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Fifty Ways to Leave Your Wellbore: An Honest Look at the Causes and Costs of Unplanned Sidetracks



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Abstract

Unplanned sidetracks are low-frequency high-cost events that have meaningful negative impact on the economics of oil field development. While it is clearly desirable to reduce the frequency and severity of unplanned sidetracks, without a robust baseline for event frequency it can be difficult to estimate the value and efficacy of actions taken to mitigate sidetrack risk. For high volume drilling operations, there exists enough data to establish a meaningful baseline. This study aims to quantify the costs of unplanned sidetrack operations to drilling in North America by estimating the frequency of sidetracks, the reason the sidetrack was needed, typical amount of lost footage and time due to the sidetrack being required. With estimates of these values available a better cost-model for sidetracks maybe developed with which sidetrack mitigating technologies and techniques may be better evaluated for return on investment.

A comprehensive set of approximately 6,500 North American wells drilled in a two-year timespan (2019-2020) by a variety of operators, drilling contractors, and directional service providers was analyzed for frequency of sidetrack operations. In each case where a sidetrack was performed, a review was conducted to determine whether the sidetrack was planned, and whether a reason for sidetrack was recorded. Lost footage and time were estimated from survey records the original holes and the sidetrack wellbores. Cases where there was an intervening well drilled before attempting a sidetrack were excluded from lost time analysis. Also reviewed were case where multiple sidetracks were ultimately required for successful drilling of each wellbore, and whether an initial sidetrack increases or decreases the risk additional sidetracks being required.

There were over 450 wells that required at least one sidetrack. Most of these sidetracks were unplanned and fell into one of four major categories: Equipment lost in hole, directional drilling error, unplanned geology, and hole quality problems. These four categories accounted for nearly 95% of all unplanned sidetracks. The average footage lost due when sidetracking was 2750ft. The average lost time was greater than two days. For wells that have already performed an unplanned sidetrack, it was found that with each additional sidetrack in a well the risk of requiring an additional sidetrack increases further. This suggests that there is even more value in preventing the first sidetrack than there may first appear.

By establishing baseline rates of unplanned sidetracks for several common causes an expected cost to operations can be estimated prior to embarking on a development campaign. In the future, by demonstrating improved results over these baseline values, new technologies and drilling practices can better estimate the value provided to a drilling operation by mitigate rare adverse events.

