

ABSTRAK

PERENCANAAN STIMULASI *HYDRAULIC FRACTURING* UNTUK OPTIMASI PRODUKSI PADA *LOW QUALITY* *RESERVOIR (LQR)* SUMUR “RYN” LAPANGAN “RRI”

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Sumur RYN pada Lapangan RRI merupakan sumur *infill* yang direncanakan untuk mengembangkan potensi hidrokarbon pada Lapisan R-28B Formasi *Sandstone Main/Upper Cibulakan* yang termasuk kategori *low quality reservoir (LQR)* dengan permeabilitas sebesar 10 mD. Nilai permeabilitas rendah menyebabkan kemampuan alir fluida reservoir terbatas sehingga produktivitas alami sumur menjadi rendah dan memerlukan metode stimulasi untuk meningkatkan performa produksi. Penelitian ini bertujuan merencanakan stimulasi *hydraulic fracturing* yang optimum untuk meningkatkan produktivitas Sumur RYN serta membandingkan potensinya dengan metode pengembangan sumur horizontal.

Metode penelitian dilakukan melalui persiapan data sumur, data reservoir, dan data mekanika batuan sebagai dasar simulasi *hydraulic fracturing*. Penentuan desain dilakukan melalui analisis sensitivitas terhadap jenis fluida perekah, ukuran dan massa *proppant*, serta volume *pad*, yang menghasilkan 72 skenario desain dan disederhanakan menjadi enam skenario representatif. Simulasi geometri rekahan dilakukan menggunakan *software* simulasi *hydraulic fracturing* dengan metode PKN 2D, sedangkan analisis laju produksi menggunakan metode *nodal analysis* dengan bantuan *software* analisis produksi. Keberhasilan stimulasi dilakukan melalui perhitungan *fold of increase (FOI)* dan permeabilitas rata-rata formasi.

Hasil terbaik diperoleh dari skenario dengan penggunaan fluida perekah YF130.1 HTD, *proppant* Carbolite 12/18 mesh, massa *proppant* sebesar 100.000 lb, dan volume *pad* sebesar 30%. Desain tersebut menghasilkan panjang rekahan sebesar 758,4 ft, lebar rekahan sebesar 0,394 inch, konduktivitas rekahan sebesar 38.798 md.ft, nilai FCD sebesar 6,5, serta peningkatan laju produksi dari 161 STB/day sebelum stimulasi menjadi 1136 STB/day setelah stimulasi dengan nilai FOI sebesar 7,05 dan permeabilitas rata-rata formasi sebesar 595 mD. Hasil perbandingan menunjukkan bahwa metode *hydraulic fracturing* lebih optimum dibandingkan dengan metode sumur horizontal yang menghasilkan laju produksi sebesar 928 STB/day, sehingga dinilai lebih sesuai untuk meningkatkan produktivitas pada reservoir dengan karakteristik *low quality reservoir (LQR)*.

Kata kunci: Fluida Perekah, *Hydraulic Fracturing*, *LQR*, *Nodal Analysis*, *Proppant*

ABSTRACT

HYDRAULIC FRACTURING STIMULATION PLANNING FOR PRODUCTION OPTIMIZATION IN LOW QUALITY RESERVOIR (LQR) OF “RYN” WELL IN “RRI” FIELD

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RYN Well in the RRI Field is an infill well planned to develop the hydrocarbon potential in the R-28B layer of the Sandstone Main/Upper Cibulakan Formation, which is categorized as a low quality reservoir (LQR) with a permeability of 10 mD. The low permeability value limits reservoir fluid flow capability, resulting in low natural well productivity and requiring stimulation methods to improve production performance. This study aims to design an optimum hydraulic fracturing treatment to enhance RYN Well productivity and compare its potential with the horizontal well development method.

The research method was conducted through the preparation of well, reservoir, and rock mechanics data as the basis for hydraulic fracturing stimulation. The design process was carried out through sensitivity analysis of fracturing fluid type, proppant size and mass, and pad volume resulting in 72 design scenarios that were simplified into six representative scenarios. Fracture geometry simulation was performed using hydraulic fracturing simulation software with the PKN 2D method, while production rate analysis was conducted using the nodal analysis method with the assistance of production analysis software. Stimulation performance was evaluated through Fold of Increase (FOI) calculation and average formation permeability analysis.

The best result was obtained from the scenario using YF130.1 HTD fracturing fluid, Carbolite 12/18 mesh proppant, 100.000 lb proppant mass, and 30% pad volume. The design produced a fracture length of 758,4 ft, fracture width of 0,394 inch, fracture conductivity of 38.798 md.ft, and an FCD value of 6,5, resulting in an increase production rate from 161 STB/day before stimulation to 1136 STB/day after stimulation, with an FOI value of 7,05 and an average formation permeability of 595 mD. The comparison results indicate that the hydraulic fracturing method is more optimum than the horizontal well method, which only produced a rate of 928 STB/day, making it more suitable for improving productivity in reservoirs with low quality reservoir (LQR) characteristics.

Keywords: Fracturing Fluid, Hydraulic Fracturing, LQR, Nodal Analysis, Proppant