

ABSTRAK

STRATEGI INJEKSI *LOW-SALINITY WATERFLOOD* UNTUK MENINGKATKAN PENDESAKAN MINYAK PADA LAPANGAN “FRZ” RESERVOIR BATUPASIR

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Lapangan “FRZ” di Cekungan Sumatera Selatan merupakan lapangan yang diproduksi sejak September 2005 yang memiliki *Ultimate Recovery Reserve* (UR) sebesar 12.38 MMSTB dengan *Current Recovery Factor* (CRF) sebesar 16.13% hingga April 2015. Setelah melewati fase *primary* dan *secondary recovery*, masih terdapat sisa cadangan minyak (*Remaining Reserve*) sebesar 5.55 MMSTB dan potensi sisa *recovery factor* (RF) yang dapat dioptimalkan mencapai 18.3%. Kondisi ini mendorong kebutuhan penerapan teknologi *tertiary recovery* atau *Enhanced Oil Recovery* (EOR) dengan metode *Low Salinity Waterflood* (LSW) untuk meningkatkan perolehan minyak.

Penelitian ini bertujuan menentukan skenario optimum peningkatan kumulatif produksi dan *recovery factor* melalui perbandingan injeksi air salinitas tinggi dan *Low Salinity Waterflood* (LSW). Metodologi yang digunakan adalah dengan simulasi reservoir berbasis data validasi studi *waterflood* sebelumnya, dengan dua skenario yaitu sensitivitas salinitas air injeksi dan sensitivitas *constraint* laju injeksi air (*Surface Water Rate*). Evaluasi dilakukan berdasarkan *output cumulative oil production* dan *recovery factor*.

Hasil simulasi menunjukkan LSW optimum dengan 2500 PPM, mampu meningkatkan kumulatif produksi minyak menjadi 7.19 MMSTB dan *recovery factor* 23.74%, dengan peningkatan produksi 0.36 MMSTB dan RF 1.17%. Pada skenario optimum sensitivitas *constraint* laju injeksi air dengan 1200 bbl/day, kumulatif produksi meningkat menjadi 7.57 MMSTB dan RF mencapai 25.1%, dengan peningkatan produksi 0.38 MMSTB dan RF 1.36%. Temuan ini menegaskan efektivitas LSW sebagai metode EOR yang ekonomis, ramah lingkungan, dan berkelanjutan untuk pengembangan lapangan “FRZ”.

Kata kunci: *enhanced oil recovery, injeksi air salinitas rendah, recovery factor, simulasi reservoir, waterflooding*

ABSTRACT

LOW-SALINITY WATERFLOOD INJECTION STRATEGY TO ENHANCE OIL DISPLACEMENT IN “FRZ” FIELD SANDSTONE RESERVOIRS

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The “FRZ” field in the South Sumatra Basin has been in production since September 2005 and has an Ultimate Recovery Reserve (UR) of 12.38 MMSTB with a Current Recovery Factor (CRF) of 16.13% as of April 2015. After undergoing primary and secondary recovery phases, the field still has a Remaining Reserve of 5.55 MMSTB and a potential remaining recovery factor (RF) of 18.3% that can be optimized. This situation necessitates the implementation of tertiary recovery technology or Enhanced Oil Recovery (EOR) using the Low Salinity Waterflood (LSW) method to increase oil recovery.

This study aims to determine the optimum scenario for increasing cumulative production and recovery factor by comparing high salinity water injection and Low Salinity Waterflood (LSW). The methodology involves reservoir simulation based on validated data from previous waterflood studies, with two scenarios: sensitivity to injection water salinity and sensitivity to injection rate constraints (Surface Water Rate). Evaluation is conducted based on cumulative oil production and recovery factor outputs.

Simulation results show that the optimum LSW at 2500 PPM salinity can increase cumulative oil production to 7.19 MMSTB and the recovery factor to 23.74%, with an incremental production of 0.36 MMSTB and an incremental RF of 1.17%. In the optimum scenario for injection rate constraint at 1,200 bbl/day, cumulative production increases to 7.57 MMSTB and the recovery factor reaches 25.1%, with an incremental production of 0.38 MMSTB and an incremental RF of 1.36%. These findings confirm the effectiveness of LSW as an economical, environmentally friendly, and sustainable EOR method for the development of the “FRZ” field.

Keywords: enhanced oil recovery, low-salinity water injection, recovery factor, reservoir simulation, waterflooding.