RINGKASAN

EVALUASI *MUD WEIGHT* BERDASARKAN ANALISIS MODEL GEOMEKANIK 1D

oleh
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Sumur AAK-002 pada Lapangan Krajan merupakan sumur eksplorasi di area Cekungan Jawa Timur Utara. Sumur ini dibor hingga kedalaman total 1756 m. Selama operasi pemboran berlangsung terdapat *wellbore instability problem* pada trayek 7" yaitu *hole collapse* di interval kedalaman 1300 – 1380 m (F. Ngimbang Bawah LST) dan *stuck pipe* di interval kedalaman 1388 – 1425 m (F. Ngimbang Bawah SST) yang disebabkan oleh dinding lubang bor runtuh. *Wellbore instability* perlu diatasi, maka dilakukanlah evaluasi *mud weight* berda sarkan analisis Model Geomekanik 1D.

Dalam mengevaluasi *mud weight* agar sesuai *safe mud window* demi meminimalisir *wellbore instability*, dilakukan analisis *mud weight actual* terlebih dahulu dengan pendekatan Model Geomekanik 1D. Pembuatan Model Geomekanik 1D diawali dengan pengolahan data *well log* yaitu *gamma ray log*, *density log*, dan *sonic log*. Dari pengolahan data *well log* tersebut didapatkan *shale base line* (SBL), *normal compaction trend* (NCT), dan *overburden gradient* (OBG). Prediksi *pore pressure* (PP) divalidasi dengan data *Drill Stem Test* (DST). Prediksi *fracture gradient* (FG) divalidasi dengan data *leak-off test* (LOT). Prediksi *minimum horizontal stress* (Shmin) dan *maximum horizontal stress* (SHmax), dan *shear failure gradient* (SFG). Penggunaan *mud weight actual* dapat dianalisis berdasarkan Model Geomekanik 1D dan mengkorelasikan permasalahan yang terjadi. Evaluasi *mud weight* dilakukan sesuai *safe mud window concept*.

Berdasarkan analisis model geomekanik 1D, menunjukkan bahwa *mud weight* yang digunakan pada trayek 7" memiliki nilai *mud weight* yang lebih kecil dari *shear failure gradient* (MW < SFG), sehingga bisa mengakibatkan *wellbore instability problem*. Pada interval kedalaman 1300 – 1450 m terjadi *hole collapse*, sehingga *mud weight* perlu dinaikkan dari 9.16 – 9.41 ppg menjadi 11 – 12.2 ppg untuk mengatasi *wellbore instability hole collapse.* Pada interval kedalaman 1388 - 1425 m terjadi *stuck pipe problem,* usaha pembebasan *stuck pipe* dilakukan dengan *work on pipe, overpull* dan injeksi lumpur *high vis* hingga akhirnya *drillstring* dapat dibebaskan.

Kata kunci: geomekanik, *mud weight*, *safe mud window*

ABSTRACT

MUD WEIGHT EVALUATION BASED ON 1D GEOMECHANICAL MODEL ANALYSIS

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The AAK-002 well in the Krajan Field is an exploration well in the North East Java Basin area. The well was drilled to a total depth of 1756 m. During the drilling operation, there was a wellbore instability problem on the 7" section, namely hole collapse at a depth interval of 1300 - 1380 m (F. Ngimbang Bawah LST) and stuck pipe at a depth interval of 1388 - 1425 m (F. Ngimbang Bawah SST) caused by borehole wall collapse. Wellbore instability needs to be addressed, so a mud weight evaluation based on 1D Geomechanical Model analysis was conducted.

In evaluating the mud weight to fit the safe mud window in order to minimize wellbore instability, the actual mud weight analysis is carried out first with a 1D Geomechanical Model approach. The creation of the 1D Geomechanical Model begins with processing well log data, namely gamma ray log, density log, and sonic log. From the well log data processing, the shale base line (SBL), normal compaction trend (NCT), and overburden gradient (OBG) are obtained. The pore pressure (PP) prediction was validated with Drill Stem Test (DST) data. Fracture gradient (FG) prediction is validated with leak-off test (LOT) data. Prediction of minimum horizontal stress (Shmin) and maximum horizontal stress (SHmax), and shear failure gradient (SFG). The use of actual mud weight can be analyzed based on the 1D Geomechanical Model and correlate the problems that occur. Mud weight evaluation is carried out according to the safe mud window concept.

Based on the 1D geomechanical model analysis, it shows that the mud weight used in the 7" section has a mud weight value that is smaller than the shear failure gradient (MW < SFG), so it can cause wellbore instability problems. In the 1300 - 1450 m depth interval hole collapse occurs, so the mud weight needs to be increased from 9.16 - 9.41 ppg to 11 - 12.2 ppg to overcome wellbore instability hole collapse. In the depth interval 1388 - 1425 m stuck pipe problem occurred, efforts to free the stuck pipe were carried out by working on pipe, overpull and high vis mud injection until finally the drillstring could be freed..

Keywords: geomechanic, *mud weight*, *safe mud window*