ABSTRAK

KORELASI BATUAN INDUK – BATUAN INDUK FORMASI PRE-NGIMBANG DAN NGIMBANG BERDASARKAN DATA GEOKIMIA ORGANIK, LAPANGAN "GPM", CEKUNGAN JAWA TIMUR UTARA

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Formasi pre-Ngimbang dan Formasi Ngimbang merupakan batuan induk utama pada sistem petroleum Cekungan Jawa Timur Utara yang berperan penting dalam pembentukan hidrokarbon. Namun, kajian mengenai korelasi antar batuan induk berdasarkan integrasi data geokimia organik, biostratigrafi, dan isotop karbon masih relatif terbatas. Penelitian ini bertujuan untuk menentukan karakteristik batuan induk Formasi pre-Ngimbang dan Formasi Ngimbang serta mengevaluasi korelasi antar batuan induk pada Sumur GIT-1, GIT-3, dan GIT-5 di Lapangan GPM, Cekungan Jawa Timur Utara. Metode yang digunakan meliputi analisis litostratigrafi, biostratigrafi, *Rock-Eval Pyrolysis, vitrinite reflectance* (%Ro), Tmax, dan isotop karbon ($\delta^{13}C$).

Hasil penelitian menunjukkan bahwa interval penelitian tersusun atas batulempung karbonan, batulanau, batupasir, dan sisipan batubara yang diendapkan dalam lingkungan transisional. Formasi pre-Ngimbang berumur Paleosen berdasarkan keberadaan *Dicolpopollis malesianus*, sedangkan Formasi Ngimbang berumur Eosen Akhir (zona P15) yang dicirikan oleh *Turborotalia cerroazulensis*, *Turborotalia centralis*, *Globigerinatheka tropicalis*, *Globigerinatheka semiinvoluta*, *Hantkenina alabamensis*, *Pseudohastigerina micra*, dan *Cribrohantkenina inflata*. Analisis geokimia menunjukkan dominasi kerogen tipe III dengan kecenderungan menghasilkan gas (*gas-prone*). Nilai %Ro berkisar 0,39–0,59%, Tmax 423–446 °C, dan $\delta^{13}C$ −28,66‰ hingga −26‰ yang mengindikasikan dominasi material organik darat dengan pengaruh lingkungan transisional. Integrasi data litostratigrafi, biostratigrafi, geokimia organik, dan isotop karbon menunjukkan kesamaan karakter antar sumur sehingga batuan induk Formasi pre-Ngimbang dan Ngimbang pada Sumur GIT-1, GIT-3, dan GIT-5 dapat dikorelasikan dengan baik. Kesamaan karakter litostratigrafi, biostratigrafi, dan geokimia menunjukkan bahwa ketiga sumur berkembang dalam sistem pengendapan yang saling berhubungan dan memiliki karakter geokimia yang konsisten sebagai batuan induk hidrokarbon.

Kata kunci: batuan induk, Pre-Ngimbang-Ngimbang, geokimia, isotop karbon, korelasi

ABSTRACT

SOURCE ROCK–SOURCE ROCK CORRELATION PRE-NGIMBANG AND NGIMBANG FORMATION BASED ON ORGANIC GEOCHEMICAL DATA, "GPM" FIELD, NORTH EAST JAVA BASIN

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The pre-Ngimbang and Ngimbang Formations constitute the principal source rocks within the petroleum system of the North East Java Basin and play a significant role in hydrocarbon generation. However, studies focusing on source rock-to-source rock correlation by integrating organic geochemical, biostratigraphic, and carbon-isotope data remain relatively limited. This study aims to determine the source rock characteristics of the pre-Ngimbang and Ngimbang Formations and to evaluate correlations among source rocks in the GIT-1, GIT-3, and GIT-5 wells of the GPM Field, North East Java Basin. The methodology employed includes lithostratigraphic, biostratigraphic, Rock-Eval Pyrolysis, vitrinite reflectance (%Ro), Tmax, and carbon isotope ($\delta^{13}C$) analyses.

The results indicate that the studied intervals are composed of carbonaceous shale, siltstone, sandstone, and coal interbeds deposited in a transitional environment. The pre-Ngimbang Formation is interpreted to be Paleocene in age based on the occurrence of Dicolpopollis malesianus. In contrast, the Ngimbang Formation is assigned to the Late Eocene (P15–P17 Zone), characterized by the presence of Turborotalia cerroazulensis, Turborotalia centralis, Globigerinatheka tropicalis, Globigerinatheka semiinvoluta, Hantkenina alabamensis, Pseudohastigerina micra, and Cribrohantkenina inflata. Geochemical analysis reveals a predominance of Type III kerogen with a gas-prone hydrocarbon generation potential. The %Ro values range from 0.39% to 0.59%, Tmax values from 423°C to 446°C, and $\delta^{13}C$ values from −28.66‰ to −26‰, indicating a predominance of terrestrial organic matter with a transitional environmental influence. The integration of lithostratigraphic, biostratigraphic, organic geochemical, and carbon-isotope data demonstrates consistent characteristics across the wells, indicating that the pre-Ngimbang and Ngimbang source rocks in the GIT-1, GIT-3, and GIT-5 wells can be correlated with a high degree of confidence. These similarities suggest that the three wells developed within a genetically related depositional system and possess consistent geochemical characteristics as hydrocarbon source rocks.

Keywords: carbon isotope, correlation, geochemistry, Ngimbang, pre-Ngimbang Formation, source rock.