Operator in Saudi Arabia Optimizes Milling Performance via Real-Time Coiled Tubing Data

**OVERVIEW**

Milling interventions are often necessary to remove restrictions in a well for optimum efficiency of routine or special operations, while minimizing downtime without incurring any costly damage. In this case, an operator in Saudi Arabia was preparing to sidetrack a critical gas producer well, which first required milling out of a tubing nipple restriction in order to allow subsequent deployment of the whipstock.

A coiled tubing operation was planned, using SPECTRUM SM Intervention Services’ real-time sensing bottomhole assembly (BHA) to maintain accurate depth control throughout the milling process, with an essential goal of preserving the integrity of a close-by packer in order to avoid pulling the completion string. With SPECTRUM Intervention Services, the milling was accomplished without damaging the packer, thus preventing the operator from having to pull the completion string with a workover rig.

**CHALLENGES**

- Millout restriction without damaging packer to avoid pulling the completion string:
  - Identify accurate depth of nipple restriction to be milled out
  - Use downhole motor at optimum conditions to avoid internal-component damage and stalling

**SOLUTIONS**

- Utilizing SPECTRUM SM Intervention Services to provide accurate target identification via depth correlation
- Obtaining real-time downhole data to enable control of downhole motor performance

**RESULTS**

- Delivered flawless execution of SPECTRUM diagnostic services, optimizing time on location and mitigating risks
- SPECTRUM services helped operator avoid costs of workover rig and allowed rigless execution with coiled tubing

**CHALLENGES**

The prior operator’s experience had demonstrated inherent risks and inefficiencies related to inadequate milling performance, due to frequent motor stalling and extra time on location. Improving operations and tool performance would require two key elements: 1) Monitoring the coiled tubing depth in real time to assist accurate positioning in order to efficiently mill the nipple, and 2) optimizing proper operating conditions of the downhole motor while milling out the restriction to help prevent nonproductive time (NPT) and job delays.

**SOLUTIONS**

Halliburton used SPECTRUM Intervention Services with a modular BHA on coiled tubing, customized for collecting real-time data with sensors for depth correlation via a casing collar locator and pressure monitoring across the motor. Leveraging the real-time measurements being delivered to surface operations, the team accurately identified the nipple position by...
correlating depth while also preventing motor stalling – further minimizing millout time and avoiding extra trips to replace damaged components.

The use of SPECTRUM Intervention Services’ real-time data resulted in an efficient operation that achieved the customer’s objectives, while significantly mitigating the risk of unintentionally damaging the packer. Additionally, the transparency of downhole conditions and tool performance led to a significant improvement in overall results compared to similar operating environments.

RESULTS

Real-time pressure and depth measurements allowed the operator to control and optimize weight on bit and pump rate during the job, resulting in improved reliability of the downhole motor and optimized milling performance.

The operator achieved its objective of milling the restriction without damaging the packer or having to pull the completion string, thus saving potential associated workover rig costs by being able to deliver the entire operation via SPECTRUM Intervention Services’ real-time coiled tubing services.

DID YOU KNOW

SPECTRUM® SM Real-Time Coiled Tubing Services combines intervention and diagnostic services to help operators monitor and optimize job performance in real time, resulting in greater efficiency, safer operations, and higher return on investment.

SPECTRUM Intervention Services is the latest Halliburton coiled tubing fiber-optic technology, helping to improve reliability and precision during job execution via real-time measurements from the customized BHA. This modular system includes sensors monitoring pressure (inside and outside the tools), temperature, casing collar locator, gamma ray, inclination, tool face, tension/compression, and torque.

The SPECTRUM Intervention Services allows all regular coiled tubing operational parameters to be maintained, including flow-through capability, high pump rates, tolerance to corrosive fluids and ball-drop capability. Real-time measurements are collected from the location of the treatment and surrounding downhole environment. Information can be shared remotely via satellite communication to global experts or the customer’s office, creating the ability to customize well intervention operations in real time, and thus saving time and reducing total costs.

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