

ABSTRAK

PERENCANAAN *WELLHEAD MATERIAL SELECTION* *DESIGN* SUMUR *ARTIFICIAL LIFT* (ESP) PADA SUMUR “KRL-07” LAPANGAN “LUMOS”

Oleh
Karel Salosa Sitompul
NIM: 113210015
(Program Studi Sarjana Teknik Perminyakan)

Sumur “KRL-07” merupakan salah satu sumur produksi dengan tekanan permukaan 2854 psi dan temperatur operasi 90°F. Kondisi operasi tersebut menunjukkan adanya potensi korosi akibat kandungan gas CO₂ yang tinggi, meskipun gas H₂S tidak terdeteksi. Hal ini menuntut pemilihan material *wellhead* yang tepat untuk menjaga integritas peralatan, mencegah kegagalan sistem, dan menjamin keselamatan operasi. Mengingat sumur ini menggunakan sistem artificial lift berupa *Electric Submersible Pump* (ESP), ketepatan pemilihan material pada *wellhead* menjadi aspek penting untuk mendukung keandalan serta umur operasi sumur.

Tahapan penelitian ini dilakukan dengan menganalisis karakteristik fluida reservoir dan parameter operasi seperti tekanan, temperatur, serta kandungan gas korosif. Berdasarkan data tersebut, dilakukan penentuan parameter desain utama meliputi *Pressure Rating*, *Material Class*, *Temperature Class*, dan *Production Specification Level* (PSL). Proses evaluasi dan pemilihan material mengacu pada standar API *Specification* 6A, agar material yang dipilih memiliki performa optimal secara teknis dan ekonomis.

Hasil analisis menunjukkan bahwa penggunaan *wellhead* dengan *pressure rating* 3000 psi tidak memberikan margin keamanan yang cukup, karena tekanan operasi hampir mencapai batas desain peralatan. Oleh karena itu, dipilih *wellhead* dengan *pressure rating* 5000 psi yang menghasilkan *safety factor* sebesar 1,75. Dengan tekanan parsial CO₂ sebesar 206 psi yang termasuk kategori *Highly Corrosive*, material yang direkomendasikan adalah kelas CC dengan *Temperature Class* S dan PSL 1. Spesifikasi tersebut dinilai mampu menjaga integritas *wellhead*, mengurangi potensi korosi, serta menjamin keberlangsungan produksi yang aman dan efisien dalam jangka panjang.

Kata kunci: API 6A, CO₂, *Pressure Rating*, *Temperature*, *Wellhead*

ABSTRACT

WELLHEAD MATERIAL SELECTION DESIGN PLANNING FOR ARTIFICIAL LIFT (ESP) WELL IN “KRL-07” AT “LUMOS” FIELD

By
Karel Salosa Sitompul
NIM: 113210015
(Petroleum Engineering Undergraduated Program)

The “KRL-07” well is one of the production wells with surface pressure of 2854 psi and operating temperature of 90°F. These operating conditions indicate a potential corrosion risk due to high CO₂ content, although H₂S gas was not detected. Therefore, proper wellhead material selection is essential to maintain equipment integrity, prevent system failure, and ensure operational safety. Since this well utilizes an artificial lift system with an Electric Submersible Pump (ESP), accurate material selection for the wellhead becomes crucial to support reliability and prolong the operational lifespan of the well.

The research was conducted by analyzing reservoir fluid characteristics and operating parameters such as pressure, temperature, and corrosive gas content. Based on these data, the main design parameters were determined, including Pressure Rating, Material Class, Temperature Class, and Production Specification Level (PSL). The evaluation and material selection process referred to API Specification 6A and corrosion resistance criteria based on NACE MR0175 to ensure the chosen material meets both technical and economic requirements.

The analysis results show that the use of a wellhead with 3000 psi pressure rating does not provide a sufficient safety margin, as the operating pressure is close to the equipment's design limit. Therefore, a wellhead with 5000 psi pressure rating was selected, providing a safety factor of 1.75. With a CO₂ partial pressure of 206 psi, categorized as Highly Corrosive, the recommended material is Class CC with Temperature Class S and PSL 1. This specification is considered capable of maintaining wellhead integrity, minimizing corrosion risks, and ensuring safe and efficient production continuity in the long term.

Keywords: API 6A, CO₂, Pressure Rating, Temperature, Wellhead