

INTISARI

PENGUNAAN METODE *VOLUMETRIC ANALYSIS* (VOLAN) DALAM ANALISIS PETROFISIKA BATUPASIR GLAUKONITIK, RESERVOIR “FA”, KELOMPOK SIHAPAS, CEKUNGAN SUMATRA TENGAH

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Analisis petrofisika reservoir batupasir “FA”, Kelompok Sihapas, Cekungan Sumatra Tengah dilaksanakan di PT. Chevron Pasific Indonesia. Laporan stratigrafi menyebutkan bahwa litologi reservoir “FA” didominasi oleh batupasir glaukonitik dan lapisan tipis batuan padat (*tight rock*). Kondisi litologi tersebut melatarbelakangi penggunaan metode *Volumetric analysis* (Volan) yang menggunakan gambar silang log neutron dan log densitas dalam evaluasi formasi. Metode Volan berbeda dengan metode konvensional. Metode konvensional menggunakan beberapa persamaan dalam evaluasi formasi dan menghitung volume serpih menggunakan persamaan linear log sinar gamma. Ketiadaan parameter untuk menghitung saturasi air dari data laboratorium juga menjadi permasalahan dalam penelitian, sehingga tujuan dari penelitian adalah: (1) melakukan analisis petrofisika yang lebih akurat dan optimis untuk reservoir “FA” dibandingkan dengan hasil dari metode konvensional; (2) melakukan evaluasi reservoir “FA” melalui perhitungan volume serpih, porositas, dan saturasi menggunakan metode dan parameter baru yang lebih tepat; dan (3) menghitung dan memetakan interval ekonomis pada reservoir “FA” secara lateral untuk interpretasi pola penyebaran hidrokarbon secara kualitatif.

Evaluasi reservoir dilakukan dengan metode Volan, di mana saturasi air batupasir dihitung menggunakan persamaan Simandoux termodifikasi. Hasil rekonstruksi metode konvensional digunakan untuk perbandingan dan kontrol kualitas hasil penelitian metode Volan. Zona *net pay* ditentukan melalui kalkulasi *fractional flow*.

Keakuratan hasil dengan Metode Volan dibuktikan dari hubungan volume serpih, porositas total, porositas efektif, dan porositas batupasir. Hasil yang lebih optimis ditunjukkan dengan penurunan total rata-rata volume serpih sebesar 14% dan kenaikan total rata-rata porositas efektif sebesar 5% dibandingkan hasil metode konvensional. Ketepatan perhitungan saturasi air divalidasi oleh data inti batuan dengan parameter baru $a = 1$; $m = 1,6317$; $n = 1,9187$; R_w dari *picket plot* = 0,54 Ωm pada 77°F; dan $R_{sh} = 4,575 \Omega m$. Interval ekonomis ditentukan dengan nilai *cut-off* volume serpih 65%, *cut-off* porositas efektif 8%, dan *cut-off* saturasi air total pada 64%. Zona *net pay* terdeteksi pada 223 dari 302 sumur.

Kata kunci : Glaukonit, batuan padat, metode Volan, metode konvensional, zona *net pay*.

ABSTRACT

APPLICATION OF VOLUMETRIC ANALYSIS (VOLAN) METHOD IN GLAUCONITIC SANDSTONE PETROPHYSICAL ANALYSIS, “FA” RESERVOIR, SIHAPAS GROUP, CENTRAL SUMATRA BASIN

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Petrophysical analysis of “FA” sandstone reservoir, Sihapas Group, Central Sumatra basin had conducted in PT. Chevron Pacific Indonesia. The stratigraphy report gives information about the existence of glauconitic sandstone and thin bed tight rock as the dominant lithology in “FA” reservoir. These lithology conditions become the background why volumetric analysis (Volan) method is applied. Volan method uses neutron log and density log crossplot in the formation evaluation. This method is different from the conventional method. Conventional method uses gamma ray linear equation for shale volume calculation. The absence of parameters from laboratory data to determine water saturation is also becomes a problem in this research. In order to solve those problems, this research goes to 3 goals which are: (1) doing the petrophysical analysis that is more precise and gives more optimism result for “FA” reservoir as compared to the conventional method result; (2) evaluating the “FA” reservoir through the determination of shale volume, porosity, and saturation which is evaluated using new appropriate method and new parameters; (3) doing calculation and lateral mapping of “FA” reservoir economic interval to get qualitative interpretation of hydrocarbon distribution.

Reservoir evaluation is done by Volan method. In the other hand, sandstone water saturation is determined using modified Simandoux equation. The conventional method reconstruction results are used as comparison and quality control for the result from Volan method. Net pay zone is determined through fractional flow calculation.

The Volan method results better in precision that are proven by the relation between shale volume, total porosity, effective porosity, and sandstone porosity. The more optimism results are showed by the decreasing of total average shale volume to 14% and increasing of the total average effective porosity to 5% if it is compared with conventional method result. The accuracy of water saturation determination using new parameter ($a=1$, $m=1.6317$, $n=1.9187$, R_w from picket plot = $0.54 \Omega m$ at $77^{\circ}F$, and $R_{sh} = 4.575 \Omega m$) is validated by core data. Economic intervals are defined by the shale volume cut-off at 65%, effective porosity cut-off at 8%, and total water saturation cut-off at 64%. Net pay zone are detected at 223 of 302 wells.

Keywords: Glauconite, tight rock, Volan method, conventional method, net pay zone.