DSI Booster Tool, in Split Flow mode, helps customer drill for 113 hrs on a deep Geothermal well in Europe

Challenge

A geothermal well in southern Poland is the deepest well ever drilled in the country. Eventually, the heat produced will be piped 10km to a neighboring town for district heating and cooling of homes.

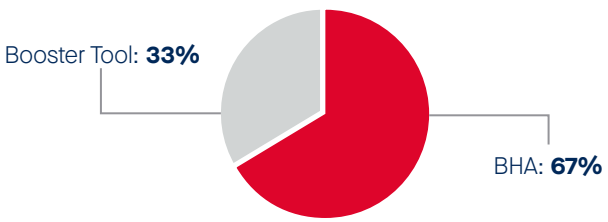
Numerous challenges arose during drilling due to the uncharted nature of the well. At a depth of 5900m TVD, the decision was made to suspend drilling for two months while the drilling team devised a new approach. One significant issue was the suspected washout of the formation, believed to be caused by excessive hydraulic force at the bit face, which was washing out and eroding the formation.

Solution

DSI recommended its 5-in. Booster Tool for the 6-in. OH since the Tool could split the flow to the bit to "dampen" the hydraulic impact. It could also redistribute the total flow across the system and boost the annular velocity higher up the string.

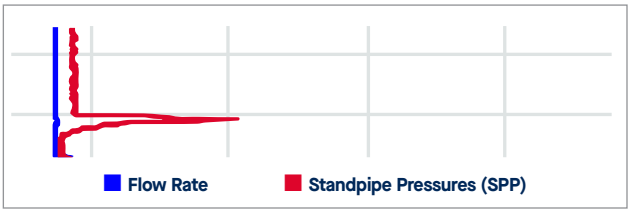
Before drilling activity was suspended, the maximum total flow rate through the BHA was 900LPM. The 5-in. Booster Tool was set up to reduce the flow rate to the bit to 67% (600LPM) and divert 33% (300LPM) upwards out the Booster Tool, providing the same 900LPM as before.

Flow Rate Distribution%



Execution

The 5-in. Booster Tool was picked up and run into the hole on a rotary BHA. Upon reaching the bottom at a depth of 5900m TVD, an opening ball was dropped from the surface. A constant flow rate was maintained, and when the ball landed on the ball seat within the Booster Tool, a pressure response was observed. Following best operational practices, the flow rate was kept constant throughout the procedure, as indicated by the blue flow rate track.



The red track indicates the ball landing on the seat, followed by an increase in SPP. As the pressure rises, the spring begins to compress, causing the indexing mechanism to shift position. When the SPP reaches its peak (the shear pressure of the ball), the ball passes into the ball catcher below, and the tool locks open in Split Flow drilling mode. The visible reduction in the SPP plot indicates a lower reading at the same flow rate. This reduction confirms that the tool is open and Split Flow is activated, resulting in a larger TFA within the system.

Following the opening procedure, drilling resumed at a rate of penetration (ROP) of 1m/h This continued for a total of 113 hours, during which 46m was drilled to reach a depth of 6000m. Eventually, the BHA was pulled out due to the low ROP.