FracPoint Completion System Isolated Openhole Horizontal Well in Lower Huron Shale

Technology overcame wellbore obstacles

Benefits

- Increased production rates
- Lowered operational cost
  - Eliminated coiled tubing operations
  - Eliminated cementing operations
  - Eliminated wireline operations
  - Reduced pumping time

Background and challenges

- Lower Huron Shale, Kentucky
- Provide increased production associated with multistage hydraulic fracturing while reducing cost
- Needed to complete well after drillstring caught fire and had to be left downhole
- Needed to overcome wellbore obstacles caused by downhole fire

Baker Hughes solution and results

- Included FracPoint multistage fracturing system using hydraulic-set openhole packers, including one that was set in casing for additional isolation
- Used ball-activated frac sleeves and pressure-activated sleeve (P-sleeve)
- Successfully deployed a FracPoint completion and salvaged the well
- Successfully fractured an eight-stage FracPoint system

The Baker Hughes FracPoint™ multistage fracturing system provided a completion method using packers to isolate sections of the wellbore (stages) and frac sleeves to direct the frac treatment to the desired stage. The use of this type of completion eliminated the need for cementing the liner, coiled tubing operations, and wireline operations, while significantly reducing overall pumping time.

This particular setup was a long liner string back to surface, so a casing hanger packer was not needed. To provide extra protection while fracturing, a hydraulic-set openhole packer was set in the vertical intermediate casing. Even though the primary application of the FracPoint tool is for openhole, the system can also be used for isolation in a cased-hole environment.

Before installing the FracPoint system, the operator had a downhole fire while drilling (air-drilled hole) and lost a portion of the drillstring. The landing depth of the well had to be cut short and the wellbore had been damaged. After the operator expressed their concerns about reaching setting depth with the completion, it was decided to try to complete the well as planned, minus the depth lost.

While installing the system, the bottom of the tool string started having difficulty moving up or down the hole approximately 1,500 ft (457.2 m) from the setting depth because of the wellbore damage the fire had caused. The Baker Hughes personnel on location recommended stopping and circulating around the system to clean up the debris surrounding it. After pumping a foam sweep for three hours, the debris was determined to be cleared by watching the returns from circulating. The string was picked up again and was free to move. To ensure the string made it to setting depth, the foam was circulated while running in the hole, and the tool string was reciprocated as needed. The tool string was landed at the intended setting depth, and was hung on the wellhead.

The pumping crew then rigged up. Because there was no fluid in the string, 5 bbls (0.6 m^3) of water were pumped first. A setting ball was dropped downhole immediately following, and the ball was circulated down to the ball seat sub with water. The appropriate amount of pressure was applied to set the hydraulically actuated openhole packers, including the one in the casing. At this point, the rig was moved to the next location and the frac job could commence at the operator's discretion.

Five weeks later the fracturing crew was called out to location and the fracturing began. The P-sleeve was opened first by simply applying pressure, and the first frac was performed. Once the frac was complete for this stage, the ball corresponding to the second stage was dropped into the flow path without shutting down the pumping operation. When the ball seated for the second stage, pressure was applied to open the sleeve and the second fracture was started. This process was repeated until all eight stages were fractured. All eight stages of the FracPoint multistage fracturing system were successfully fractured, averaging a surface pressure of 3,600 psi (248 bar). The operator was impressed with the FracPoint system's ability to salvage the well.