

ABSTRAK

INTEGRASI UJI TRANSIEN TEKANAN DAN *DELIVERABILITY* UNTUK OPTIMASI PERFORMA SUMUR PA-1 FORMASI KUJUNG

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Penentuan kapasitas *deliverability* sumur gas dan pemahaman komprehensif terhadap karakteristik heterogenitas reservoir merupakan tahapan krusial dalam pengembangan lapangan gas kondensat. Permasalahan utama pada Sumur PA-1 Formasi Kujung terletak pada kompleksitas heterogenitas reservoir yang tinggi serta adanya hambatan aliran *non-Darcy* dan potensi pengendapan kondensat yang dapat menurunkan produktivitas sumur secara drastis dalam jangka pendek.

Penelitian ini melakukan evaluasi terintegrasi terhadap performa *deliverability*, analisis transien tekanan (*Pressure Transient Analysis* / PTA), dan pemodelan sekuensial produksi dengan penentuan laju alir produksi optimum untuk sumur PA-1 tanpa menimbulkan *problem*. Metodologi yang digunakan meliputi analisis data PVT komposisional, metode empiris Rawlins-Schellhardt serta metode *Linearized Inflow Performance Relationship* (LIT) Houpeurt yang divalidasi menggunakan perangkat lunak Saphir Ecrin. Strategi optimasi dilakukan melalui simulasi skenario produksi sekuensial antar-lapisan dengan pengaturan manajemen ukuran *choke* dengan mempertimbangkan nilai *critical rate* dan *erosional rate*.

Hasil analisis dari perangkat lunak Saphir Ecrin menunjukkan bahwa Layer 1 memiliki karakteristik homogen, sedangkan Layer 2 mengikuti model *Two-Porosity*. Nilai *skin* total yang tinggi lebih dari delapan, didominasi oleh dua komponen *non-damage* berupa hambatan geometris penetrasi sebagian dan efek turbulensi aliran *non-Darcy*. Metode Rawlins-Schellhardt yang diintegrasikan dengan *pseudopressure* terbukti paling valid dengan deviasi terkecil kurang dari empat persen. Strategi *Sequential Production* dengan memproduksi Layer 1 terlebih dahulu terbukti efektif memperpanjang umur sumur (*well lifetime*) dari 2,72 tahun menjadi 5 tahun. Disarankan untuk melakukan *re-perforation*, stimulasi *acidizing*, serta implementasi strategi penentuan bukaan *Choke* secara bertahap.

Kata kunci: Aliran *Non-Darcy*, *Deliverability* Gas, Heterogenitas Reservoir, Produksi Sekuensial, Transien Tekanan

ABSTRACT

INTEGRATED PRESSURE TRANSIENT AND DELIVERABILITY ANALYSIS FOR WELL PA-1 PERFORMANCE OPTIMIZATION IN KUJUNG FORMATION

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Determining the production capacity of gas wells and gaining a comprehensive understanding of reservoir heterogeneity are crucial steps in the development of a gas condensate field. The main challenges at Well PA-1 in the Kujung Formation lie in the high complexity of reservoir heterogeneity, as well as the presence of non-Darcy flow resistance and the potential for condensate deposition, which can drastically reduce well productivity in the short term.

This study conducts an integrated evaluation of production capacity performance, pressure transient analysis (PTA), and sequential production modeling to determine the optimal production flow rate for Well PA-1 without causing problems. The methodology employed includes compositional PVT data analysis, the Rawlins-Schellhardt empirical method, and the Houpeurt Linearized Inflow Performance Relationship (LIT) method, validated using Saphir Ecrin software. The optimization strategy was carried out through simulations of sequential inter-layer production scenarios with choke size management settings, taking into account the critical rate and erosional rate values.

The results of the analysis using the Saphir Ecrin software show that Layer 1 has homogeneous characteristics, while Layer 2 follows the Two-Porosity model. The high total skin value greater than eight is dominated by two non-damage components: partial geometric penetration resistance and the non-Darcy flow turbulence effect. The Rawlins-Schellhardt method, integrated with pseudopressure, proved to be the most valid, with the smallest deviation of less than four percent. The Sequential Production strategy, which involves producing Layer 1 first, has been shown to effectively extend well lifetime from 2.72 years to 5 years. It is recommended to perform re-perforation, acidizing stimulation, and implement a strategy for gradually adjusting the choke opening.

Keywords: Gas Deliverability, Non-Darcy Flow, Pressure Transient, Reservoir Heterogeneity, Sequential Production