ABSTRAK

PENENTUAN *RATE OF PENETRATION* MELALUI IMPLEMENTASI METODE BOURGOYNE AND YOUNG BERDASARKAN *MECHANICAL FACTOR* OPTIMUM PADA SUMUR A-27 LAPANGAN ABR

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Efisiensi pengeboran sumur minyak dan gas sangat bergantung pada pencapaian nilai *Rate of Penetration* (ROP) yang optimum untuk mengurangi waktu pemboran dan biaya operasional. Penelitian ini bertujuan untuk menentukan nilai ROP optimum serta mengidentifikasi parameter *mechanical factor* yang dapat diaplikasikan pada proses pengeboran ke depannya.

Penentuan nilai *Rate of Penetration* (ROP) menggunakan metode Bourgoyne and Young yang dinilai lebih komprehensif dibandingkan metode Samertone, Speer, maupun Fullertone, karena mempertimbangkan faktor kompaksi formasi, faktor kedalaman formasi, faktor kekuatan formasi, faktor perbedaan tekanan pada dasar lubang bor, faktor WOB, faktor RPM, faktor keausan *bit*, dan faktor hidrolika. Penggunaan metode Samertone dinilai kurang komprehensif karena perhitungannya hanya terbatas pada parameter RPM, WOB, *hole size*, dan *rock strength*. Metode Speer dan metode Fullertone memiliki keterbatasan pada rendahnya tingkat akurasi karena perhitungannya sangat bergantung pada hasil interpretasi pembacaan *chart*. Penentuan ROP dilakukan melalui simulasi 4 skenario dengan kombinasi WOB dan RPM yang divalidasi kelayakannya berdasarkan *string analysis* (keamanan beban), *hole cleaning* (hidrolika), dan evaluasi keekonomian menggunakan metode *Cost per Foot*.

Hasil perhitungan menunjukkan bahwa skenario keempat merupakan skenario optimum untuk Sumur A-27, yang menghasilkan nilai ROP optimum pada trayek 12.25" sebesar 128.33 ft/hr dan 142.56 ft/hr pada trayek 8.5". Skenario ini memenuhi kriteria *hole cleaning* yang efektif dengan *lifting capacity* bernilai positif dan lebih dari 50%, serta nilai *Cutting Capacity Annulus* di bawah 5%. Secara ekonomi, skenario ini mampu mengurangi biaya operasional menjadi 55.658,87 USD dari skenario *basecase* sebesar 63.256,37 USD, sehingga menghasilkan penghematan biaya sebesar 7.597,49 USD.

Kata kunci: *bourgoyne and young, rate of penetration*, WOB, RPM, *cost per foot*

ABSTRACT

DETERMINATION OF RATE OF PENETRATION THROUGH IMPLEMENTATION OF THE BOURGOYNE AND YOUNG METHOD BASED ON OPTIMUM MECHANICAL FACTOR IN WELL A-27 OF THE ABR FIELD

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The efficiency of oil and gas well drilling is highly dependent on achieving an optimum Rate of Penetration (ROP) value to reduce drilling time and operational costs. This study aims to determine the optimum ROP value and identify mechanical factor parameters that can be applied to future drilling processes.

Determination of the Rate of Penetration (ROP) value using the Bourgoyne and Young method is considered more comprehensive than the Samertone, Speer, and Fullertone methods because it takes into account the formation compaction factor, formation depth factor, formation strength factor, pressure difference factor at the bottom of the borehole, WOB factor, RPM factor, bit wear factor, and hydraulic factor. The Samertone method is considered less comprehensive because its calculations are limited to the parameters of RPM, WOB, hole size, and rock strength. The Speer and Fullertone methods have limitations in terms of low accuracy because their calculations are highly dependent on the results of chart reading interpretations. ROP determination is carried out through a simulation of 4 scenarios with a combination of WOB and RPM, the feasibility of which is validated based on string analysis (load safety), hole cleaning (hydraulics), and economic evaluation using the Cost per Foot method.

The calculation results show that the fourth scenario is the optimum scenario for Well A-27, which produces an optimum ROP value of 128.33 ft/hr on the 12.25" trajectory and 142.56 ft/hr on the 8.5" trajectory. This scenario meets the criteria for effective hole cleaning with a positive lifting capacity of more than 50% and an annulus cutting capacity value of less than 5%. Economically, this scenario reduces operating costs to USD 55,658.87 from the base case scenario of USD 63,256.37, resulting in cost savings of USD 7,597.49.

Keywords: bourgoyne and young, *rate of penetration*, WOB, RPM, *cost per foot*