

INTISARI

Indonesia merupakan salah satu negara yang mengandalkan minyak dan gas bumi sebagai sumber energi utama. Meningkatnya kebutuhan energi, terutama pada minyak dan gas akan mengakibatkan cadangan semakin berkurang. Penelitian ini bertujuan untuk menemukan lapisan potensial hidrokarbon, serta evaluasi parameter petrofisika pada Formasi Keutapang, khususnya interval *Upper* dan *Lower Keutapang* di lapangan IHM, Cekungan Sumatera Utara. Data utama yang digunakan berupa data log sumur, meliputi log *gamma ray*, densitas, neutron, dan resistivitas dari empat sumur penelitian. Metodologi penelitian mencakup analisis litofasies dan *clustering* berbasis log *gamma ray*, serta identifikasi lapisan hidrokarbon secara kualitatif dan perhitungan parameter petrofisika secara kuantitatif. Parameter yang dianalisis meliputi volume serpih, porositas total dan porositas efektif, saturasi air (S_w), serta permeabilitas. Identifikasi zona reservoir dan zona *pay* dilakukan melalui penentuan nilai *cut-off* petrofisika yang diperoleh dari analisis crossplot dan distribusi log. Hasil penelitian menunjukkan bahwa Formasi Keutapang di lapangan IHM didominasi oleh serpih dengan perselingan batupasir dan sisipan batulanau. Interval potensial hidrokarbon ditentukan berdasarkan nilai *cut-off* yang memenuhi kriteria *pay* serta adanya *crossover* antara log densitas dan neutron. Pada interval *Upper Keutapang*, teridentifikasi tiga lapisan potensial, yaitu AKA_40 pada sumur Charlie, serta AKA_68 dan AKA_66 pada sumur Delta. Sementara itu, interval *Lower Keutapang* memiliki tiga lapisan potensial, yaitu LOKA_76 pada sumur Alpha, serta LOKA_87 dan LOKA_69 pada sumur Delta. Secara kuantitatif, interval *Upper Keutapang* memiliki nilai volume serpih sebesar 3–28%, porositas total 18–32%, porositas efektif 11–27%, saturasi air 57–76%, dan permeabilitas 1.156–281.126 mD. Interval *Lower Keutapang* menunjukkan nilai volume serpih 4–24%, porositas total 13–30%, porositas efektif 9–24%, saturasi air 49–78%, serta permeabilitas 2–141 mD. Berdasarkan hasil tersebut, dapat disimpulkan bahwa Formasi Keutapang di Lapangan IHM memiliki potensi reservoir yang cukup baik pada interval dan lapisan tertentu, sehingga layak untuk dipertimbangkan pada tahap pengembangan selanjutnya.

Kata kunci: Petrofisika, Formasi Keutapang, Interval *Upper* dan *Lower Keutapang*, Potensial Reservoir, Analisis Data Log.

ABSTRACT

Indonesia is one of the countries that relies on oil and gas as its primary energy sources. The increasing demand for energy, particularly oil and gas, has led to a gradual depletion of reserves. This study aims to identify potential hydrocarbon-bearing layers and to evaluate petrophysical parameters of the Keutapang Formation, specifically the Upper and Lower Keutapang intervals in the IHM Field, North Sumatra Basin. The primary data used in this study consist of well log data, including gamma ray, density, neutron, and resistivity logs from four wells. The research methodology includes lithofacies analysis and gamma ray-based clustering, qualitative identification of hydrocarbon-bearing layers, and quantitative calculation of petrophysical parameters. The analyzed parameters include shale volume, total and effective porosity, water saturation (S_w), and permeability. Reservoir and pay zone identification were conducted by determining petrophysical cut-off values derived from cross plot analysis and log distribution analysis. The results indicate that the Keutapang Formation in the IHM Field is predominantly composed of shale with interbedded sandstone and siltstone layers. Potential hydrocarbon intervals were determined based on cut-off values that meet pay criteria and the presence of density–neutron log crossover. In the Upper Keutapang interval, three potential layers were identified, namely AKA_40 in the Charlie well, as well as AKA_68 and AKA_66 in the Delta well. Meanwhile, the Lower Keutapang interval contains three potential layers, namely LOKA_76 in the Alpha well, and LOKA_87 and LOKA_69 in the Delta well. Quantitatively, the Upper Keutapang interval exhibits shale volume values ranging from 3–28%, total porosity of 18–32%, effective porosity of 11–27%, water saturation of 57–76%, and permeability ranging from 1.156 to 281.126 mD. The Lower Keutapang interval shows shale volume values of 4–24%, total porosity of 13–30%, effective porosity of 9–24%, water saturation of 49–78%, and permeability ranging from 2 to 141 mD. Based on these results, it can be concluded that the Keutapang Formation in the IHM Field has good reservoir potential in certain intervals and layers, making it worthy of consideration for further development stages.

Keywords: *Petrophysics, Keutapang Formation, Upper and Lower Interval, Reservoir Potential, Well Log Analysis.*