Temperature analysis of the well RN15/IDDP2 in Reykjanes under long-term flow variations

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Keywords: geothermal well, wellbore simulation, forward modelling, temperature log

ABSTRACT

The RN15/IDDP2 well in Reykjanes, Iceland, is one of the demonstration sites of the ongoing EU. Horizon 2020 DEEPEGS project. So far, the well represents the deepest geothermal drilled hole in Iceland with a final depth of 4659 m and measured bottom hole temperature of 427°C and fluid pressure of 34 MPa. (Friðleifsson et al., 2016). The project objective is to explore reservoirs under supercritical conditions. One of the challenging scientific tasks of this project is to estimate the static formation temperature around the well under continuous injection condition within the drilled borehole. Our on-going research aims at applying a numerical simulation approach to inverse the formation temperature based on the recorded temperature logs. Here, we present and discuss our current state of research.

In our work, a transient thermal transport model is set up and calculated by applying an in-house developed wellbore simulator, which allows for the incorporation of complex wellbore configurations and boundary conditions. In addition, the model is capable of taking into account the circulation time variation along depth due to the deepening of the well into account to prevent overestimated-cooling period at the greater depth. As an example test of the numerical tool, we present the procedure of performing one forward modeling using prior known initial formation temperature to obtain well fluid temperature profile. In this process, the whole injection history of drilling mud is considered which allows us to follow the local temperature perturbation that is changing with time at different depths. The time stepping scheme in the simulation is adjusted according to the real logging speed to guarantee simultaneous temporal-depth matching between the simulated and measured fluid temperature. Initial results of the long-term temperature variation in the well as well as the comparison between simulated and logged data will be presented.

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