TECHNOLOGY ENABLED COILED TUBING CLEANOUT IN LOW FORMATION PRESSURE WELLS

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ABSTRACT

Probability of success for coiled tubing (CT) cleanout operations in high deviation, thru tubing wellbores for Chevron in Kalimantan, Indonesia, was low. This technical and operational challenge was compounded when faced with large casing and low bottomhole pressure.

Direct circulation using the gas lift system produced returns in batches. Reverse cleanout using fluid resulted in a stuck pipe incident, and direct foam circulation was both expensive and complicated when coupled with offshore logistical challenges. All of these techniques were considered inappropriate.

After developing and evaluating alternatives, an innovative cleanout method was proposed. Using the available gas lift in conjunction with a CT deployed, real-time monitoring system, the focus shifted from surface monitoring to real-time downhole measurement. This enabled optimum decision-making during the execution phase of the cleanout.

Two cleanout operations were performed utilizing real-time downhole measurements coupled with an innovative high efficiency fluid and jetting assembly. Both well configurations involved cleaning out 9 5/8-in casing though a 3 1/2-in production string at depths in excess of 8,000 feet and deviations of 60 and 90 degrees respectively.

Utilizing fiber-optic acquired data enabled an optimum cleanout of fill across the low pressured reservoir. Losses were minimized, (while maintaining fill removal to surface), by maintaining the bottomhole pressure at balanced condition while regulating surface choke and gas lift injection rates. Additionally, access to real-time, fiber-optic transmitted CCL data enabled accurate target depth correlation, minimizing multiple tags runs.

All job objectives were met within the scope of the campaign while the proven success has opened numerous additional candidates.

This paper will investigate and discuss in detail the challenges, alternatives, and proven solution to cleaning out low formation pressure wells.

INTRODUCTION

West Seno Field was initially drilled in 2003 and 2004 and is located in offshore Kalimantan. It is a deepwater development (with water depth of 3,300 ft) which utilizes a tension leg platform (TLP) and floating production unit. Figure 1 is a photograph of the West Seno platform and Production unit. The initial development consisted of 28 wells drilled on a single TLP. The deepwater nature of the development coupled with remote location has dictated that any intervention or remedial work in the field must be performed in a cost effective manner. This eliminates the use of workover rigs, and also requires that marine support is kept to a minimum. In addition, operational efficiency is of the utmost importance in order to reduce time on site and operating cost.

Sand production has been identified as a problem that regularly occurs in the West Seno operation. This problem was not initially expected during project planning and was not addressed in the initial completion designs. Several wells were experiencing continuous sand production; this has resulted in these wells becoming non-productive, once sand fill covered the productive interval. In order to remediate the sand-producing zones and return the wells to production, the sand must be cleaned from the wellbore. This proved to be quite a challenging undertaking.

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