



Packers Plus successfully completes geothermal well with new Inferno system completion tools



Background

Geothermal energy is one of the leading renewable sources of environmentally friendly power generation. It involves using the earth's stored thermal energy to super heat water, which can then be used to directly heat homes or generate electricity. Traditionally, geothermal electric plants have been built on the edges of tectonic plates where high temperature geothermal resources are available near the surface. Recent improvements in drilling and extraction technology have enabled the creation of geothermal power plants in areas where the thermal resources lie deep under the surface.

With some of the hottest conditions anywhere in the world, granite formations in the Cooper Basin of South Australia are ideal for geothermal energy generation. This is where Geodynamics, a company focused on Enhanced Geothermal Systems (EGS), also known as hot fractured rock (HFR) geothermal energy, is developing a large-scale geothermal electricity project.

The Challenge

The geothermal target formations in the Cooper Basin lie over 13,000 ft (4,000 m) below the surface and require hydraulic

fracturing to increase surface area for efficient heating of injected water. Geodynamics had successfully drilled five vertical wells, but had encountered challenges with casing integrity due to the extreme conditions. In order to successfully complete, they needed to find a company willing to build a set of completion tools rated for 600°F (315°C) and 10,000 psi (69 MPa). Geodynamics had approached a number of companies, none of which were keen to take on the project. As a highly innovative company known for designing customized completion solutions, Packers Plus welcomed the challenge.

The Solution

The project required Packers Plus to supply fit-for-purpose production packers, liner hangers, polished bore receptacles (PBR), seal assemblies, anchor latches and float equipment for 7-in. and 9 5/8-in. casing sizes. This required research into all tool parameters including metal alloys, threads, seals, and elements in order to design prototype tools that could pass testing to 600°F and 10,000 psi. To add to the challenge, Geodynamics required that the tools be ready for installation in six months. A Packers Plus product design team was quickly assembled with representatives from Engineering, Manufacturing and Technical Services, and the Houston Rapid Tool Development Center served as the headquarters.

The Results

The new Inferno™ completion tools were successfully designed, prototyped, tested and delivered within the scheduled project timeline. Geodynamics and Packers Plus Field Operations personnel then worked

together on the unique installation sequence required to repair the geothermal well. The team faced a number of upfront challenges with the mud system due to the intense heat; however, the team was able to work past these issues and successfully complete the well in preparation for hydraulic stimulation.

Geodynamics announced the successful fracture stimulation of the well at 4,400 m and 4,700 m depths with a total 3,460 bbl (550 m³) fluid resulting in a three-fold increase in fracture conductivity. The measured temperature at the total depth of 4,900 m was 532°F (278°C), hotter than the previous wells they had completed.

Packers Plus' success with a geothermal well not only distinguishes them as the "go-to" solutions company for complex completions, but opens up an entirely new global market for the award-winning company. Geodynamics alone has a goal of providing the equivalent of 10 to 15 coal-fired power stations (10,000 MW) by the end of this decade.

In addition, the oil and gas industry continues to push the limits of drilling and completions by targeting deeper and hotter formations. The success of this geothermal project indicates the potential application of the Inferno tools for multi-stage hydraulic fracturing. The Inferno system will operate in the same manner as the Packers Plus StageFRAC* system, which has been run over 5,000 times in a wide variety of formations and conditions.

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