Erosion Testing of Conventional Gas Lift Check Valves for Unconventional Applications

Authors

Michael Romer - ExxonMobil Upstream Integrated Solutions

Tom Murray - ExxonMobil Technology and Engineering

Justin Lapointe - XTO Energy

Abstract:

Onshore tight oil production has led to a renaissance for conventional gas lift equipment. After years of customer and supplier focus on side pocket mandrels and their associated flow control devices, tubing-deployed conventional mandrels and valves are back in style. But are yesterday's conventional gas lift check valves up to today's unconventional production and operational demands?

API 19GLHB Gas Lift Handbook well unloading guidelines were designed to limit the maximum rate of clean fluids through downhole valves to less than 1 bbl/min. Hydraulically fractured wells receive > 2500 lb proppant / lateral ft—equivalent to > 13 million lb/mile…and modern laterals are often greater than 2 miles long! Would anyone guarantee that the fluids left in a well prior to unloading are completely free of pesky, ultra-light, 100-mesh proppant? If the remaining fluids aren't "clean", then what might happen during unloading?

The authors started an erosion testing program after a rash of conventional 1" gas lift check valve solids-related failures in the Permian. Multiple suppliers were invited to subject their check valves (and upgrades) to 400 bbl of water with 1% sand at up to 1 bbl/min injection. Disappearing darts, broken springs, eroded housings, scored seal pads, and general metal loss ensued. Failure modes often duplicated field experience.

This presentation will discuss the testing background, goals, facility setup, procedures, aftermath, and learnings. Common failure modes will be shared, along with 1" versus 1.5" and single versus dual check performance comparisons. Could any conventional check valves maintain functionality after this relatively realistic abuse?