

Expro Excellence

Expro's TCP team successfully delivers first underbalanced perforated completion for key European Geothermal project

Geothermal | Well Flow Management



Objectives and background

- Expro was awarded a ten-well TCP project for Geothermal (hot water) delivery with a tight schedule from award to execution
 - This project was divided into five pairs of wells (doublets) – one water injection well and one water producing well. At surface these wells were very close (~ 8 m) but at a depth (~3,000m) approximately, 0.93 miles apart
 - This distance enabled injected water to travel through the formation resulting in heated water production (~93.3°C), which entered a closed pipe system for heating buildings, greenhouses, homes etc

Challenges

- Specially lined casing with glass reinforced Epoxy (GRE) was used to preserve the integrity of the wellbore for an expected 30-year life. At only four mils thick, the lining, if damaged, would allow corrosive salt water to attack the casing, creating a future well integrity issue
- Running long intervals (~150m) of large (4.5in OD) high-shot density (12spf) perforating guns conveyed on small Coiled Tubing (2.00 OD) with small (1.50 AMT) threads of low strength (42,000 lbs)
- To provide uniform wellbore underbalance (formation pressure is greater than the wellbore pressure) at the time of firing for optimal perforation tunnel cleaning across the entire perforating interval
- Expro had to work within tight timelines around an active drilling project with any issues resulting costly penalties

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- To ensure well longevity, special roller connectors were designed to protect the GRE lined casing from damage by ensuring minimal contact while running the long gun assemblies in the well. The efficient collaboration between the client, Expro, and outside experts was essential for the effective design, delivery, and implementation of this
- To determine if the long bottomhole assembly (BHA) could be successfully deployed, fired, and retrieved on Coiled Tubing, Expro's Reservoir Engineering team performed shock modelling (PulseFrac) to ensure this could be accomplished
- Modelling was validated with the successful completion of two wells to date (4 runs total), with 100% shots fired and no safety or lost-time incidents
- For the perforation clean-up, Expro's Auto-Vent Firing Head, provided a fit-for purpose solution to closed system firing. Auto-venting during firing allowed communication of pressure from the formation into the wellbore to facilitate this formation clean-up

Value to the client

- The customer benefited from the efficient application of tried-and-tested completion technology and expertise from the oil and gas industry to increase productivity for this geothermal project, boosting energy security and assisting energy transition initiatives
- To assure this project's successful completion, Expro supplied an integrated project management solution, offering technical know-how, supply chain coordination, and operational excellence
- Injection and production results are being further analyzed to determine the effectiveness of gun systems selected to optimize the BHA assemblies used in these wells going forward

Lower carbon footprint



Integrated approach

