

eRED[®] Valve Saves Six Hours of Rig Time for BP

UNITED KINGDOM

CHALLENGE

- » Provide more efficient method of setting a shallow barrier
- » Reduce rig-up time for PCE
- » Recommend easily adaptable solution for existing BP completion infrastructure

SOLUTION

- » eRED[®] valve used as a shallow-set barrier
- » eRED valve programmed to close on applied command to act as shallow barrier while blowout preventer was removed and Christmas tree was installed

RESULTS

- » Eliminated need for three wireline runs, saving approximately six hours of rig time
- » Reduced HSE risks associated with rigging up PCE for wireline
- » Decreased exposure to potential weather-related nonproductive time

OVERVIEW

The Eastern Trough Area Project, commonly known as ETAP, is a network of nine smaller oil and gas fields in the central North Sea covering an area up to 35 km in diameter, six operated by BP and another three operated by Shell. A single Central Processing Facility (CPF) sits over the Marnock field and serves as a hub for all production and operations of the assets.

Well No. 22/24a-PWRI-3 is the third ETAP produced-water disposal well drilled and operated from the ETAP CPF. Produced-water reinjection (PWRI) into this Palaeocene section above the Marnock gas-condensate reservoir was selected as the best environmental option for disposal of ETAP produced-water volumes.

The ETAP PWRI-3 well was drilled and completed using a heavy-duty jackup (HDJU) rig from May 2008 to July 2008. A 7-in. Duoline tubing string with 25Cr/Inconel 718 assemblies was installed. The well was perforated following the Christmas tree installation and then injection-tested.

The feasibility of using the Halliburton eRED[®] valve as an integral part of the wireline tubing hanger plug was studied by BP as part of an effort to improve efficiency. Because eRED valves allow any number of pressure tests up to 10,000 psi while reducing the number of wireline runs required to install, equalize and retrieve the plugging device it was chosen to set the shallow barrier. Onboard programmable electronics and sensors enabled the eRED valve to open and close as per predetermined pressure and time signals providing a highly flexible downhole barrier.

CHALLENGE

BP needed a more efficient method to set a shallow barrier and to reduce rig time for pressure-control equipment (PCE). In doing this, BP wanted to ensure that the solution chosen would adapt to the existing completion infrastructure that was set in the well.

SOLUTION

This water injection completion consisted of a hydrostatically set 9 5/8-in. x 5 1/2-in. production packer, un-perforated 5 1/2-in. and 7-in. 25 Cr tubing, and a tubing-retrievable safety valve (TRSV).



The eRED valve was made up to a standard 6.187-in. lock and pre-installed into the tubing hanger at surface. It was then run in hole with the ball in the open position, allowing fluids to bypass while landing the tubing hanger.

Once at depth, the tubing hanger was landed and locked in place. The production packer was then set and the tubing tested to 6,000 psi through the open eRED valve. The TRSV was then pressure-tested and in-flow tested as per program.

After successful completion of the TRSV function and in-flow test, the eRED valve was commanded to close with a preprogrammed pressure and time signature (2,500 psi applied to tubing for 10 minutes). A delay of five minutes was included for bleeding off pressure prior to closing.

The eRED valve closed as expected when the command trigger was initiated. The barrier was then tested, the blowout preventer (BOP) was removed, and the lower master gate valve and Christmas tree were then installed and tested.

Still without any form of intervention, the eRED valve was opened remotely by applying the predetermined command trigger at surface (1,500 psi for 10 minutes). Positive feedback that the valve had opened was indicated at surface by observing a tubing pressure drop.

The equalized hanger plug and lock assembly was then retrieved with wireline, without the need for PCE.

RESULTS

The eRED valve functioned as designed, enabling BP to remotely close and then equalize (reopen) across the plugging assembly without the need for wireline intervention. This operation eliminated the need for three wireline runs, along with the associated rigging up of PCE, thus saving approximately six hours of rig time and significantly reducing exposure to health, safety, and environmental (HSE) risks. Additional results of this operation included:

- » Pre-installed eRED valve eliminated necessity for three slickline runs
- » Approximately six hours of rig time saved
- » Downhole barrier closed and reopened without any intervention
- » Removed requirement to rig up PCE once eRED valve was opened and reservoir isolation device confirmed still closed
- » Reduced slickline service costs related to both personnel and equipment

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