ABSTRAK

ANALISA *1D GEOMECHANICAL MODEL* PADA *EXISTING WELL* (SUMUR SB-31 LAPANGAN H)

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Sumur SB-31 berlokasi di Cekungan Jawa Timur Utara yag memiliki beberapa masalah terkait stabilitas lubang bor seperti *kick* dan *lost circulation.* Hal ini dapat disebabkan karena penggunaan densitas fluida pemboran yang kurang tepat pada kedalaman tertentu, disamping juga dapat diakibatkan karena jenis batuan pada formasi terkait.

Analisa *safety mud window* dilakukan dengan data *wireline log* (*gamma ray log, density log*, dan *sonic log*) menggunakan *Drillwork Predict Software*. Pada *density log* diperlukan analisa lebih lanjut yang memuat data asli *density log* dengan hasil analisa *software* (data *composite*) untuk menghasilkan nilai *overburden gradient* yang tepat. Nilai *normal compaction trend* pada penelitian ini menggunakan analisa berdasarkan *trend* garis pada *sonic log*. Selanjutnya dilakukan perhitungan *pore pressure* dan *fracture pressure* yang keduanya divalidasi data tekanan aktual di beberapa titik yang diperoleh berdasarkan data lapangan. Kemudian diestimasi *minimum* dan *maximum horizontal stress* sebagai bagaian dari *in-situ stress*. Selain itu, perlu diestimasi juga nilai *shear failure gradient* agar diperoleh *range* densitas lumpur yang optimal untuk meminimalisir *well instability,* dimana harus lebih dari *shear failure gradient* dan kurang dari *minimum horizontal stress*.

Berdasarkan analisa geomekanika terhadap *problem* pemboran, indikasi terjadinya *overpressure* (*top overpressure*) terdapat pada kedalaman 3600 ft TVD. *Lost circulation* di Sumur SB-31 terjadi pada formasi Tuban yang batuan utamanya berupa *limestone* yang memang umumnya terdapat *reef, gravel,* dan *cavern* (gua/rongga). *Kick* yang ada di sekitar kedalaman 4600 ft terjadi karena *mud weight* yang digunakan kurang dari nilai *pore pressure*.

Kata kunci: geomekanika, *safety mud window*, *shear failure gradient*, *wellbore instability*

ABSTRACT

1D GEOMECHANICAL MODEL ANALYSIS OF EXISTING WELL (SB-31 WELL H FIELD)

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The "SB-31" well is located in the North East Java Basin and has several problems related to borehole stability such as kick and lost circulation. This can be caused by the use of inappropriate drilling fluid densities at certain depths, while it can also be caused by the type of rock in the formation.

Safety mud window analysis was conducted with wireline log data (gamma ray log, density log, and sonic log) using Drillwork Predict Software. In the density log, further analysis is needed that contains the original density log data with the results of the software analysis (composite data) to produce the correct overburden gradient value. The normal compaction trend value in this study uses an analysis based on the trend line in the sonic log. Furthermore, the calculation of pore pressure and fracture pressure is carried out, both of which are validated by actual pressure data at several points obtained based on field data. Then the minimum and maximum horizontal stress is estimated as part of the in-situ stress. In addition, it is also necessary to estimate the shear failure gradient value in order to obtain the optimal mud density range to minimize well instability, which must be more than the shear failure gradient and less than the minimum horizontal stress.

Based on the geomechanical analysis of the drilling problem, indications of overpressure (top overpressure) are at a depth of 3600 ft TVD. Lost circulation in Well SB-31 occurred in the Tuban formation whose main rock is limestone which generally contains reefs, gravel, and caverns. The kick around 4500 ft depth occurred because the mud weight used was less than the pore pressure value.

Keywords: geomechanics, safety mud window, shear failure gradient, wellbore instability