Remote Open Close Technology Reduces Abandonment Costs and Increases Operational Efficiency

EVO-RED® BRIDGE PLUG SAVES 30 HOURS OF RIG TIME

WESTERN AUSTRALIA

OVERVIEW

An operator in Western Australia, required a solution to reduce or eliminate interventions during their abandonment operations on a platform well.

A rigless slickline intervention campaign was identified to minimize operations carried out during plug and abandonment (P&A) operations once the rig arrived on site. Halliburton proposed a remotely operated Evo-RED® bridge plug to be used in two capacities. First, it was used as a temporary well barrier during suspension and subsequent well kill operations by looping a trigger to open, and then close, as many times as required until the well was killed. It was also utilized as a test barrier to safely change out the christmas tree / blowout preventer ahead of retrieving the production tubing, without the need for intervention.

The Evo-RED plug was opened via application of a preprogrammed pressure command to the tubing against the closed Evo-RED plug. Inhibited seawater was pumped through the tubing to remove hydrocarbons. Once the timer expired, the Evo-RED plug closed, and inhibited seawater was then pumped down the annulus in order to remove hydrocarbons. In both cases seawater was bullheaded into the formation.

Having a remote opening barrier to kill the well without slickline intervention saved a minimum of six hours critical path rig time. Additionally, by allowing for efficient well kill operations without slickline operations, the well could be killed immediately prior to P&A operations without having the rig on site.

CHALLENGE

The operator wanted to find a solution to reduce or eliminate interventions during their abandonment operations on a platform well. A well integrity review of a shut-in platform production well had identified it as a candidate for abandonment. Benefits of performing offline well kill operations efficiently and providing a shallow barrier with minimal intervention operations was noted.
SOLUTION

Knowing the operator needed an effective barrier that could be remotely operated using applied pressure and timer commands, Halliburton proposed the remotely operated Evo-RED bridge plug. The Evo-RED plug offers greater flexibility, as it uses onboard decision-making electronics that monitor well conditions and are programmed to either open or close whenever a specified condition (known as a trigger) is detected. This would allow the operator to communicate with the tool remotely from surface using a combination of applied pressure commands and timers.

The strategy was to use the plug as a temporary well barrier during suspension to safely change out the christmas tree / blowout preventer ahead of retrieving the completion, which would give both an API-verified barrier and a means to remotely open and close the valve on demand in order to perform pumping and completion retrieval operations without the need for intervention.

The tubing was cut above the production packer on the platform, and the well was subsequently killed by bullheading inhibited seawater via the tubing and annulus. The Evo-RED bridge plug was selected for use as a well barrier and was deployed in the closed position using slickline. With plastic-coated tubing, the assembly was located inside a blast joint in order to ensure the bridge plug seal would not be compromised. It was successfully set using a non-explosive DPU® downhole power unit activated on a timer, then tested to ensure integrity. The Evo-RED plug was then function tested via an applied pressure trigger command to open the valve, after which a 10-minute timer was initiated to reclose the tool. Once the valve had returned to the closed position, a pressure test was carried out to ensure its integrity as a qualified barrier for temporary suspension to remove the wellhead.

Prior to the jack-up rig arriving on location, the operator took advantage of having a remote opening barrier and killed the well offline on multiple occasions, including immediately before the rig could perform P&A operations. This action subsequently saved a, minimum of six hours critical path rig time normally required for this operation. The Evo-RED plug was opened via application of the preprogrammed pressure command to the tubing against the closed Evo-RED plug. This initiated a timer to commence, which gave the operator a sufficient window to pump 200 bbls of inhibited seawater at 7.4bbl/min through the Evo-RED plug to circulate any gas that may have been present in the well.

RESULT

When completed, the Evo-RED bridge plug was successfully tested and qualified as a barrier once again. When the jack-up was positioned over the well, the Evo-RED plug was tested along with the surface pressure control equipment to change out the BOP and the wellhead. Subsequent opening allowed for tubing retrieval, once the plug was locked open via a pressure command to allow for a bypass through the tubing while the pre-cut tubing was being retrieved. It was later retrieved on deck once the tubing was laid out.

Use of the remotely operated Evo-RED plug in a rigless intervention saved the client 30 hours rig time and greatly reduced the number of interventions required to complete the well. It also helped eliminate three slickline runs, one wireline rig-up and rig-down, while also reducing the time that a slickline crew was required to be on location. Since the operation ended 1.5 days under authorization for expenditure (AFE), the operator came in US $300,000 under budget. The operator ultimately saved a grand total of 70 hours of rig time when including the 40 hours of time gained by performing the tubing cut and killing the well ahead of schedule.

The Halliburton Evo-RED bridge plug saved time, reduced HSE exposure, operational risks, and save costs normally incurred in these operations.

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