ABSTRAK

EVALUASI *PROBLEM PIPE STICKING* DAN EFEKTIVITAS PENANGGULANGANNYA PADA TRAJEKTORI 12-1/4" PEMBORAN SUMUR "M-09" LAPANGAN MUTIARA

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Permasalahan *pipe sticking* merupakan gangguan umum dalam operasi pemboran karena menyebabkan peningkatan NPT, biaya, dan risiko kehilangan peralatan. Kejadian *pipe sticking* pada trajektori 12-1/4" pemboran Sumur "M-09" di Lapangan Mutiara menjadi dasar penelitian ini untuk mengetahui penyebab teknis terjadinya *hole packed off* serta menilai efektivitas penanggulangannya. Tujuan penelitian adalah mengevaluasi faktor pemicu, kinerja metode penanganan, dan merumuskan rekomendasi pencegahan.

Penelitian dilakukan dengan metode studi kasus berbasis data sekunder berupa laporan *Root Cause Analysis* (RCA), *Daily Operation Report* (DOR), data *mud logging,* serta dokumentasi operasi *jarring, Free Point Indicator*, dan *back-off.* Analisis difokuskan pada parameter pemboran, kondisi *hole cleaning*, desain BHA, serta respons operasional untuk menilai hubungan penyebab dan efektivitas tindakan penanggulangan.

Hasil penelitian menunjukkan bahwa *pipe sticking* disebabkan oleh kombinasi *hole cleaning* yang tidak efektif, kondisi *underbalanced* akibat *mud weight* 8.4 ppg, serta desain BHA yang mempersempit *annulus*. Operasi *jarring* yang dilakukan lebih dari 1.000 kali tidak efektif dan menyebabkan *mud losses*, sementara pipa baru berhasil dilepas setelah dilakukan *Free Point Indicator* dan *back-off.* Kesimpulannya, penanggulangan di lapangan belum optimal karena keterlambatan keputusan dan tidak adanya sistem deteksi dini. Rekomendasi mencakup penerapan *stuck pipe decision tree*, peningkatan *monitoring real-time,* dan perbaikan desain operasi pemboran.

Kata Kunci : *Bottom Hole Assembly*, Efektivitas Penanggulangan*, Hole Cleaning, Pipe Sticking, Underbalanced Drilling.*

ABSTRACT

EVALUATION OF PIPE STICKING ISSUES AND MITIGATION EFFECTIVENESS IN THE 12-1/4" DRILLING TRAJECTORY OF WELL "M-09" AT THE MUTIARA FIELD

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Pipe sticking is a common operational disturbance in drilling activities because it increases non-productive time (NPT), costs, and the risk of losing downhole equipment. The pipe sticking incident that occurs during the drilling of Well "M-09" in the Mutiara Field becomes the basis of this research to identify the technical causes of hole pack-off and to evaluate the effectiveness of the mitigation actions. The objective of this study is to evaluate the triggering factors, assess the performance of the applied mitigation methods, and formulate prevention recommendations.

This research uses a case study approach based on secondary data, including Root Cause Analysis (RCA) reports, Daily Operation Reports (DOR), mud logging data, and documentation of mitigation operations such as jarring, Free Point Indicator, and back-off. The analysis focuses on drilling parameters, hole cleaning conditions, Bottom Hole Assembly (BHA) design, and operational responses in order to determine the causal relationships and evaluate the effectiveness of the mitigation actions taken.

The results show that pipe sticking is caused by a combination of ineffective hole cleaning, underbalanced drilling due to the use of 8.4 ppg mud weight, and a BHA design that reduces annular clearance. The jarring operation, performed more than 1,000 times, is ineffective and leads to mud losses, while the pipe is successfully released only after Free Point Indicator and back-off operations are conducted. The study concludes that the mitigation actions in the field are not optimal due to delayed decision-making and the absence of an early detection system. The recommendations include the implementation of a stuck pipe decision tree, enhancement of real-time monitoring, and improvements in drilling operational design.

Keyword: *Bottom Hole Assembly, Hole Cleaning, Mitigation Effectiveness, Pipe Sticking, Underbalanced Drilling*