

RINGKASAN

EVALUASI DATA MUD LOGGING DAN WELLSITE GEOLOGY UNTUK IDENTIFIKASI GEOTHERMAL FEED ZONE PADA PEMBORAN SUMUR DUG-L6, LAPANGAN GEA, SUMATERA SELATAN.

Penelitian ini bertujuan untuk mengidentifikasi zona produktif pada sumur panas bumi DUG-L6, Lapangan Gea, Sumatera Selatan, melalui integrasi data real-time selama pemboran berarah. Analisis difokuskan pada dua trayek lubang, yaitu 12¼” (1300–1790 mMD) dan 9⅞” (1790–2593 mMD), dengan menggunakan data dari Mud Logging Unit (MLU), deskripsi cutting, parameter teknis pemboran, serta respon formasi terhadap fluida sirkulasi. Indikator utama yang digunakan meliputi anomali drilling break, kehilangan sirkulasi lumpur, anomali temperatur BHCT, serta keberadaan mineral alterasi hidrotermal.

Hasil menunjukkan tiga kejadian drilling break signifikan pada kedalaman 1388–1389.7 mMD, 1667–1669 mMD, dan 2495.7–2497 mMD, yang ditandai dengan peningkatan tajam ROP, penurunan WOB, dan anomali suhu permukaan. Nilai BHCT melebihi ambang 55°C tercatat selama sirkulasi aktif pada interval 1300–1355 mMD (maksimum 63,4°C) dan 2300–2593 mMD (maksimum 60,6°C), disertai dengan kejadian kehilangan sirkulasi total (TLC). Evaluasi cutting pada interval 1300–1355 mMD mengidentifikasi litologi Dacite Lithic Tuff dengan mineral alterasi illite dan chlorite, serta nilai MeB sebesar 4–5 yang mengindikasikan zona transisi menuju zona permeabel.

Dua interval, yakni 1300–1355 mMD dan 2300–2593 mMD, memenuhi minimal tiga dari empat kriteria validasi zona feed, meliputi drilling break, TLC, anomali BHCT, dan mineral hidrotermal. Temuan ini menunjukkan bahwa integrasi data mud logging dan observasi geologi sumur mampu mengidentifikasi zona reservoir secara akurat selama pemboran. Metode ini terbukti efektif sebagai dasar pengambilan keputusan teknis secara real-time pada pemboran panas bumi.

Kata kunci: *Geothermal, zona feed, mud logging, drilling break, BHCT, DUG-L6, Sumatera Selatan.*

ABSTRACT

EVALUATION OF MUD LOGGING AND WELLSITE GEOLOGY DATA FOR THE IDENTIFICATION OF GEOTHERMAL FEED ZONES IN THE DRILLING OF WELL DUG-L6, GEA FIELD, SOUTH SUMATRA.

This study aims to identify productive zones in the DUG-L6 geothermal well, Gea Field, South Sumatra, by integrating real-time drilling data and geological observations during directional drilling. The analysis focuses on two borehole sections, 12¼" (1300–1790 mMD) and 9⅞" (1790–2593 mMD), using data from Mud Logging Unit (MLU), cutting descriptions, drilling parameters, and formation responses. Key indicators used include drilling break anomalies, mud losses, temperature anomalies (BHCT), and the presence of hydrothermal alteration minerals.

Results show three major drilling breaks at 1388–1389.7 mMD, 1667–1669 mMD, and 2495.7–2497 mMD, which coincide with sharp ROP increases, WOB reductions, and surface thermal anomalies. BHCT values exceeding 55°C were recorded during circulation at 1300–1355 mMD (peak 63.4°C) and 2300–2593 mMD (peak 60.6°C), accompanied by total and partial mud losses. Evaluation of cuttings in the 1300–1355 mMD interval revealed Dacite Lithic Tuff lithology with moderate to strong chlorite and illite alteration, supported by MeB values of 4–5, indicating transition from a sealing zone to a permeable feed zone.

Two zones—1300–1355 mMD and 2300–2593 mMD—meet at least three of four validation criteria: drilling break, circulation loss, BHCT anomaly, and hydrothermal mineral indicators. These findings demonstrate that the integration of mud logging and geological wellsite data can effectively identify geothermal reservoir zones in real-time, eliminating the need for post-drilling datasets such as wireline logging or PTS. The methodology provides a reliable, early assessment tool for geothermal drilling decision-making.

Keywords: *geothermal drilling, mud logging, wellsite geologist, feed zone, hydrothermal alteration, directional well, formation evaluation*