

ABSTRAK

ANALISIS LUMPUR *POLYAMINE* UNTUK MENJAGA STABILITAS LUBANG BOR YANG MENEMBUS LITOLOGI *SHALE* PADA PEMBORAN SUMUR F-99 LAPANGAN FA

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Operasi pemboran Sumur F-99 Lapangan FA mengalami *problem* penyempitan lubang bor ketika dilakukan pembesaran lubang bor 17-1/2” di interval kedalaman 1916 – 1938 m yang menembus *Top* Gebang Sand pada Formasi Baong dengan litologi yang didominasi oleh *shale* dengan sisipan batupasir, *siltstone*, dan karbonat yang terindikasi *swelling*. Oleh karena itu, perlu dilakukan analisis lebih lanjut mengenai kereaktifan formasi *shale* terhadap lumpur pemboran.

Metode analisis tersebut menggunakan Analisis *X-Ray Diffraction* (XRD) dan Analisis *Methylene Blue Test* (MBT) yang kemudian dapat diketahui kandungan mineraloginya. Selain itu, dari hasil Analisis *Bulk Oriented X-Ray Diffraction* (XRD) juga dapat diketahui sifat dari batuan tersebut berdasarkan perhitungan *Brittleness Index* (BI). Berdasarkan analisis tersebut, selanjutnya diformulasikan beberapa sampel lumpur yang sesuai untuk menangani *wellbore instability* yang selanjutnya dilakukan Analisis *Swelling Test* menggunakan metode *Clay Oriented X-Ray Diffraction* (XRD) dan Analisis *Hot Rolled Dispersion Test* untuk mengetahui keefektifannya dalam mengontrol hidrasi dan dispersi.

Berdasarkan pengujian sampel *cutting* Sumur F-99 dapat diketahui bahwa penyempitan lubang bor yang terjadi bukan disebabkan oleh *swelling* dan jenis lumpur yang tepat untuk menangani dispersi yaitu *polymer freshwater mud* dengan formulasi 5% KCl 2% *Polyamine* PHPA yang mampu secara efektif mengurangi dispersi sebagai upaya pencegahan ketidakstabilan lubang bor pada pemboran selanjutnya. Tingginya nilai *Brittleness Index* menandakan formasi ini mudah runtuh dan rentan terhadap *wellbore instability*.

Kata kunci: *Shale*, XRD, MBT, *Polyamine Mud*, *Wellbore Instability*.

ABSTRACT

ANALYSIS OF POLYAMINE MUD FOR MAINTAINING WELLBORE STABILITY THROUGH SHALE LITHOLOGY DURING THE DRILLING OF WELL F-99, FA FIELD

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The drilling operations of Well F-99 in the FA Field encountered wellbore instability during the enlargement of the 17-1/2" hole section within the 1916 – 1938 m depth interval, which penetrates the Top Gebang Sand of the Baong Formation. This formation is predominantly composed of shale interbedded with sandstone, siltstone, and carbonate showing an indication of swelling. Therefore, an analysis of shale reactivity towards drilling fluid is necessary.

The analysis method employed X-Ray Diffraction (XRD) Analysis and Methylene Blue Test (MBT) Analysis to determine the mineralogical content. Furthermore, the Bulk Oriented X-Ray Diffraction (XRD) results was conducted to characterize the rock properties based on the calculation of the Brittleness Index (BI). Based on these analyses, several drilling fluid formulations were formulated to mitigate wellbore instability, which were subsequently tested using Clay Oriented X-Ray Diffraction (XRD) Swelling Tests and Hot Rolled Dispersion Tests were conducted to evaluate their effectiveness in controlling hydration and dispersion.

Based on cutting sample tests from Well F-99, it was identified that the wellbore instability was not caused by swelling and the most suitable mud type to mitigate dispersion is a polymer freshwater mud formulated with 5% KCl 2% Polyamine PHPA, which effectively reduces dispersion as a preventive measure against wellbore instability in subsequent drilling operations. The high Brittleness Index indicates that the formation is prone to collapse and highly susceptible to wellbore instability.

Keywords: Shale, XRD, MBT, Polyamine Mud, Wellbore Instability