

LWD Acquisition of Caliper and Drilling Mechanics in a Geothermal Well, A Case Study in Sorik Marapi Field - Indonesia

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Abstract : The geothermal drilling environment presents many obstacles that have limited the use of directional drilling and logging-while-drilling (LWD) technologies, such as borehole washout, mud losses, severe vibration, and high temperature. The case study presented in this paper demonstrates a practice to enhance data logging in geothermal drilling by deploying advanced telemetry and LWD technologies. This operation is aiming continuous improvement in geothermal drilling operations. The case study covers a 12.25-in. hole section of well XX-05 in Pad XX of the Sorik Marapi Geothermal Field. LWD string consists of electromagnetic (EM) telemetry, pressure while drilling (PWD), vibration (DDSr), and acoustic calliper (ACAL). Through this tool configuration, the operator acquired drilling mechanics and caliper logs in real-time and recorded mode, enabling effective monitoring of wellbore stability. Throughout the real-time acquisition, EM-PPM telemetry had provided a three times faster data rate to the surface unit. With the integration of Caliper data and Drilling mechanics data (vibration and ECD -equivalent circulating density), the borehole conditions were more visible to the directional driller, allowing for better control of drilling parameters to minimize vibration and achieve optimum hole cleaning in washed-out or tight formation sequences. After reaching well TD, the recorded data from the caliper sensor indicated an average of 8.6% washout for the entire 12.25-in. interval. Washout intervals were compared with loss occurrence, showing potential for the caliper to be used as an indirect indicator of fractured intervals and validating fault trend prognosis. This LWD case study has given added value in geothermal borehole characterization for both drilling operation and subsurface. Identified challenges while running LWD in this geothermal environment need to be addressed for future improvements, such as the effect of tool eccentricity and the impact of vibration. A perusal of both real-time and recorded drilling mechanics and caliper data has opened various possibilities for maximizing sensor usage in future wells.

Keywords : geothermal drilling, geothermal formation, geothermal technologies, logging-while-drilling, vibration, caliper, case study

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