

Formation Pressure Data Acquisition in Mud Loss Prone Zones: Case Studies from Mumbai High Field, India

Abstract

Mumbai High, a giant offshore oilfield of India located in the Arabian Sea, about 160 km West-North-West of Mumbai City, is the largest oil producing asset in India for the past 30 years. The field is a highly heterogeneous, multi-layered carbonate reservoir and is in declining stage of its producing life. Pressure maintenance by water injection is uneven in the reservoir due to lateral and vertical heterogeneity. Problems being faced are differential depletion of sub-layers associated with mud losses during drilling of infill wells. Most of the wells now being drilled are either highly deviated or horizontal laterals in order to maximize the borehole exposure to reservoir.

In order to monitor the effectiveness of the water injection pressure maintenance in reservoir, formation testers are extensively used in this field. But present well geometric configuration like horizontal wells combined with unpredicted mud losses presents the greatest challenge to acquiring formation pressure data. Also, use of pipe conveyed WFT (Wireline Formation Tester) data acquisition devices for such wells have added extra burden on the operator's budgets both in terms of time and the associated rig costs. The introduction of LWD technology based Formation Pressure While Drilling (FPWD) tool in Mumbai High since May 2008 has helped to obtain meaningful formation pressure data in highly deviated and horizontal wells under tough drilling conditions and even in the wells prone to severe mud losses. The increased success of pressure data acquisition has helped not only to map the depletion across various reservoir layers, but also to optimize completion design in the wells.

This paper brings up a few case studies where good quality formation pressure data was successfully obtained while drilling the horizontal section of the well. One of the case studies illustrates the importance of formation pressure data acquisition while drilling in the well where generally no WFT data could have been recorded due to complete losses encountered in the well.