VersaFlex® System Successfully Runs to Depth Without Internal Fluids in a Shallow Extended-Reach Well

FIRST-EVER ‘FLOATED-IN’ LINER INSTALLATION IN COMPLEX WELLBORE SAVES OPERATOR TIME AND MONEY

WILLISTON BASIN, NORTH DAKOTA

OVERVIEW

Petro Harvester was seeking to complete a well with a true vertical depth of 5,800 feet (1,768 meters) and a total depth of 16,000 feet (4,877 meters) in the Williston Basin. The shallow nature of the well reduces the available force to push the completion string to setting depth. This, along with build sections in the well and typical doglegs that occur while drilling, made it challenging to be able to deploy the liner to setting depth and complete the well. After thorough pre-job planning and analysis, it was decided that the best option for this completion would be to run the liner and workstring to depth without initially filling the entire system (known as “floating in”). By not filling the liner, the pipe becomes buoyant and does not drag on the open formation as much as when the liner is initially filled. This reduction in friction allows the liner to have enough available weight to reach the target depth. Had the liner been filled, the friction would have significantly increased, and the completion would have been 1,000 feet (305 meters) short from the target depth. This installation marks the first floated-in liner application where the VersaFlex® expandable liner hanger (ELH) system was used without Buoyancy-Assisted Casing Equipment (BACE™) assemblies, which would normally isolate a section of the liner from being filled. Instead, the entire system was allowed to be run in dry, without any fluids.

CHALLENGE

In the Williston Basin, Petro Harvester had a unique wellbore geometry with a shallow extended-reach horizontal section, leading to difficulties getting the production liner to depth due to increased friction.

SOLUTION

In an attempt to reduce friction while running in hole, the VersaFlex® expandable liner hanger system was used to run the entire workstring and liner to depth without initially filling the workstring and liner.

RESULTS

The first-ever floated-in application of the VersaFlex system was successfully run to depth without initially filling the workstring and liner in a shallow extended-reach horizontal completion.  
» Once on depth, the workstring and liner were filled, and normal cementing and liner hanger setting procedures were completed without incident.  
» Operator saved over four hours of rig time, valued at more than USD 200,000.
CHALLENGES
For the first time, the operator was faced with an upward-sloped horizontal well with complex geometry, and it had never run a completion liner to depth without filling. The operator’s main focus was to deploy the completion string to bottom in the shallow section of the wellbore. Other challenges arose when deciding how to float in the completion string, which included ensuring that the rig would have enough available weight to move the string. Challenges included determining how to fill the completion string once on bottom and still maintain well control, and how to ensure that no tools would be damaged while filling the string.

SOLUTIONS
Halliburton recommended that the operator add heavy drill collars to its available pipe on location in order to have more weight to push the completion string to bottom. A J-slot modified VersaFlex Adjustable Pressure Breech Lock running tool was run to set the VersaFlex system due to its ability to handle the stresses that floating in puts on the liner hanger running tool. To address the issue of filling once the tool string was on bottom, Halliburton recommended that the air be circulated to the rig’s gas buster unit instead of forcing it down and into the annulus, which can potentially cause a well control issue. Initial filling of the string with brine was gradual. Once the string was filled, the well was circulated and conditioned without issues.

RESULTS
This was the first case of a VersaFlex system being used in a shallow extended-reach horizontal completion in the Williston Basin, and the system’s first-ever floated-in installation that was run to depth without filling. Even with a complex wellbore geometry, the VersaFlex system allowed the operator to easily and efficiently push the completion string to bottom. The system enabled the entire liner to be floated in to bottom without any additional equipment needed. Once on depth, the workstring and liner were filled, and normal cementing and liner hanger setting procedures were successfully completed. With this flawless operation, at least four hours of rig time were saved, eliminating potential costs of more than USD 200,000. Halliburton recently completed the fourth installation by using all of the same tools and procedures. This method of floated-in liner installation has now become the standard for Petro Harvester.