

eRED® Valves Save 10 Wireline Runs from Subsea Completion

UNITED KINGDOM

CHALLENGE

- » Reduce or eliminate necessity for multiple wireline runs required to perform packer setting and testing
- » Reduce or eliminate additional wireline runs required to set shallow barrier

SOLUTION

- » Two eRED® valves to remotely open and close the downhole plug
- » One eRED valve was used to set packer and act as deep-set barrier, while the other eRED valve acted as shallow-set barrier
- » Both eRED valves were programmed to respond to unique commands

RESULTS

- » Saved 10 wireline runs in comparison to traditional plug and prong application
- » Reduced HSE risks associated with rigging up pressure-control equipment (PCE) for wireline
- » Decreased operational time on rig, resulting in less exposure to potential nonproductive time (NPT) due to adverse weather conditions

OVERVIEW

The Eastern Trough Area Project (ETAP) is an integrated development of seven different reservoirs. Four separate fields are operated by BP: Marnock, Mungo, Monan, and Machar. The Machar well in this case study is a subsea producer (tied back to the ETAP platform). The de-completion, sidetrack, and two-stage recompletion was performed from a semisubmersible rig in the last quarter of 2009.

The Halliburton eRED® intelligent downhole equalizing device was previously used successfully in several platform and subsea operations for BP in the UK and Norwegian sectors. Programmable electronics and sensors enable the eRED valve to be repeatedly instructed to open and close by using pressure and time commands. This particular operation was the first time that two eRED valves had been used in series in one completion, with each tool programmed to respond to its own unique command, specifically applying pressure over a given time period.

Both eRED valves functioned as designed, enabling BP to remotely open and close, and then perform multiple tests against them. A total of six deep and four shallow wireline runs were eliminated from this particular operation, resulting in a significant reduction in health, safety, and environmental (HSE) exposure.

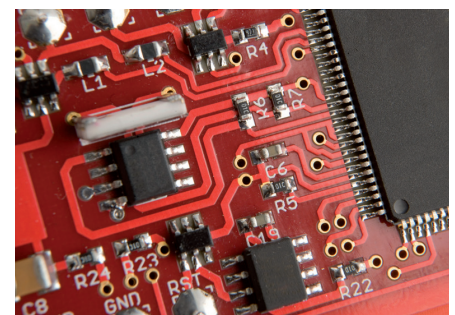
CHALLENGE

To properly complete the seven different reservoirs, BP needed to set and test the packers and shallow barrier valves. Traditionally, this would require several wireline runs, which, in turn, can create additional challenges such as HSE risk, weather-related delays, and extra service costs.

SOLUTION

The Lower Completion

Following the de-completion and sidetrack operations, the lower completion and liner hanger were run in hole (RIH) to depth in the newly drilled 6-in. openhole section. A ball was then dropped and circulated to depth. The completion was then pressured up to set the openhole packers. The pressure was increased to set the liner hanger and release the running tool.



The Upper Completion

In this particular operation, two traditional plugs were replaced with eRED valves for improved safety and reduction of risk by removing wireline runs. Both eRED valves were pre-installed onshore, one as a deep-set barrier below the production packer (on a standard 4.313-in. lock) and the second in the tubing hanger (on a standard 4.875-in. lock). Both eRED valves were fully tested from above and below before shipping as normal.

Offshore, a laptop was connected to the eRED valves and diagnostic checks were made to ensure they were operating correctly. The upper completion was then RIH with both valves fully open, allowing fluid to bypass and allowing pressure to access the lower completion for well control. With the completion at depth, the tubing hanger was landed and locked in place.

The deep-set eRED valve was then instructed to close with a preprogrammed pressure and time command of 750 psi (in a window of 500–1,000 psi) applied to the tubing for 10 minutes. A delay of five minutes was included to allow for bleeding off of applied pressure prior to the ball closing.

The production packer was then set hydraulically by pressuring up against the deep-set eRED valve. The first attempt to pressure-test the production packer was unsuccessful. As the valve was set up with repeating triggers, the instruction to reopen the ball was given with the same pressure and time command of 750 psi (in a window of 1,500–2,000 psi) applied to tubing for 10 minutes (but no time delay). Following troubleshooting, the eRED valve was given instructions to close again with the same preprogrammed pressure and time command. The production packer pressured-tested successfully on the second attempt.

The tubing hanger eRED valve was then instructed to close with its different preprogrammed pressure and time command of 1,750 psi (1,500-2,000 psi window) applied to tubing for 10 minutes. A delay of five minutes was also included.

With both eRED valves now closed, providing a fully testable dual barrier, the drilling blowout preventer (BOP) was set, and the subsea tree was installed and tested. Still without any form of intervention, the tubing hanger eRED valve was opened remotely with its command trigger. Positive feedback that the valve had opened was observed at surface by a tubing pressure drop. The deep-set valve was then opened remotely with its command trigger. Once again, positive feedback that the eRED valve had opened was observed at surface by a tubing pressure drop.

RESULTS

Both eRED valves functioned as designed, enabling BP to remotely open and close the valves, and then perform multiple tests against them. A total of six deep and four shallow wireline runs were eliminated from this particular operation, resulting in a significant reduction in HSE exposure. Additional results of this operation included:

- » Reduced exposure to potential weather-related delays by decreasing risks associated with wireline operations (i.e., less necessity to rig up slickline), which is especially important for winter operations
- » Reduced personnel-on-board (POB) requirements (four-man wireline crew required later in the program and for shorter duration)
- » Reduced slickline service costs for both personnel and equipment
- » Increased operator confidence in eRED valves that remotely open and close
- » Pre-installed eRED valves and annulus filter sub reduced slickline runs from 12 to two

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