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North Caspian Extended-Reach Wells Completed Without Washpipe, Cutting 2 Days and USD 2 Million per Well

Design of new ResFlow CV check-valve ICD eliminates need for washpipe to displace oil-base mud

CHALLENGE

Run stand-alone screens in extended-reach wells without washpipe or coiled tubing for oil-base mud displacement and cleanup operations.

SOLUTION

Use ResFlow CV* check-valve ICD to allow cleanup and displacement of oil-base mud without the use of washpipe.

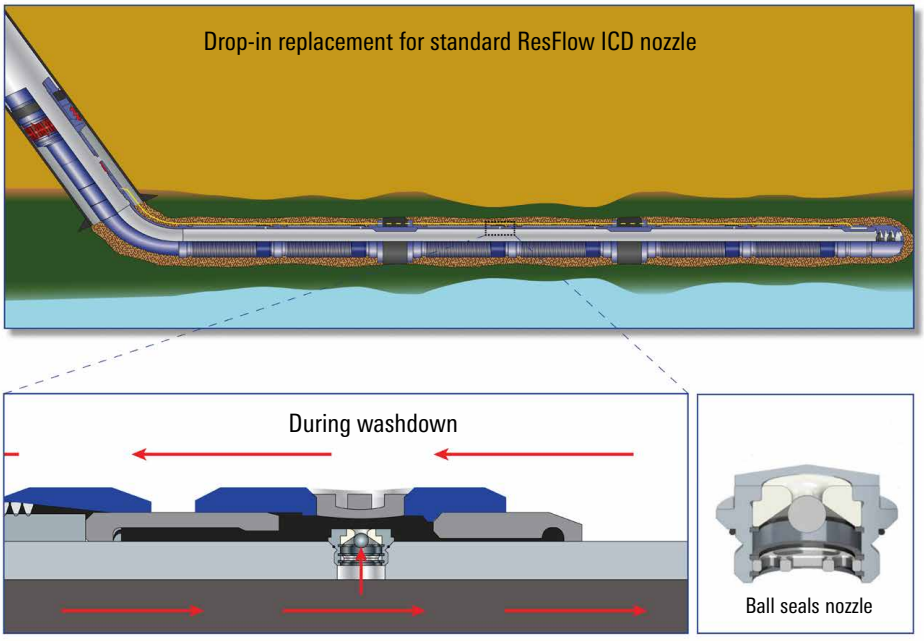
RESULTS

Completed five wells successfully without washpipe by using ResFlow CV ICDs, saving 2 days and USD 2 million per well.

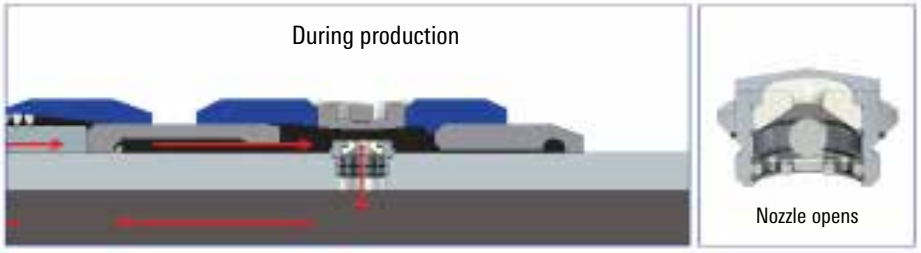
Use of washpipe not feasible in extended-reach wells requiring sand control

An operator was developing an oil field with openhole extended-reach wells that had measured depths up to 5 mi [8 km] and a total vertical depth of approximately 0.93 mi [1.5 km]. A sandstone formation with a large gas cap necessitated sand screens with inflow control devices (ICDs) to minimize early gas breakthrough. Rotating screens were selected as the primary completion installation technique in this extended-reach environment, where openhole sections reached up to 3.1 mi [5 km]. To reduce torque friction and address shale instability, oil-base mud (OBM) was used during drilling and running in hole.

In the first six extended-reach wells, the OBM was left in the open hole until the upper completion was run and was then partially recovered during well lifting and production. Solids in the mixture of freshwater, crude oil, OBM, and brine had damaged the pumps and other surface facilities and required



When fluid was being pumped downhole, fluid pressure caused the ball to seal the ResFlow CV check-valve ICD assembly, preventing fluid loss through the nozzle. The ball and seat dissolved before production started, opening the valve to flow.



When the aluminum ball was dissolved using an acid-base treatment, hydrocarbons flowed from outside the annulus through the screen filter into the ICD housing and then into the basepipe through the nozzle.

them to be refurbished after every well startup. And the incomplete cleanup had prevented the toe intervals from producing efficiently. As a result, the operator decided that the OBM should be displaced before the wells were lifted.

Various options to displace the OBM were evaluated. Running washpipe with screens with concentric string rotation was not feasible and would have increased the weight of the completion string, increasing drag. In wells as long as the ones planned, the heavy washpipe would have tested the tensile limits of the service tool and made it difficult to run the screens to total depth. Coiled tubing was not available, and running washpipe along the openhole section in a separate trip would have added too much time to the project. The operator asked Schlumberger to find an alternative method to displace the OBM.

ResFlow CV check-valve ICD eliminates need for washpipe

Schlumberger recommended the new ResFlow CV check-valve ICD, which does not require washpipe. This ICD, which includes a ceramic nozzle, a ceramic or dissolvable aluminum ball, and an aluminum plate, prevents fluid loss through the nozzles during washdown and then controls the flow of hydrocarbons during production like a standard ResFlow* inflow control device.

The ICDs were run in hole. The pressure of the fluid being pumped down the completion string caused the ball to flow onto the check-valve assembly, preventing the fluid from leaking into the annulus through the nozzle. After the fluid traveled the length of the completion string to the toe of the well and then back up the annulus, the ball and plate dissolved with the standard acid-base breaker system used for well cleanup. At that point the ResFlow CV ICD worked like a standard ResFlow ICD nozzle, helping balance inflow along the wellbore.

Operation trims 2 days, saving up to USD 2 million per well

The five wells were successfully completed, with no Schlumberger-related NPT. Eliminating deployment of the washpipe saved the operator 2 days and approximately USD 2 million per well.

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