RINGKASAN

EVALUASI *WELLBORE STABILITY* PADA SUMUR FA-12 LAPANGAN DLI MENGGUNAKAN PENDEKATAN GEOMEKANIK 1D DARI DATA *LOG*

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Operasi pemboran pada Sumur FA-12 Lapangan DLI mengalami *problem lost circulation* pada kedalaman 5436-5478 ft, 6415-6443 ft, dan 7022-7030 ft pada Formasi Kujung dengan *lithology limestone*. Selain *problem lost circulation, lithology* formasi pada Sumur FA-12 juga didominasi oleh *shale* yang dapat menyebabkan *wellbore instability* jika *mud weight* yang digunakan lebih kecil dari *shear failure gradient.*

Dalam melakukan evaluasi *mud weight* ini diperlukan konsep *safe mud window* dimana perencanaan densitas lumpur yang aman untuk digunakan harus lebih besar dari *pore pressure* dan *shear failure gradient*, tetapi tidak boleh lebih besar dari *minimum horizontal stress* dan *fracture pressure*. Langkah awalnya adalah pembuatan model geomekanik 1D dengan pengolahan data *well log* berupa *gamma ray log*, *density log*, dan *sonic log*. Karena keterbatasan data yang dimiliki, untuk memvalidasi prediksi *pore pressure* menggunakan data *mud weight actual* pengganti data *drill stem test* (DST), validasi *fracture gradient* menggunakan data *leak-off test* (LOT). Kemudian melakukan prediksi *minimum horizontal stress* (Shmin), *maximum horizontal stress* (SHmax), dan *shear failure gradient* (SFG).

Berdasarkan analisis model geomekanik 1D, Hasil evaluasi untuk meminimalisir terjadinya *wellbore instability* yang disebabkan karena *mud weight* maka diperlukan evaluasi *mud weight* pada *hole section* 12 ¼" di Formasi Ngrayong dengan *range* 12,7 – 14,3 ppg dan pada *hole section* 8 ½" di Formasi Kujung disarankan untuk menggunakan DOB2C (*Diesel Oil Bentonite Cement*) karena penggunaan LCM tidak maksimal.

Kata kunci: Geomekanik, *Mud Weight, Safe Mud Window*

ABSTRACT

EVALUATION OF WELLBORE STABILITY IN WELL FA-12, DLI FIELD, USING A 1D GEOMECHANICAL APPROACH FROM WELL LOG DATA

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Drilling operations in Well FA-12, located in the DLI Field, encountered lost circulation problems at depths of 5436–5478 ft, 6415–6443 ft, and 7022–7030 ft within the Kujung Formation, which consists of limestone lithology. In addition to lost circulation issues, the formation lithology in Well FA-12 is predominantly shale, which may lead to wellbore instability if the mud weight used is lower than the shear failure gradient.

To evaluate the appropriate mud weight, it is essential to apply the concept of the safe mud window. The planned mud weight must be higher than both the pore pressure and the shear failure gradient but must not exceed the minimum horizontal stress and fracture pressure. The first step in this process involves developing a 1D geomechanical model by processing well log data, including gamma ray logs, density logs, and sonic logs. Due to limited data availability, actual mud weight data were used to validate pore pressure predictions in place of drill stem test (DST) data, while leak-off test (LOT) data were used to validate the fracture gradient. Subsequently, predictions of minimum horizontal stress (Shmin), maximum horizontal stress (SHmax), and shear failure gradient (SFG) were performed.

Based on the 1D geomechanical model analysis, an evaluation was conducted to minimize wellbore instability caused by mud weight. As a result, adjustments to the mud weight are recommended as follows, in the 12 ¼" hole section within the Ngrayong Formation, with a mud weight range of 12.7 – 14.3 ppg, and in the 8 ½" hole section within the Kujung Formation, it is recommended to use DOB2C (Diesel Oil Bentonite Cement) due to the limited effectiveness of using LCM (Lost Circulation Material).

Keywords: Geomechanics, Mud Weight, Safe Mud Window