ABSTRAK

ANALISA DAN PENANGANAN *LIQUID LOADING* BERDASARKAN DATA PRODUKSI PADA SUMUR"RF" LAPANGAN "RNF"

Oleh
Rofidho Nur Fata
NIM: 113220088
(Program Studi Sarjana Teknik Perminyakan)

Salah satu permasalahan produksi pada suatu sumur gas adalah tekanan gas tidak lagi mampu mengangkat *liquid. Problem liquid loading* adalah fenomena dimana kecepatan gas sudah tidak mampu mengangkat *liquid* yang menyebabkan terakumulasinya *liquid* di dasar sumur. Sumur "RF" pada lapangan "RNF" merupakan sumur gas dengan kedalaman TVD 16009 ft dan MD 19885 ft. Produksi lapangan "RNF" mencapai rate tertinggi pada tahun 2007 dengan rate 11.45 MMSCFD. Hasil identifikasi laju alir kritis menunjukkan sumur mengalami problem *liquid loading*, yang menyebabkan laju produksi terus menurun mendekati nol pada Maret 2008. Tujuan pada penelitian ini yaitu untuk mengindentifikasi permasalahan liquid loading pada sumur "RF".

Metodologi terdiri dari beberapa tahapan seperti, studi literatur, pengumpulan data, dan pengolahan data. Data pada reservoir digunakan untuk menentukan faktor kompresibilitas gas, densitas gas, dan visositas gas. Analisa penentuan *inflow performance relationship* dengan data *production logging tools* menggunakan metode Forchheimer *non-Darcy flow*. Analisa nodal pada sumur "RF" menggunakan metode Beggs dan Brill untuk perhitungan kehilangan tekanan dan perhitungan ukuran *choke* menggunakan metode Ros, Gilbert, Baxendell, serta Achong. *Critical velocity calculation* dengan tiga model Turner, Coleman, dan Nosseir serta *software.* untuk deulifikasi penanganan dengan sensitivitas ukuran *choke*.

Hasil analisa didapatkan nilai *absolute open flow* pada sumur "RF" sebesar 11.95 MMSCFD. Pada penelitian ini penanganan yang dilakukan menggunakan ukuran *choke 32/64 inch* dengan lau alir gas 9.45 MMSCFD yang semula pada sumur "RF" menggunakan *choke* sebesar 22/64 inch dengan laju alir 6.5 MMSCFD.

Kata Kunci: *liquid loading,* laju alir kritis gas, sumur gas, *velocity string, choke*

ABSTRACT

ANALYSIS AND MITIGATION OF LIQUID LOADING BASED ON PRODUCTION DATA IN WELL "RF" OF THE "RNF" FIELD

By
Rofidho Nur Fata
NIM: 113220088
(*Petroleum Engineering Undergraduated Program*)

One of the production problems encountered in gas wells is the inability of the gas pressure to lift the accumulated liquid to the surface. Liquid loading is a phenomenon in which the gas velocity is no longer sufficient to carry the liquid, resulting in liquid accumulation at the bottom of the wellbore. The "RF" well in the "RNF" field is a gas well with a True Vertical Depth (TVD) of 16,009 ft and a Measured Depth (MD) of 19,885 ft. The "RNF" field reached its peak production rate of 11.45 MMSCFD in 2007. Based on the critical gas velocity analysis, the well was identified as experiencing liquid loading, causing the production rate to continuously decline and approach zero by March 2008. Therefore, the objective of this study is to identify the liquid loading problem in the "RF" well and evaluate an appropriate mitigation strategy to improve production performance.

The research methodology consisted of literature review, data collection, and data analysis. Reservoir data were used to determine gas compressibility factor, gas density, and gas viscosity. The inflow performance relationship (IPR) was established using Production Logging Tool (PLT) data based on the Forchheimer non-Darcy flow model. Nodal analysis of the "RF" well was performed using the Beggs and Brill correlation for pressure loss calculations, while choke size was evaluated using the Ros, Gilbert, Baxendell, and Achong correlations. Critical gas velocity was analyzed using the Turner, Coleman, and Nosseir models and validated using commercial well performance software. The liquid loading mitigation strategy was evaluated through choke size sensitivity analysis.

The analysis results indicate that the Absolute Open Flow (AOF) of the "RF" well is 11.95 MMSCFD. The optimum mitigation strategy was achieved by increasing the choke size from 22/64 inch to 32/64 inch, resulting in an increase in the gas production rate from 6.50 MMSCFD to 9.45 MMSCFD. These results demonstrate that choke size optimization effectively improves gas flow capacity, reduces the impact of liquid loading, and enhances the production performance of the "RF" well.

Keywords: liquid loading, gas critical velocity, gas well, velocity string, choke