

## ABSTRAK

### ANALISIS "BOREHOLE INSTABILITY" PADA HOLE SECTION 17 ½" DAN 8 ½" BERDASARKAN DATA WELL LOG DENGAN PENDEKATAN GEOMEKANIK PADA PEMBORAN SUMUR T-01 LAPANGAN ST

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Operasi pemboran pada Sumur T-01 Lapangan ST mengalami *problem partial loss* pada kedalaman 3230-3237 m pada Formasi Belumai dengan *lithology limestone*. Selain *partial loss*, *lithology* formasi Sumur T-01 didominasi *shale* yang dapat menyebabkan *borehole instability* jika *mud weight* yang digunakan lebih kecil dari *shear failure gradient*.

Dalam menentukan rekomendasi *mud weight* tersebut, dibutuhkan model geomekanik 1D yang mewakili kondisi tekanan di bawah permukaan. Model geomekanik 1D dibuat berdasarkan pengolahan data *well logging*, yaitu *gamma ray log*, *sonic log*, dan *density log*. Dalam pengolahan data tersebut didapatkan beberapa parameter yang mendukung, yaitu *shale base line*, *normal compaction trend*, *overburden gradient*, *pore pressure*, *fracture gradient*, *minimum horizontal stress*, *maximum horizontal stress*, *shear failure gradient*. Dilakukan juga pengolahan data untuk mendapatkan parameter mekanika batuan, seperti *internal friction angle* dan *cohesive strength*.

Berdasarkan analisis model geomekanik 1D, *mud weight* yang digunakan pada kedalaman 3230-3237 m adalah 16,9 ppg, dimana nilai tersebut lebih besar daripada *minimum horizontal stress* dan *fracture gradient* pada kedalaman tersebut. Untuk menghindari permasalahan tersebut, *mud weight* yang digunakan perlu diturunkan secara berkala menjadi 14,4-14,9 ppg untuk menjaga *mud weight* tetap berada diatas *shear failure gradient* dan dibawah *minimum horizontal stress* dan *fracture gradient*.

Kata kunci: *mud weight*, *wellbore stability*, *safe mud window*

## ***ABSTRACT***

### ***Borehole Instability Analysis in 17 ½” and 8 ½” Hole Sections Based on Well Log Data Using a Geomechanical Approach in Drilling Well T-01 ST Field***

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*Drilling operations at Well T-01 in the ST Field encountered a partial loss problem at a depth of 3230-3237 m within the Belumai Formation, which has a shale lithology. In addition to the partial loss issue, the lithology of the T-01 well formation is dominated by shale, which can cause borehole instability if the mud weight used is lower than the shear failure gradient.*

*In determining the recommended mud weight, a 1D geomechanical model representing the subsurface pressure conditions is required. The 1D geomechanical model is built based on the processing of well log data, namely gamma ray log, sonic log, and density log. From this data processing, several supporting parameters are obtained, such as shale baseline, normal compaction trend, overburden gradient, pore pressure, fracture gradient, minimum horizontal stress, maximum horizontal stress, and shear failure gradient. Data processing is also carried out to obtain rock mechanics parameters, such as internal friction angle and cohesive strength..*

*Based on the 1D geomechanical model analysis, the mud weight used at the depth of 3230-3237 m was 16.9 ppg, which exceeds the minimum horizontal stress and fracture gradient at that depth. To avoid such issues, the mud weight should be gradually reduced to 14.4–14.9 ppg to ensure it remains above the shear failure gradient and below the minimum horizontal stress and fracture gradient.*

*Keywords: mud weight, wellbore stability, safe mud window*