Well Abandonment Using Hydraulic Tubing Release Tool

H. Mutenga* (Schlumberger), G. Joneja (Schlumberger), M. Awalt (Schlumberger), M. Serwaa Bonsu-Gyimah (Schlumberger), M. Bogaerts (Schlumberger), C. Johnson (Schlumberger) & D. Schmidt (BG Tanzania)

SUMMARY

Traditional abandonment of a well is accomplished by setting multiple cement plugs to achieve zonal isolation. By setting longer plugs to cover multiple zones and thus having fewer cement jobs, rig time and operating costs can be significantly reduced. However, there are limitations to the length a cement plug can be set conventionally without increasing the operational risks such as stuck pipe. The Hydraulic Tubing Release Tool was introduced on a deepwater exploration and appraisal well campaign in East Africa. It has been used successfully on 5 wells to set long abandonment plugs, ranging from 700m to 1800m.
Introduction

Traditional abandonment of a well is accomplished by stacking multiple cement plugs to achieve zonal isolation. The plugs covering reservoir sections are normally independently verified in keeping with best practices applicable to well barriers. By setting longer plugs to cover multiple zones, rig time and operating costs can be significantly reduced. However, there are limitations to cement plug length when set conventionally without significantly increasing the risk of stuck pipe. The Hydraulic Tubing Release Tool (HTRT) was introduced during a deep-water exploration campaign in East Africa. It has been used successfully during the abandonment of five different wells where seven plug and abandonment operations placed long abandonment plugs, ranging from 405m to 1787m, in a single operation.

Method and Theory

The HTRT is connected to sacrificial tubing and run in hole to plug setting depth. The cement slurry is then placed in the wellbore after which the HTRT is disconnected from the sacrificial tubing string. Typically this is achieved by launching a dedicated dart down the running string to activate the releasing system built into the HTRT Tool. The dart latches into a sliding sleeve located on the inside diameter of the HTRT which is held in place by shear screws. Once the dart has landed and the required pressure is reached, the screws shear causing the internal sleeve to move downward. The movement results in the separation of the HTRT while the sacrificial tubing stays in the cement column and will be left in the wellbore after abandonment (Figure 1). Using the appropriate sized dart and a crossover that maximizes pipe ID is vital, which ensures a smooth transition from drill pipe to tubing and ultimately achieves successful disconnection.

Figure 1 An example of tubing releasing system configuration used on a well abandonment in East Africa. On release of the tubing release system after plug placement, 660m of tubing can be left in the hole allowing the abandonment of the open hole in one attempt.
The utilization of the tubing release tool system in well abandonment operations has proved to lower the risks and operational costs through the reduction of necessary cementing operations. With the sacrificial tubing being left in the cement, there is less risk of plug contamination which occurs as a result of pulling out of the plug. It also allows for longer plugs to be set in a single operation as opposed to stacking several cement plugs to get the required length, saving additional time.

It has been used successfully on five deepwater wells in East Africa to set long abandonment plugs in open holes ranging from 700m to 1800m MD. On the final well, a plug length of 1787m was noted as the 2nd longest plug ever to be set worldwide using this tool. The main objective of the disconnect system is to shorten the time taken to perform a well abandonment program as well as reducing the associated risks, thereby saving rig time and money. \(\text{(Figure 2)}\)

\textbf{Figure 2} Multiple permeable zones can be isolated by setting one long plug that would otherwise be too risky or impossible to set.
Conclusions

Using the Hydraulic Tubing Release Tool (HTRT) system in well abandonment operations saves operators valuable rig time and money by reducing the number of cement plugs and time “waiting on cement” (to harden) for plug verification. It has been shown to increase the success rate of plug cementing operations by reducing the risk associated with the placement of multiple stacked plugs. (Figure 3)

![Average Time (Hours) Spent on Setting and Verifying Abandonment Plugs](image)

**Figure 3** Individual plug setting and verification time is significantly reduced using the HTRT system. Online time savings of over 15 days achieved over the 7-wellbore P&A campaign

Acknowledgements

David Schimdt – BG Tanzania Operations Engineer

Paul Foster – BG Tanzania Drilling Superintendent

Mark Hesketh – BG Tanzania Head of Wells Engineering