ABSTRAK

EVALUASI DAN OPTIMASI HIDROLIKA PEMBORAN TRAYEK PRODUKSI 8½″ SUMUR *DIRECTIONAL* "ARD-01"

Oleh
Rivandi Ardanda Adiguna
NIM: 113220026
(Program Studi Sarjana Teknik Perminyakan)

Sumur "ARD-01" merupakan sumur *directional* tipe J dengan kedalaman akhir 7585 ftMD menembus Formasi Tuban berlitologi *limestone*. Pada trayek 8 ½" terjadi permasalahan pemboran berupa program hidrolika yang belum optimum akibat daya pada *bit* yang kurang baik, ditunjukkan oleh nilai BHHP/HPs sebesar 7,63% dimana hal tersebut dapat berpotensi terjadi *bit balling* dan *cutting regrinding* akibat penumpukan *cutting* pada lubang bor. Perhitungan evaluasi hidrolika lumpur di annulus diperoleh nilai Ft sebesar 95,85%, Ca sebesar 0,850%, PBI sebesar 1. Dimana Nilai tersebut mengindikasikan bahwa performa hidrolika pada bit belum optimal sedangkan hidrolika pada *annulus* sudah optimal.

Evaluasi dan optimasi hidrolika pada penelitian ini dilakukan menggunakan metode *Bit Hydraulic Horse Power* (BHHP) karena dinilai efektif untuk sumur directional dengan target nilai BHHP/HPs ≥ 48%, sedangkan pada annulus digunakan parameter *Cutting Transport Ratio* (Ft) ≥ 90%, *Cutting Concentration* (Ca) < 5%, dan *Particle Bed Index* (PBI) ≥ 1. Optimasi hidrolika pemboran dilakukan dengan mengubah tekanan pompa dan laju alir pompa.

Hasil optimasi hidrolika pemboran dengan mengubah Paktual sebesar 2100 psi menjadi Poptimasi sebesar 4200 psi dan Qaktual sebesar 450 gpm menjadi Qoptimasi sebesar 530 gpm dengan spesifikasi pompa *National Oil Varco* berjenis *triplex* yang disusun secara seri diperoleh rasio BHHP/HPs sebesar 48,00%. Ft sebesar 96,17%, Ca sebesar 0,721%, PBI sebesar 1. Peningkatan rasio tersebut menunjukkan bahwa performa hidrolika pada bit menjadi lebih optimal, sehingga efektivitas pembersihan dasar lubang bor meningkat dan pengangkatan *cutting* di *annulus* menunjukkan bahwa *cutting* dalam kondisi tidak mengendap.

Kata kunci: *Bit Hydraulic Horsepower*, Optimasi Pemboran, Pemboran Berarah

ABSTRACT

EVALUATION AND OPTIMIZATION OF DRILLING HYDRAULICS IN THE 8½" PRODUCTION HOLE SECTION OF DIRECTIONAL WELL "ARD-01"

By
Rivandi Ardanda Adiguna
NIM: 113220026
(*Petroleum Engineering Undergraduated Program*)

The "ARD-01" well is a Type J directional well with a final depth of 7,585 ftMD, penetrating the Tuban Formation, which consists of limestone. During the 8 ½" section, a drilling issue arose in the form of a suboptimal hydraulic program due to insufficient bit power, as indicated by a BHHP/HPs ratio of 7.63%, which could potentially lead to bit balling and the need for cutting regrinding due to cuttings buildup in the borehole. Calculations for the evaluation of drilling fluid hydraulics in the annulus yielded values of Ft at 95.85%, Ca at 0.850%, and PBI at 1. These values indicate that the hydraulic performance at the bit is not yet optimal, while the hydraulics in the annulus are already optimal.

Hydraulic evaluation and optimization in this study were conducted using the Bit Hydraulic Horsepower (BHHP) method, as it is considered effective for directional wells with a target BHHP/HPs value of ≥ 48%. For the annulus, the parameters used were a Cutting Transport Ratio (Ft) of ≥ 90%, a Cutting Concentration (Ca) of < 5%, and a Particle Bed Index (PBI) of ≥ 1. Drilling hydraulics optimization was performed by adjusting the pump pressure and pump flow rate.

The results of drilling hydraulic optimization—achieved by changing the actual pressure (Paktual) from 2,100 psi to the optimized pressure (Poptimasi) of 4,200 psi and the actual flow rate (Qaktual) from 450 gpm to the optimized flow rate (Qoptimasi) of 530 gpm using a triplex National Oil Varco pump configured in series—yielded a BHHP/HPs ratio of 48.00%. Ft was 96.17%, Ca was 0.721%, and PBI was 1. This increase in the ratio indicates that the bit's hydraulic performance has become more optimal, thereby improving the effectiveness of the bottomhole cleanout; furthermore, the removal of cuttings from the annulus indicates that the cuttings are not settling.

Keywords: Bit Hydraulic Horsepower, Directional Drilling, Drilling Optimization,