagai reservoir sekunder minyak dan gas bumi. Penelitian ini, dilakukan untuk mengetahui pemahaman karakteristik petrofisika dalam mengidentifikasi zona prospek hidrokarbon secara lebih akurat, guna mendukung efisiensi eksplorasi dan pengembangan lapangan migas di wilayah tersebut. Penelitian di Lapangan “ZA”, memfokuskan analisis petrofisika untuk menentukan parameter reservoir dan mengidentifikasi zona prospek hidrokarbon melalui interpretasi data log sumur dan korelasi stratigrafi. Metode yang digunakan, yaitu analisis kualitatif dan kuantitatif. Analisis kualitatif dilakukan dengan menggunakan data *wireline log*, *mudlog*, deskripsi *core* dan biostratigrafi untuk interpretasi litologi, elektrofases, dan lingkungan pengendapan. Analisis kuantitatif menggunakan data *well report* untuk menghitung volume *shale* (V_{sh}), porositas (Φ), saturasi air (S_w), dan permeabilitas (K), serta menentukan nilai *cut-off* dan *lumping*. Hasil Penelitian untuk 6 sumur (ZA-2 hingga ZMA-1) pada Formasi Ngimbang Klastik menunjukkan bahwa litologi didominasi batupasir, batulempung, dan batubara dengan fasies utama *tributary channel*, *floodplain* dan *point bar*. Secara umum, fasies *tributary channel* memiliki nilai rata-rata porositas efektif sebesar 20–25%, saturasi air 20–35%, dan permeabilitas 100–1300 mD, sedangkan fasies *Point Bar* menunjukkan porositas efektif sekitar 21–24%, saturasi air 30–48%, dan permeabilitas 280–700 mD. Kedua fasies ini, masih tergolong dalam klasifikasi reservoir baik hingga sangat baik menurut Koesoemadinata (1980). Meskipun, secara geologi fasies *tributary channel* memiliki porositas lebih tinggi, pada Sumur ZA-2 dan ZA-3 fasies *point bar* menunjukkan nilai porositas lebih besar akibat kondisi pengendapan lokal yang berenergi lebih rendah dengan pemadatan dan sementasi minimal. Hasil ini, menunjukkan bahwa variasi kualitas reservoir dipengaruhi oleh perbedaan fasies dan kondisi geologi lokal.

Kata kunci: Cekungan Jawa Timur Utara, Formasi Ngimbang Klastik, Fasies, Hidrokarbon, Petrofisika.

ABSTRACT

IDENTIFICATION OF HYDROCARBON PROSPECTIVE ZONE POTENTIAL BASED ON PETROPHYSICAL ANALYSIS IN THE “ZA” FIELD, NGIMBANG CLASTIC FORMATION, NORTH EAST JAVA BASIN

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The Ngimbang Clastic Formation, dated to the Late Eocene in the North East Java Basin, consists of sandstone, shale, and coal, which act as secondary reservoirs for oil and gas. This study aims to understand the petrophysical characteristics to accurately identify potential hydrocarbon zones, thereby supporting efficient exploration and field development in the area. Research in the “ZA” Field, focuses on petrophysical analysis to determine reservoir parameters and identify prospective hydrocarbon zones through well log interpretation and stratigraphic correlation. The methods used include both qualitative and quantitative analyses. The qualitative analysis was conducted using wireline log, mud log, core description, and biostratigraphy data to interpret lithology, electrofacies, and depositional environment. The quantitative analysis used well report data to calculate volume of shale (V_{sh}), porosity (Φ), water saturation (S_w), and permeability (K), as well as to determine cut-off values and lumping. The results from six wells (ZA-2 to ZMA-1) within the Ngimbang Clastic Formation show that the lithology is dominated by sandstone, shale, and coal, with the main facies being distributary channel, floodplain, and point bar. Generally, the distributary channel facies has an average effective porosity of 20–25%, water saturation of 20–35%, and permeability of 100–1300 mD, while the point bar facies shows effective porosity of 21–24%, water saturation of 30–48%, and permeability of 280–700 mD. Both facies are classified as good to very good reservoirs according to Koesoemadinata (1980). Although, geologically, the distributary channel facies typically exhibits higher porosity, in wells ZA-2 and ZA-3, the point bar facies shows greater porosity due to local depositional conditions with lower energy, resulting in minimal compaction and cementation. These findings indicate that variations in reservoir quality are influenced by differences in facies type and local geological conditions

Keywords: *Facies, Hydrocarbon, Ngimbang Clastic Formation, North East Java Basin, Petrophysics.*