

RINGKASAN

Sumur GWK-8 merupakan proyek gas *deepwater* dengan formasi *sandstone* yang *slightly cemented* dan *permeability* rendah. Formasi *slightly cemented sandstone* telah diperkuat dengan teknologi kompleksi *sand screen* yakni *Shaped Memory Polymer (SMP) sand control system* yang mana proses pemasangan menyebabkan *damage* pada *near wellbore*. *Damage* dari proses kompleksi dan *permeability* yang rendah diperbaiki dengan stimulasi. Stimulasi *Matrix acidizing* bertujuan untuk meningkatkan produktivitas sumur.

Penelitian ini dilaksanakan dengan pengumpulan data untuk *upper zone* sumur GWK-8 meliputi data *reservoir*, data sumur dan studi literatur. Optimisasi *matrix acidizing* dilaksanakan pada perencanaan, operasi pelaksanaan dan evaluasi hasil. Perencanaan *matrix acidizing* meliputi pemilihan komposisi *acid*, *volume acid* yang dibutuhkan supaya menjangkau *damage* pada *near wellbore* 2 Ft, dan *pumping rate* aman dibawah *formation fracture* yang dibantu oleh *software*. Operasi *matrix acidizing* berdasarkan perencanaan diawali oleh pembersihan lubang sumur, proses *pre-flush*, proses *pumping* untuk *main acid*, proses *pumping* untuk *over flush* dan *flowback welltesting*. Evaluasi hasil *matrix acidizing* dari hasil *welltesting* untuk menentukan *skin*, *permeability* dan *deliverability* berhasil meningkat.

Matrix acidizing dengan *hydrochloric acid (HCl)* 9% dan *hydrofluoric acid (HF)* 1%, *pre-flush* dengan NH_4Cl dan *over flush* dengan *Base Oil* dengan *pump rate* 3 BPM dibuktikan keberhasilannya dengan *welltesting*. *Welltesting* membuktikan normalisasi *damage* dan perbaikan formasi *pre-matrix acidizing* mempunyai *skin* (s) 33,4 dan *permeability* (k) 32,4 mD sedangkan *post-matrix acidizing* dengan *skin* (s) 10 dan *permeability* (k) menjadi 121 mD. Laju produksi gas yang teruji terjadi peningkatan yakni *pre-matrix acidizing* adalah 30 MMSCFD dan *post-matrix acidizing* adalah 44 MMSCFD tanpa ada indikasi pasir formasi terlepas. *Inflow Performance Relationship (IPR)* menunjukkan *deliverability* sumur gas GWK-8 sebelum dan sesudah proses *matrix acidizing* terjadi peningkatan *Absolute Open Flow (AOF)* dari 45,90 MMSCFD menjadi 152,51 MMSCFD. Perbaikan *skin* (s) 334%, *permeability* (k) 373% dan nilai AOF meningkat 332% merupakan parameter utama proses optimisasi *matrix acidizing* telah berhasil. Secara keekonomian *Net Present Value (NPV)* sebelum *matrix acidizing* MM\$ 92,48 meningkat setelah *matrix acidizing* menjadi MM\$ 322,59 dan *Pay Out Time (POT)* terjadi perbaikan dari 4 tahun menjadi 2 tahun.

ABSTRACT

Well GWK-8 is a deepwater gas project with slightly cemented sandstone formation and low permeability. The slightly cemented sandstone formation has been strengthened by sand screen completion technology, namely the Shaped Memory Polymer (SMP) sand control system where the installation process causes damage to the near wellbore. Damage from the completion process and low permeability are improved by stimulation. Matrix acidizing stimulation aims to increase productivity of the gas well.

This research was carried out by collecting data for the upper zone of Well GWK-8 including reservoir data, well data and literature studies. Matrix acidizing optimization is carried out in planning, operations, and evaluating results including economy. Matrix acidizing planning includes acid fluid selection, the volume of acid needed to reach damage 2 Ft near wellbore, and the safe pumping rate under formation fracture pressure aided by software. Matrix acidizing operations based on planning begin with well hole cleaning, pre-flush pumping, pumping process for main acid, pumping process for over flush and flowback welltesting. Evaluation of matrix acidizing results from welltesting results to determine skin, permeability, and deliverability of the gas well.

Matrix acidizing with hydrochloric acid (HCl) 9% and hydrofluoric acid (HF) 1%, pre-flush with NH_4Cl and over flush with Base Oil with pump rate 3 BPM successfully proved by welltesting. Welltesting proved that damage normalization and formation improvement for pre-matrix acidizing has skin (s) 33.4 and permeability (k) 32.4 mD, while post-matrix acidizing skin (s) 10 and permeability (k) becomes 121 mD. The gas production tested rate has increased for pre-matrix acidizing is 30 MMSCFD and post-matrix acidizing is 44 MMSCFD without any indication of formation sand breakthrough. Inflow Performance Relationship (IPR) shows the deliverability of GWK-8 gas wells before and after the matrix acidizing process there was an increase in Absolute Open Flow (AOF) from 45.90 MMSCFD to 152.51 MMSCFD. Skin (s) improvement 334%, permeability (k) 373% and AOF value increased 332% are the main parameters of the matrix acidizing optimization process has been successful. Economically, Net Present Value (NPV) before matrix acidizing MM\$ 92.48 increased after matrix acidizing to MM\$ 322.59 and Pay Out Time (POT) has improved from 4 years to 2 years.