

ABSTRAK

EVALUASI DAN OPTIMASI DESAIN *ELECTRIC SUBMERSIBLE PUMP* (ESP) BERBASIS ANALISIS KINERJA PRODUKSI SUMUR DI LAPANGAN “N”

Oleh
Nanang Hidayat
NIM: 113220022
(Program Studi Sarjana Teknik Perminyakan)

Sumur produksi di Lapangan “N” menggunakan sistem *Electric Submersible Pump* (ESP) sebagai metode *artificial lift* untuk membantu mengangkat fluida dari reservoir ke permukaan. Penurunan tekanan reservoir menyebabkan berkurangnya kemampuan alir alami sehingga performa ESP perlu dievaluasi. Pada beberapa sumur, desain ESP yang terpasang belum sesuai dengan kondisi operasi sumur sehingga pompa tidak bekerja pada titik efisiensi optimal, oleh karena itu diperlukan evaluasi dan optimasi desain ESP untuk meningkatkan efisiensi operasi dan potensi produksi sumur.

Metode penelitian yang digunakan adalah evaluasi teknis dengan analisis kuantitatif terhadap performa ESP menggunakan data reservoir, fluida, produksi, sumur, serta desain dan kondisi operasi ESP eksisting. Evaluasi dilakukan melalui perhitungan *Total Dynamic Head* (TDH), analisis *pump performance curve*, dan *Inflow Performance Relationship* (IPR). Selanjutnya, dilakukan analisis peningkatan produksi (*gain*) hasil optimasi yang kemudian diklasifikasikan menggunakan metode *percentile* P10, P50, dan P90 untuk menentukan prioritas kandidat sumur optimasi.

Hasil evaluasi terhadap 7 sumur ESP produksi *single layer* di Lapangan “N” menunjukkan bahwa 6 sumur berada pada kondisi *over-stage* sehingga pompa tidak beroperasi secara efisien. Optimasi melalui desain ulang ESP meningkatkan potensi total produksi minyak dari 172 BOPD menjadi 198 BOPD. Berdasarkan metode *percentile*, sumur NGH-010 teridentifikasi sebagai prioritas utama optimasi dengan *oil gain* sebesar 8,1 BOPD. Hasil penelitian menunjukkan bahwa evaluasi dan optimasi ESP efektif dalam meningkatkan kinerja operasi serta potensi produksi minyak di Lapangan “N”.

Kata kunci: *Electric Submersible Pump*, *Artificial Lift*, Optimasi Produksi, *Total Dynamic Head*, *Inflow Performance Relationship*.

ABSTRACT

EVALUATION AND OPTIMIZATION OF ELECTRIC SUBMERSIBLE PUMP (ESP) DESIGN BASED ON WELL PRODUCTION PERFORMANCE ANALYSIS IN THE “N” FIELD

By

Nanang Hidayat

NIM: 113220022

(Petroleum Engineering Undergraduated Program)

Production wells in Field “N” utilize Electric Submersible Pump (ESP) systems as an artificial lift method to lift fluids from the reservoir to the surface. The decline in reservoir pressure has reduced the natural flow capability of the wells, making ESP performance evaluation necessary. In several wells, the installed ESP design is no longer compatible with the current operating conditions, causing the pump to operate away from its optimum efficiency point. Therefore, evaluation and optimization of ESP design are required to improve operational efficiency and production potential.

The research method employed in this study was a technical evaluation using quantitative analysis of ESP performance based on reservoir, fluid, production, well, and existing ESP design and operating condition data. The evaluation was conducted through Total Dynamic Head (TDH) calculations, pump performance curve analysis, and Inflow Performance Relationship (IPR) analysis. Furthermore, production gain resulting from the optimization process was analyzed and classified using the P10, P50, and P90 percentile method to determine the priority ranking of candidate wells for optimization.

The evaluation results of seven single-layer ESP wells in Field “N” indicated that six wells were in an over-stage condition, causing the pumps to operate inefficiently. ESP redesign optimization increased the potential total oil production from 172 BOPD to 198 BOPD. Based on the percentile method, well NGH-010 was identified as the highest-priority candidate for optimization with an oil gain of 8.1 BOPD. The results demonstrate that ESP evaluation and optimization are effective in improving operational performance and enhancing oil production potential in Field “N”.

Keywords: Electric Submersible Pump, Artificial Lift, Production Optimization, Total Dynamic Head, Inflow Performance Relationship.