

## ABSTRAK

### PERENCANAAN STIMULASI *ACID FRACTURING* PADA SUMUR PS-ST2 LAPANGAN FENESIA DALAM OPTIMASI PENINGKATAN LAJU PRODUKSI MINYAK

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Sumur PS-ST2 di Lapangan FENESIA, Cekungan Jawa Timur Utara, merupakan sumur eksploitasi pada formasi karbonat *limestone* yang mengalami penurunan produksi signifikan dari 22 BOPD menjadi 2.96 BOPD dalam waktu kurang dari dua minggu. Penurunan ini disebabkan oleh rendahnya permeabilitas formasi (2.25 mD) dan terbentuknya *skin factor* positif (+2.75) yang menghambat aliran fluida dari reservoir ke lubang sumur. Untuk mengatasi masalah tersebut, dipilih metode *acid fracturing* yang efektif membentuk rekahan buatan dan melarutkan dinding batuan karbonat sehingga memperbesar jalur aliran fluida.

Penelitian menggunakan pendekatan analisis kualitatif dan kuantitatif. Analisis kualitatif meliputi studi literatur, interpretasi data log, dan analisis petrofisik. Analisis kuantitatif mencakup pengolahan data reservoir, produksi, sumur dan pompa, serta geomekanika batuan. Tahapan penelitian meliputi pengumpulan data geologi, reservoir, produksi, mekanika batuan, dan injeksi; perencanaan komposisi fluida, geometri rekahan, volume fluida, desain operasi; dan analisis hasil desain dengan perhitungan Excel serta perangkat lunak MFrac untuk mengevaluasi *fracture conductivity*, *Fracture Conductivity Dimensionless* (FCD), dan produktivitas melalui *Productivity Index* (PI) serta *Inflow Performance Relationship* (IPR).

Hasil penelitian menunjukkan *acid fracturing* berhasil meningkatkan permeabilitas efektif formasi. Desain rekahan PKN menghasilkan panjang rekahan 206.4415 ft, permeabilitas rekahan 93.2481 mD, permeabilitas rata-rata 25.6136 mD, *fracture conductivity* 19500.1079 mD-ft, dan FCD sebesar 37.04 untuk metode PKN dan 39.36 untuk FCD rata-rata dengan MFrac. Nilai PI meningkat masing-masing 5.8; 4.47; dan 5.63 (metode McGuire & Sikora, Michael Prats, Cinco-Ley), sementara produksi minyak naik 463.6 % dari 22.00 BOPD menjadi 124 BOPD. *Skin factor* menurun menjadi -6.31, menandakan perbaikan signifikan pada formasi.

Kata kunci: *acid fracturing*, FCD, *fracture conductivity*, *Productivity Index*, *skin factor*,

## **ABSTRACT**

### **ACID FRACTURING STIMULATION DESIGN FOR WELL PS-ST2 IN FENESIA FIELD TO OPTIMIZE OIL PRODUCTION RATE**

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*The PS-ST2 well in the FENESIA Field, Northeast Java Basin, is a production well in a limestone carbonate formation that experienced a significant production decline from 22 BOPD to 2.96 BOPD in less than two weeks. This decline was caused by the low formation permeability (2.25 mD) and the development of a positive skin factor (+2.75), which hindered fluid flow from the reservoir to the wellbore. To address this issue, the acid fracturing method was selected, as it effectively creates artificial fractures and dissolves carbonate rock walls, thereby enlarging the fluid flow pathways.*

*The research employed both qualitative and quantitative approaches. The qualitative analysis included literature studies, log data interpretation, and petrophysical analysis. The quantitative analysis covered reservoir, production, well, pump, and rock geomechanics data processing. The research stages included collecting geological, reservoir, production, rock mechanics, and injection data; planning fluid composition, fracture geometry, fluid volume, and operation design; and analyzing the design results using Excel calculations and MFract software to evaluate fracture conductivity, Fracture Conductivity Dimensionless (FCD), and productivity through Productivity Index (PI) and Inflow Performance Relationship (IPR).*

*The results showed that acid fracturing successfully increased the effective formation permeability. The PKN fracture design produced a fracture length of 206.4415 ft, fracture permeability of 93.2481 mD, average permeability of 25.6136 mD, fracture conductivity of 19500.1079 mD-ft, and an FCD of 37.0424 for the PKN method and 39.36 for the average FCD using MFract. PI values increased to 5.8, 4.4708, and 5.6374 (McGuire & Sikora, Michael Prats, and Cinco-Ley methods, respectively), while oil production rose by 463.6 % from 22.00 BOPD to 124 BOPD. The skin factor decreased to -6.31, indicating a significant improvement in formation performance.*

*Keywords: acid fracturing, FCD, fracture conductivity, productivity index, skin factor*