ABSTRAK

PERENCANAAN *ELECTRICAL SUBMERSIBLE PUMP* (ESP) DAN SENSITIVITAS GAS TERHADAP KEDALAMAN PADA SUMUR MJN-293 LAPANGAN KENT

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Pada sumur MJN-293 dilakukan kerja ulang pindah lapisan (KUPL) dari lapisan I ke lapisan L. Kondisi *natural flow* yang rendah menyebabkan perlunya *Electrical Submersible Pump* (ESP), untuk meningkatkan produksi minyak. Namun, tingginya kandungan *free gas* berpotensi menyebabkan *gas lock* yang dapat menurunkan kinerja pompa, sehingga diperlukan perencanaan desain ESP yang tepat dan analisis sensitivitas gas terhadap kedalaman guna mencapai operasi yang stabil dan efisien.

Penelitian ini dilakukan melalui analisis data produksi, reservoir, sumuran, PVT, dan pompa. Perhitungan meliputi pennetuan *Inflow Performance Relationship* (IPR) menggunakan *modified Vogel*, *Pump Setting Depth* (PSD), *Pump Intake Pressure* (PIP), *Total Dynamic Head* (TDH), serta jumlah *stages* pompa. Selain itu, dilakukan analisis sensitivitas *free gas* untuk memperoleh desain pompa yang paling sesuai dalam mencegah terjadinya *gas lock* dan mendukung target produksi sumur.

Hasil analisis IPR menunjukkan nilai *Absolute Open Flow* (AOF) sebesar 344.45 BLPD dengan target produksi 300 BLPD (87% dari AOF). Pada kedalaman 5800 ft, kadar *free gas* mencapai 91.02% yang berpotensi menggangu kinerja pompa, sehingga diterapkan AGH tipe 400 *Series* D5-21 mampu mengurangi *free gas* hingga 6.97% dan menghasilkan nilai Turpin 0.17, yang menunjukkan kondisi operasi pompa stabil. Desain ESP optimum menggunakan REDA D460N CR-CT-ES pada frekruensi 56 Hz dengan 145 *stages*, PIP sebesar 480.19 psi, dan TDH sebesar 5044.88 ft, serta REDA Maximus 540 *Series*, REDA MAX – EE-R AWG#4, tranformer dengan kapasitas 75 kVA, dan FixStar 1500yang menghasilkan operasi pompa optimal dan stabil.

Kata kunci: *Electrical Submersible Pump*, *Advanced Gas Handling*, *Gas Lock*, *Free Gas*, *Pump Setting Depth*, *Total Dynamic Head*

ABSTRACT

DESIGN OF ELECTRICAL SUBMERSIBLE PUMP (ESP) AND GAS SENSITIVITY TO DEPTH IN WELL MJN-293 KENT FIELD

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MJN-293 was planned workover from layer I to layer L. Low natural flow conditions necessitated the use of an Electrical Submersible Pump (ESP) to increase oil production. However, the high free gas content has the potential to cause gas lock, which can reduce pump performance. Therefore, proper ESP design planning and gas sensitivity analusis at depth are required to achieve stable and efficient operation.

This study was conducted through analysis of production, reservoir, well, PVT, and pump data. The calculations included determining the Inflow Performance Relationship (IPR) using modified Vogel, Pump Setting Depth (PSD), Pump Intake Pressure (PIP), Total Dynamic Head (TDH), and the number of pump stages. In addition, a free gas sensitivity analysis was performed to obtain the most suitable pump design to prevent gas lock and support the well production target.

The IPR analysis results show an Absolute Open Flow (AOF) value of 344.45 BLPD with a production target of 300 BLPD (87% of AOF). At a depth of 5,800 ft, the free gas content reached 91.02%, which could potentially interfere with pump performance. Therefore, a 400 Series D5-21 AGH was applied, which reduced the free gas to 6.97% and produced a Turpin value of 0.17, indicating stable pump operating conditions. The optimum ESP design uses REDA D460N CR-CT-ES at a frequency of 56 Hz with 145 stages, PIP of 480.19 psi, and TDH of 5044.88 ft, as well as REDA Maximus 540 Series, REDA MAX – EE-R AWG#4, a transformer with a capacity of 75 kVA, and FixStar 1500, which produce optimal and stable pump operation.

Keywords: Electrical Submersible Pump, *Advanced Gas Handling*, *Gas Lock*, *Free Gas*, *Pump Setting Depth*, *Total Dynamic Head*