

ABSTRAK

PENENTUAN ZONA PROSPEK HIDROKARBON BERDASARKAN ANALISIS PETROFISIKA LAPANGAN JEE, FORMASI BANGKO, BEKASAP, MENGKALA, CEKUNGAN SUMATRA TENGAH

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Formasi Bangko, Bekasap, dan Mengkala pada Lapangan JEE di Cekungan Sumatra Tengah merupakan sistem pengendapan yang dipengaruhi pasang surut dan menghasilkan variasi fasies serta karakteristik reservoir yang kompleks. Variasi karakteristik tersebut memengaruhi kualitas reservoir dan distribusi hidrokarbon, sehingga diperlukan pemahaman mengenai hubungan antara fasies dan karakteristik petrofisika untuk mengidentifikasi zona prospek hidrokarbon. Penelitian ini bertujuan untuk mengidentifikasi lingkungan pengendapan, karakteristik petrofisika, serta menentukan zona prospek hidrokarbon melalui integrasi data *wireline log* dan *core*. Penelitian ini menggunakan metode kualitatif dan kuantitatif. Metode kualitatif meliputi interpretasi litologi, elektrofases, fasies, lingkungan pengendapan dan interpretasi sikuen stratigrafi. Metode kuantitatif dilakukan melalui perhitungan parameter petrofisika yang meliputi *volume shale*, porositas, permeabilitas, dan saturasi air untuk mengevaluasi kualitas reservoir dan menentukan zona prospek hidrokarbon. Hasil penelitian menunjukkan bahwa lingkungan pengendapan berkembang pada *tidal sand ridge* bagian subtidal yang terdiri atas tiga asosiasi fasies utama, yaitu *tidal ridge axis*, *tidal ridge off-axis*, dan *tidal ridge fringe*. Analisis petrofisika menunjukkan bahwa. Formasi Bekasap memiliki volume shale 0,1–0,25 v/v, porositas efektif 0,15–0,25 v/v, permeabilitas 49–2700 mD, dan saturasi air 0,4–0,8 v/v, Formasi Bangko memiliki volume shale 0,2–0,3 v/v, porositas efektif 0,19–0,26 v/v, permeabilitas 30–2300 mD, dan saturasi air 0,6–0,82 v/v sedangkan Formasi Mengkala memiliki volume shale 0,1–0,2 v/v, porositas efektif 0,16–0,36 v/v, permeabilitas 46–2600 mD, dan saturasi air 0,5–0,75 v/v. Zona prospek hidrokarbon berkembang pada interval reservoir yang didominasi oleh *fasies tidal ridge axis* dan *tidal ridge off-axis* dengan karakteristik reservoir yang relatif lebih baik, sehingga diinterpretasikan sebagai zona prospek hidrokarbon utama pada daerah penelitian.

Kata kunci : fasies, hidrokarbon, petrofisika, Cekungan Sumatra, *tidal sand ridge*

ABSTRACT

DETERMINATION OF PROSPECTIVE HYDROCARBON ZONES BASED ON PETROPHYSICAL ANALYSIS IN THE JEE FIELD, BANGKO, BEKASAP, AND MENGGALA FORMATIONS, CENTRAL SUMATRA BASIN

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The Bangko, Bekasap, and Menggala Formations in the JEE Field, Central Sumatra Basin, represent a tide-dominated depositional system characterized by complex facies variability and reservoir heterogeneity. These variations significantly influence reservoir quality and hydrocarbon distribution, highlighting the need to understand the relationship between depositional facies and petrophysical characteristics for hydrocarbon prospect identification. This study aims to determine the depositional environment, evaluate petrophysical characteristics, and identify hydrocarbon prospect zones through the integration of wireline log and core data. The study employed both qualitative and quantitative approaches. Qualitative analyses included lithological interpretation, electrofacies analysis, facies analysis, depositional environment interpretation, and sequence stratigraphic interpretation. Quantitative analyses involved the calculation of petrophysical parameters, including shale volume, effective porosity, permeability, and water saturation, to evaluate reservoir quality and identify hydrocarbon prospect zones. The results indicate that the depositional environment developed within a subtidal tidal sand ridge setting, consisting of three principal facies associations: tidal ridge axis, tidal ridge off-axis, and tidal ridge fringe. Petrophysical evaluation indicates that the Bekasap Formation has a shale volume of 0.10–0.25 v/v, an effective porosity of 0.15–0.25 v/v, a permeability of 49–2700 mD, and a water saturation of 0.40–0.80 v/v. The Bangko Formation exhibits a shale volume of 0.20–0.30 v/v, effective porosity of 0.19–0.26 v/v, permeability of 30–2300 mD, and water saturation of 0.60–0.82 v/v. Meanwhile, the Menggala Formation is characterized by a shale volume of 0.10–0.20 v/v, effective porosity of 0.16–0.36 v/v, permeability of 46–2600 mD, and water saturation of 0.50–0.75 v/v. Hydrocarbon prospect zones occur within reservoir intervals dominated by the tidal ridge axis and tidal ridge off-axis facies associations, which exhibit relatively superior reservoir characteristics and are therefore interpreted as the primary hydrocarbon prospect zones in the study area.

Keywords : *facies, hydrocarbon, petrophysical, Sumatra Basin, tidal sand ridge*