

## RINGKASAN

### EVALUASI EFEKTIVAS *SCALE INHIBITOR* BIJI PINANG DALAM MENINGKATKAN *LIFETIME* SUMUR AWH- 02 LAPANGAN PENDOPO

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Rendahnya *lifetime electric submersible pump (ESP)* pada sumur AWH-02 di lapangan Pendopo menjadi isu utama yang berdampak pada penurunan angka produksi dan peningkatan biaya operasional *well service*. Rendahnya *lifetime ESP* ini diidentifikasi akibat adanya endapan mineral karbonat (*scale*), yang menjadi penyebab utama kerusakan pada pompa *ESP*. Penanganan *scale* menggunakan inhibitor menjadi fokus utama agar meningkatkan *lifetime* sumur. Di wilayah kerja lapangan pendopo terdapat program *Corporate Social RESPonsibility (CSR)* budi daya tanaman pinang. Komoditas biji buah pinang ini memiliki potensi sebagai bahan baku *scale inhibitor* organik dari kandungan senyawa tannin. Pemanfaatan buah pinang ini diharapkan memberi nilai tambah program CSR perusahaan.

Metode penelitian diawali dengan integrasi data geologi, *reservoir*, dan *Fluida* untuk mengidentifikasi mekanisme pembentukan *scale*. Tahapan selanjutnya meliputi evaluasi hasil uji *scale inhibitor* skala laboratorium yang disesuaikan dengan kondisi lapangan untuk menentukan dosis optimum yang paling efisien secara biaya untuk *pilot project*. Penelitian diakhiri dengan uji coba lapangan guna mengevaluasi kinerja *scale inhibitor* organik biji pinang dalam meningkatkan *lifetime* sumur AWH-02.

Dari data geologi diketahui formasi produktif yaitu lapisan *batu raja formation (BRF)* yang tinggi kandungan kalsium karbonat ( $\text{CaCO}_3$ ) dan berpotensi membentuk *scale*. Untuk mengoptimalkan produksi dilakukan redesain dengan penerapan program injeksi kontinyu *scale inhibitor* dosis 300 ppm ke dalam intake *ESP* menggunakan *capillary tube* dan pompa chemical. Hasil evaluasi menunjukkan bahwa solusi kimiawi ini efektif meningkatkan *lifetime* peralatan dan efisiensi biaya operasional, yang ditandai dengan peningkatan *lifetime* dari rata-rata 2 bulan menjadi 5 bulan serta penurunan frekuensi *well service* dari 6 kali menjadi 2.4 kali per tahun.

Kata Kunci: Electrical Submersible Pump (*ESP*), *Scale* Kalsium Karbonat, *Scale inhibitor* Organik Biji Pinang, Optimasi Produksi

## ***ABSTRACT***

### ***EVALUATION THE EFFECTIVENESS OF ARECA NUT SCALE INHIBITOR IN IMPROVING LIFETIME OF Well AWH-02 IN PENDOPO FIELD***

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The low *lifetime* of the Electric Submersible Pump (*ESP*) in Well AWH-02 at the Pendopo *Field* has become a major issue affecting production decline and increasing *well service* operational costs. The low *ESP lifetime* was identified as being caused by carbonate mineral *scale* deposition, which is the primary cause of *ESP* pump failure. *Scale* treatment using inhibitors became the main focus to improve well *lifetime*. Within the Pendopo *Field* operational area, there is a Corporate Social *RESP*onsibility (*CSR*) program involving areca nut cultivation. This areca nut commodity has potential as a raw material for organic *scale* inhibitors due to its tannin compound content. The utilization of areca nuts is expected to provide added value to the company's *CSR* program.

The research methodology began with the integration of geological, *reservoir*, and fluid data to identify the *scale* formation mechanism. The next stage included laboratory-*scale inhibitor* testing adjusted to *field* conditions to determine the most cost-efficient optimum dosage for the pilot project. The study concluded with a *field* trial to evaluate the performance of the organic areca nut *scale inhibitor* in improving the *lifetime* of Well AWH-02.

Geological data indicated that the productive formation was the Batu Raja Formation (*BRF*), which contains high levels of calcium carbonate ( $\text{CaCO}_3$ ) and has significant *scale*-forming potential. To optimize production, a redesign was implemented through the application of a continuous injection program using 300 ppm organic areca nut *scale inhibitor* into the *ESP* intake using a capillary tube and chemical injection pump. Evaluation results showed that this chemical solution effectively improved equipment *lifetime* and operational cost efficiency, as indicated by improved *lifetime* from average 2 months to 5 months and reduce *well service* frequency from 6 times to 2.4 times per year.

**Keywords:** Electric Submersible Pump (*ESP*), Calcium Carbonate *Scale*, Organic Areca Nut *Scale Inhibitor*, Production Optimization