eRED® Valve Used as a Remotely Operated Shut-In Barrier

OVERVIEW

The York East well is in an undeveloped gas field located in the southern North Sea. The field lies in 150 ft of water depth, and, once completed, the York East development would consist of a normally unmanned installation (NUI) with a gas export pipeline tied back to land.

Instead of multiple wireline runs, Centrica used a Halliburton eRED® remotely operated ball valve with two built-in transducer and pressure valves to supplement the data from conventional downhole gauges.

The reduction in wireline rig-ups and operational footage reduced the overall complexity and cost of the operation. Another positive point of this operation was the reduced exposure to weather delays while rigging up slickline and the avoidance of general risks associated with wireline operations.

CHALLENGE

Centrica needed to drill, complete, test, and suspend the well with gas across the reservoir face until recompletion at a later date after the platform could be installed over the location.

Traditionally, multiple wireline runs are required to perform well tests, using traditional plug and prong methods, but the operator wanted to reduce the number of wireline rig-ups required for this operation.

SOLUTION

To reduce wireline rig ups and operational footage Halliburton suggested remote open close technology. The well was drilled to a total depth (TD) of 14,130 ft measured depth (MD). A wellbore cleanup and displacement operation was then completed prior to deploying the sandface completion across the reservoir. After the sandface completion was installed, the upper test string was run with coiled tubing in order to pump in nitrogen and aid in the cleanup of the well. Nitrogen was pumped from the toe of the well to clean up the horizontal section, and pumping continued until the well was sufficiently unloaded and flowing naturally.
After the coiled tubing was recovered, two downhole memory gauges were run and set in the lower 3.688-in. AR nipple, and the well was opened up for the cleanup phase. The well was then shut-in for a build-up period prior to running the Halliburton eRED electronic remote equalizing device with dual memory gauges connected to its bottom sub. The complete assembly – which included a 3.688-in. lock, crossover, pinned melon equalizing assembly, eRED valve, and two memory gauges – was set in the upper 3.688-in. nipple profile.

Above the lower-set nipple, there was a perforated pup to allow flow to surface. The eRED valve was then used during the well test phase (in both pressure buildup and flowing periods) as a remotely operated downhole shut-in valve.

The well was flowed via the rig well test spread, and the eRED valve was programmed to close after 59 hours, once the required step-rate test was complete. The valve would remain closed for 36 hours, as per the well test program, to obtain the required downhole buildup pressure data. Upon reaching the 36 hours, the eRED valve opened and was recovered using slickline. Once the tools were at surface, the data was downloaded from the downhole gauges and the eRED valve’s integrated sensor log. The log file data was sent back to Halliburton for conversion to pressure vs. time graphs, which were then passed on to Centrica for cross-reference purposes with the downhole gauge data.

RESULTS

The eRED valve opened and closed as per the designed program for the flow and pressure buildup periods on the York East well. The operation saved three wireline runs compared to traditional plug and prong applications, and this reduction in wireline rig-ups and operational footage decreased the overall complexity and cost of this type of operation. Other positive results of this operation were the reduced exposure to weather delays while rigging up slickline and the avoidance of general risks associated with wireline operations. Additional results of this operation included:

» The eRED valve function times could be changed on the rig to suit the pressure buildup and flow period changes
» Reduction in the associated risk involved with rigging up pressure-control equipment (PCE) and running slickline
» Excellent data was obtained for the Centrica subsurface team, including downhole shut-in, buildup, and step-rate test data

» Downhole shut-in pressures obtained would not have been possible with conventional gauges, and, as such, this has given the reservoir engineers additional data for well test analysis.