ABSTRAK

STUDI KARAKTERISTIK RESERVOAR DAN IDENTIFIKASI ZONA PROSPEK HIDROKARBON BERDASARKAN ANALISIS PETROFISIKA DI LAPANGAN “SF”, FORMASI LAKAT, CEKUNGAN SUMATRA TENGAH

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Indonesia memiliki potensi hidrokarbon yang besar, namun produksi minyak dan gas bumi terus menurun akibat kondisi lapangan yang telah memasuki fase matang. Formasi Lakat pada Cekungan Sumatra Tengah menjadi target eksplorasi yang menjanjikan, namun heterogenitas litologi yang tinggi menyebabkan pemetaan zona prospek hidrokarbon di Lapangan "SF" sulit dilakukan secara konvensional. Penelitian ini bertujuan mengarakterisasi reservoir dan mengidentifikasi zona prospek hidrokarbon menggunakan metode analisis kualitatif dan kuantitatif. Analisis kualitatif meliputi identifikasi litologi, interpretasi elektrofasies, penentuan lingkungan pengendapan, dan korelasi antarsumur, sedangkan analisis kuantitatif menggunakan perangkat lunak *Interactive Petrophysics* 2018 untuk menghitung *volume clay* (Vcl), porositas efektif (PHIE), saturasi air (Sw), dan permeabilitas (K) berdasarkan data *wireline log* dan *core* pada tiga sumur penelitian. Hasil penelitian menunjukkan litologi yang berkembang berupa batupasir dan serpih dengan lingkungan pengendapan *tide-dominated estuarine*. Sumur Tan-3 menunjukkan delapan asosiasi fasies, Tan-7 enam asosiasi fasies, dan Tan-2 tiga asosiasi fasies, yang mencerminkan variasi posisi lateral masing-masing sumur dalam sistem estuari. Nilai petrofisika pada zona reservoir menunjukkan Vcl berkisar 0,142–0,467, porositas efektif berkisar 0,112–0,192, saturasi air berkisar 0,296–0,554, dan permeabilitas berkisar 4,561–214,456 mD. Zona prospek hidrokarbon utama teridentifikasi pada fasies *tidal fluvial channel* sumur Tan-3 dengan *net pay* 17 ft dan permeabilitas rata-rata 214,456 mD, fasies *tidal fluvial channel* sumur Tan-7 dengan *net pay* 8 ft, serta fasies *mixed flat* sumur Tan-2 dengan *net pay* 25 ft.

Kata Kunci : Analisis Petrofisika, Cekungan Sumatra Tengah, Formasi Lakat, Reservoir, Hidrokarbon

ABSTRACT

A STUDY OF RESERVOIR CHARACTERISTICS AND IDENTIFICATION OF HYDROCARBON PROSPECT ZONES BASED ON PETROPHYSICAL ANALYSIS IN THE "SF" FIELD, LAKAT FORMATION, CENTRAL SUMATERA BASIN

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Indonesia has significant hydrocarbon potential, but oil and gas production continues to decline due to mature field conditions. The Lakat Formation in the Central Sumatra Basin is a promising exploration target, but its high lithological heterogeneity makes conventional mapping of hydrocarbon prospect zones in the "SF" Field difficult. This study aims to characterize the reservoir and identify hydrocarbon prospect zones using qualitative and quantitative analysis methods. Qualitative analysis includes lithology identification, electrofacies interpretation, depositional environment determination, and inter-well correlation, while quantitative analysis uses Interactive Petrophysics 2018 software to calculate clay volume (Vcl), effective porosity (PHIE), water saturation (Sw), and permeability (K) based on wireline log and core data from three research wells. The results show that the developed lithology consists of sandstone and shale with a tide-dominated estuarine depositional environment. Tan-3 shows eight facies associations, Tan-7 shows six facies associations, and Tan-2 shows three facies associations, reflecting variations in the lateral position of each well within the estuarine system. Petrophysical values in the reservoir zone indicate Vcl ranging from 0.142–0.467, effective porosity ranging from 0.112–0.192, water saturation ranging from 0.296–0.554, and permeability ranging from 4.561–214.456 mD. The main hydrocarbon prospect zones are identified in the tidal fluvial channel facies of Tan-3 with a net pay of 17 ft and average permeability of 214.456 mD, the tidal fluvial channel facies of Tan-7 with a net pay of 8 ft, and the mixed flat facies of Tan-2 with a net pay of 25 ft.

Keywords : Petrophysical Analysis, Central Sumatra Basin, Lakat Formation, Reservoir, Hydrocarbon