Not just for drilling! Implementing MPD to prevent and control mud-losses during post drilling operations like Reaming, logging, cementing long-string tubing, a case study of 2 wells

Author Block: M J Ud-Din, Weatherford; A A Alzahrani, Saudi Aramco.

Abstract
Managed Pressure Drilling (MPD) helps operators excel in efficiently navigating through narrow pore pressure-fracture pressure windows avoiding any induced losses due to extra overbalance with conventional mud. The case study highlights how these challenges were mitigated during drilling as well as post drilling operations including Reaming/Cleanout Trip, logging & Cementing Casing with the implementation of a fully automated MPD system, saving thousands of barrels of mud losses.

Case study well -1 describes a corrective approach where major losses circulation was rescued by timely displacement of well to a lighter mud precisely using MPD technology while maintaining well control, following a modified displacement table. Cured losses, restoring full circulation with no background gases after full cycle & resumed operations, hence saving expensive oil based mud-losses costs, despite of several challenges including extended lateral and high background gas percentages.

Case study well-2 describes a preventive approach where the objective of MPD was to manage the equivalent circulating density (ECD) through narrow window by adjusting the mud density, mud pump rate, MPD surface backpressure or a combination of these parameters during post drilling operations like reaming, logging and cementing. The target bottom-hole pressure was adjusted almost instantly and precisely by adjusting the surface pressure at the MPD choke, thus greatly reducing the time to stabilize well conditions in case of any well control or if downhole losses are encountered. MPD enabled reaming operations with max pump-rates, hence better hole cleaning without the hazard of downhole mud losses.

Recently, the MPD Constant Bottom Hole Pressure (CBHP) technique was successfully implemented by one of the biggest operators to drill and complete gas wells through an unconventional field. After reaching total depth by drilling using MPD technique successfully, it was decided to perform logging operations conventionally with the kill mud. But after going deeper while logging, partial losses were encountered. To rescue the situation, decision was made to switch to MPD mode, regaining full circulation.

The narrow drilling window was exacerbated by the increased in annulus frictional losses, in particular for the post-drilling operations like reaming which required a high pumprates, hence high ECD and casing cementing operation for these long horizontal wells which again lead to high ECD. So, leveraging the extensive experience in MPD, the CBHP technique was
extended to the reaming and casing cementing operation, maintaining the downhole cementing ECDs within the prescribed limits. This paper highlights the pre-planning, on-site planning, execution and post-operations phases of the Managed Pressure Cementing (MPC) operation, which allowed the operator to perform a successful reaming trip and cement job utilizing the MPD-CBHP technique, for the first time in the field.

Lost circulation is a concern during not only drilling phase. If post drilling operations like cementation are performed with full circulation utilizing MPD technology, this adds to a better casing cement integrity. By proper planning most induced lost circulation can be prevented with MPD technology.