ABSTRAK

OPTIMASI STIMULASI *ACID FRACTURING* PADA RESERVOIR KARBONAT DALAM PENINGKATAN PRODUKSI SUMUR "D-77" LAPANGAN "DEP"

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Sumur D-77 pada Lapangan "DEP" berproduksi dari *reservoir* karbonat Formasi Upper baturaja (UBR) di Cekungan Sunda dengan permeabilitas 1 mD dan *acid solubility* 70%. Permeabilitas rendah serta *skin factor* +7,8 menunjukkan adanya hambatan aliran pada zona *near wellbore*, sehingga produktivitas awal sumur hanya 289,47 BLPD pada *water cut* 81%. Sumur ini telah dilakukan stimulasi *acid fracturing*, namun desain *existing* hanya menghasilkan produksi *gross* 950 BLPD. Oleh karena itu, penelitian ini mengoptimasi fluida asam dengan mengganti fluida *existing* menggunakan VDA 20% untuk meningkatkan produktivitas Sumur D-77.

Penelitian dilakukan melalui penyelarasan (*matching*) desain *acid fracturing existing* menggunakan perangkat lunak, dilanjutkan evaluasi tiga kandidat fluida asam, yaitu HCl 15%, *gelled acid*, dan VDA 20% (*Viscoelastic Diverting Acid*). Pemilihan fluida didasarkan pada retardasi reaksi asam, kontrol *fluid loss*, mekanisme diversi, stabilitas temperatur, penetrasi asam, *cleanup*, dan risiko *formation damage*. VDA 20% dipilih karena memiliki kemampuan *self-diverting*, kontrol *fluid loss* yang baik, stabil pada temperatur *reservoir* 208°F, serta mampu mendistribusikan asam lebih merata. Optimasi dilakukan dalam tiga skenario variasi volume asam, dengan Skenario 3 sebagai skenario terbaik menggunakan YF145.1HTD dan VDA20-J557(05) 20%, volume asam 460 bbl, dan total fluida *treatment* 588 bbl.

Hasil Skenario 3 menghasilkan panjang rekahan teretsa (*Xf*) 789,4 ft, konduktivitas rekahan efektif (*Wkf*) 28.154 md.ft, dan *Dimensionless Fracture Conductivity* (FCD) 35,7. Permeabilitas rata-rata formasi (*Kavg*) meningkat menjadi 302,54 mD dengan *Fold of Increase* (FOI) 7,01. Analisis *Inflow Performance Relationship* (IPR) menunjukkan optimasi menggunakan VDA 20% mampu meningkatkan *gross rate* dari 950 BLPD menjadi 6.659,5 BLPD. Hasil ini menunjukkan bahwa VDA 20% mampu meningkatkan produktivitas Sumur D-77 secara signifikan dibandingkan desain *existing*.

Kata kunci: *Acid Fracturing*, VDA 20%, Reservoir Karbonat, Produktivitas Sumur, *Fold of Increase*.

ABSTRACT

OPTIMIZATION OF ACID FRACTURING STIMULATION IN CARBONATE RESERVOIRS FOR PRODUCTION ENHANCEMENT OF 'D-77' WELL, 'DEP' FIELD"

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Well D-77 in the "DEP" Field produces from the carbonate reservoir of the Upper baturaja Formation (UBR) in the Sunda Basin, with a permeability of 1 mD and an acid solubility *of 70%. The low permeability and* skin factor *of +7,8 indicate flow restriction in the* near-wellbore *zone, resulting in an initial productivity of only 289,47 BLPD at 81%* water cut*. This well had previously undergone* acid fracturing *stimulation; however, the* existing *design only produced a* gross rate *of 950 BLPD. Therefore, this study optimizes the acid fluid by replacing the* existing *acid fluid with 20% VDA to improve the productivity of Well D-77.*

The study was conducted by matching the existing acid fracturing *design using software, followed by the evaluation of three acid fluid candidates: 15% HCl,* gelled acid*, and 20% VDA (*Viscoelastic Diverting Acid*). The acid fluid selection was based on acid reaction retardation,* fluid loss *control, diversion mechanism, temperature stability, acid penetration, and* formation damage *risk. VDA 20% was selected due to its* self-diverting *capability, good* fluid loss *control, stability at the reservoir temperature of 208°F, and ability to distribute acid more evenly. The optimization was carried out in three acid volume variation scenarios, with Scenario 3 selected as the best scenario using YF145.1HTD and VDA20-J557(05) 20%, with an acid volume of 460 bbl and a total treatment fluid volume of 588 bbl.*

*The result of Scenario 3 produced an etched fracture half-length (*Xf*) of 789,4 ft, effective fracture conductivity (*Wkf*) of 28,154 md.ft, and* Dimensionless Fracture Conductivity *(FCD) of 35,7. The average formation permeability (*Kavg*) increased to 302.54 mD, with a* Fold of Increase *(FOI) of 7,01. The* Inflow Performance Relationship *(IPR) analysis shows that the optimization using 20% VDA increased the* gross rate *from 950 BLPD to 6.659,5 BLPD. These results indicate that 20% VDA significantly improves the productivity of Well D-77 compared to the* existing *design.*

Keywords: Acid Fracturing*, VDA 20%, Carbonate Reservoir, Well Productivity,* Fold of Increase*.*